Appendix A

Federal and State Agency Correspondence

Enclosure 1 **State and Federal Agency Comments**

Enclosure 2 **Mutual Agreement**

Enclosure 3 **State and Federal Permits**

Enclosure 4 **Annual Review Tracking Form**

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Enclosure 1. State and Federal Agency Comments

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COMMONWEALTH of VIRGINIA

L. Preston Bryant, Jr.
Secretary of Natural Resources

Department of Game and Inland Fisheries

G. Michael Bise
Acting Director

December 20, 2007

Taura Huxley
Code EV52TH
Natural Resources Specialist
NAVFAC Atlantic
6506 Hampton Boulevard
Norfolk, VA 23508

RE: Naval Facilities
Integrated Natural Resources Management Plan
Yorktown, Northwest Annex, Oceana Fentress, Dam Neck
Camp Pendleton
ESSLog#s 19076, 20545, 19789, 19789; respectively

Dear Ms. Huxley:

We have reviewed the Integrated Natural Resources Management Plans (INRMP) for the following Naval Facilities: Yorktown, Northwest Annex, Oceana Fentress, Dam Neck Camp Pendleton. We offer the following comments regarding the INRMPs. The Department of Game and Inland Fisheries (VDGIF), as the Commonwealth's wildlife and freshwater fish management agency, exercises enforcement and regulatory jurisdiction over those resources, inclusive of state or federally endangered or threatened species, but excluding listed insects. We are a consulting agency under the U. S. Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), and we provide environmental analysis of projects or permit applications coordinated through the Virginia Department of Environmental Quality, the Virginia Marine Resources Commission, the Virginia Department of Transportation, the U. S. Army Corps of Engineers, the Federal Energy Regulatory Commission, and other state or federal agencies. Our role in these procedures is to determine likely impacts upon fish and wildlife resources and habitats, and to recommend appropriate measures to avoid, reduce, or compensate for those impacts.

Yorktown

Pg 1-9; 1.7 Partnerships - We recommend expanding on the definition of the partnership between the Navy and the VDGIF. VDGIF provides input and recommendations regarding wildlife and fisheries management as well as the management and protection of rare, threatened and endangered species.

Pg 2-21; 2 6 1 Mammals. Throughout the INRMP, whitetail deer are referred to as "White-tailed deer", which is incorrect. We recommend updating the spelling for this animal throughout the entire document.

Pg 2-22; 2.6.2 Herpetofauna. We recommend making the changes to the text as suggested in the revised paragraph below. Please note that the southern toad is not known from York County and has been removed from the text.

A variety of reptiles and amphibians is known to inhabit the area. The most common snakes include the northern watersnake (*Nerodia sipedon*), eastern (=black) rat snake (*Elaphe alleganiensis*), black racer (*Coluber constrictor*), and rough green snake (*Opheodrys aestivus*). The copperhead (*Agkistrodon contortix*) is the only species of venomous snake known to occur on the Station, though eastern cottonmouth (*Agkistrodon piscivorus piscivorus*) and state-listed timber (canebrake) rattlesnake [(*Crotalus horridus*) Coastal Plain population] have known populations in York County. Common turtles include the eastern snapping turtle (*Chelydra serpentina serpentina*), northern red-bellied cooter (*Pseudemys rubriventris*), eastern mud turtle (*Kinosternon subrubrum subrubrum*), and eastern box turtle (*Terrapene carolina carolina*). Lizards found on the Station include the ground skink (*Scincella lateralis*) and the five-lined skink (*Pleistiodon* (=*Eumeces*) *fasciatus*). Of the amphibians that inhabit the area, frogs and toads comprise the largest group. Common frogs and toads found on the Station include the northern green frog (*Lithobates* (=*Rana*) *clamitans melanota*), southern leopard frog (*Lithobates* (=*Rana*) *sphenocephala utricularia*), spring peeper (*Pseudacris crucifer*), green treefrog (*Hyla cinerea*), southeastern chorus frog (*Pseudacris feriarum)* and American toad (*Anaxyrus* (=*Bufo*) *americanus*). Salamanders include spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), red-spotted newt (*Notophthalmus viridescens*), and the state-listed Mabee's salamander (*Ambystoma mabeei*).

Pg 2-22; 2.6.3 Fish. We recommend adding some text to this section that describes the anadromous fish resources known to occur at the installation and which are described below

> CAX – The York River has been designated a Confirmed Anadromous Fish Use Area. In addition, Queen Creek, King Creek, and Jones Millpond Creek have been designated Potential Anadromous Fish Use Areas. These resources are particularly valuable fisheries resources that should be protected to the greatest extent possible.
>
> WPNSTA – The York River and Indian Field Creek have been designated Confirmed Anadromous Fish Use Areas. Felgates Creek, Black Swamp and its tributaries, and King Creek have been designated Potential Anadromous Fish Use Areas. These resources are particularly valuable fisheries resources that should be protected to the greatest extent possible.

Pg 2-23; 2.6.4 Birds. The common names do not need capitalization unless part of the name is a proper noun.

Pg 2-23; 2.7 Rare, Threatened and Endangered Species and Significant Natural Communities. Throughout the document, including table 2-4, the bald eagle is referred to as federally listed. This species has been de-listed at a federal level, but continues to retain state Threatened status. We recommend updating the document to reflect the change in federal status.

Pg 3-30; 3.5.6 Water Quality and Wetlands Protection. We recommend that at least 100-foot naturally vegetated buffers be maintained on all streams and wetlands on site. In those waters that have been designated anadromous fish use areas, we recommend that all instream work adhere to a time of year restriction from February 15 through June 30 of any year. We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, we prefer stream crossings to be constructed via clear-span bridges. However, if this is not possible, we recommend countersinking any culverts below the streambed at least 6 inches, or the use of bottomless culverts, to allow passage of aquatic organisms. We also recommend the installation of floodplain culverts to carry bankfull discharges.

Pg 3-32; 3.6.1 Game Species. We recommend that waterfowl hunting be allowed at the installations. We recommend updating the deer herd and population section with updated data from VDGIF. It has come to our attention that this installation has not met the Deer Management Objectives. We recommend evaluation of this and an increase in the number of hunter hours/days at the installation.

Pg 3-64; 3.11.2 Nuisance Species – Beaver. VDGIF discourages trapping and relocating of beavers because it is unlawful, not because habitats that support beaver already have them. Beaver can lawfully be killed in the event they are damaging crops or property. We recommend clarification in this section.

Pg 3-64; 3.11.2 Nuisance Species – Groundhog (Woodchuck). It is unlawful to trap and relocate this species, or any species of wildlife. As they are defined as a nuisance species, they may lawfully be killed at any time of year. We recommend clarification in this section.

Northwest Annex

Pg 2-15; 2.5.1 Mammals. Throughout the INRMP, whitetail deer are referred to as "White-tailed deer", which is incorrect. We recommend updating the spelling for this animal throughout the entire document.

Pg 2-17; 2.5.3 Birds. The common names do not need capitalization unless part of the name is a proper noun.

Pg 2-18; 2.6 Rare, Threatened and Endangered Species. Timber and canebrake rattlesnakes are listed as occurring on the base. These species are one in the same. However, VDGIF recognizes the Coastal Plain population (canebrake) as a unique geographic variation of the timber rattlesnake. The canebrake rattlesnake should be referred to as: **timber (canebrake) rattlesnake [(*Crotalus horridus*) Coastal Plain population].** This information needs to be updated in the document text as well as in Table 2-5. To further protect this species, we recommend that the mowing of any areas adjacent to forested wetlands be performed only during the winter months (hibernation periods for the species) to avoid striking them with mowers. Other areas should be mowed frequently enough (weekly) so that the grass does not obscure the location of canebrake rattlesnakes which make them more vulnerable to strikes. We further recommend that all mowing contractors be appropriately trained in the identification and status of this species. This could be accomplished via an appropriate information sheet distributed to those working on the project (see attached). Information also can be found on our website, http://www.dgif.virginia.gov/wildlife/species/display.asp?id=030013. If a canebrake rattlesnake is observed, please report this observation to the Base Environmental Manager and avoid harming the animal.

Pg 2-19; 2.6 Rare, Threatened and Endangered Species. We recommend re-writing the paragraph regarding jurisdictional authorities to clearly state that VDGIF is responsible for the protection and management of all of the Commonwealth's wildlife species, including Threatened or Endangered species, excluding listed insects.

Pg 3-4; 3.3 Wetlands and Water Quality Protection. We recommend that at least 100-foot naturally vegetated buffers be maintained on all streams and wetlands on site. We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, we prefer stream crossings to be constructed via clear-span bridges. However, if this is not possible, we recommend countersinking any culverts below the streambed at least 6 inches, or the use of bottomless culverts, to allow passage of aquatic organisms. We also recommend the installation of floodplain culverts to carry bankfull discharges.

Oceana Fentress
None of the maps were included with the version of the document we were provided to review. We recommend making sure these are available to all reviewers of the document.

Pg 27; 2.5 Mammals. Throughout the INRMP, whitetail deer are referred to as "White-tailed deer", which is incorrect. We recommend updating the spelling for this animal throughout the entire document.

Pg 27; 2.5 Reptiles and Amphibians. We recommend making the changes to the text as suggested in the revised paragraph below.

A variety of reptiles and amphibians is known to inhabit the area. The most common snakes include the northern watersnake (*Nerodia sipedon*), eastern (=black) rat snake (*Elaphe alleganiensis*), black racer (*Coluber constrictor*), and rough green snake (*Opheodrys aestivus*). The copperhead (*Agkistrodon contortix*) is the only species of venomous snake known to occur on the Station, though eastern cottonmouth (*Agkistrodon piscivorus piscivorus*) and state-listed timber (canebrake) rattlesnake [(*Crotalus horridus*) Coastal Plain population] have known populations in York County. Common turtles include the eastern snapping turtle (*Chelydra serpentina serpentina*), northern red-bellied cooter (*Pseudemys rubriventris*), eastern mud turtle (*Kinosternon subrubrum subrubrum*), and eastern box turtle (*Terrapene carolina carolina*). Lizards found on the Station include the ground skink (*Scincella lateralis*) and the five-lined skink (*Pleistiodon (=Eumeces) fasciatus*). Of the amphibians that inhabit the area, frogs and toads comprise the largest group. Common frogs and toads found on the Station include the northern green frog (*Lithobates (=Rana) clamitans melanota*), southern leopard frog (*Lithobates (=Rana) sphenocephala utricularia*), spring peeper (*Pseudacris crucifer*), green treefrog (*Hyla cinerea*), southeastern chorus frog (*Pseudacris feriarum)*, southern toad (*Anaxyrus (=Bufo) terrestris*), and American toad (*Anaxyrus (=Bufo) americanus*). Salamanders include spotted salamander (*Ambystoma maculatum*), marbled salamander (*Ambystoma opacum*), red-spotted newt (*Notophthalmus viridescens*), and the state-listed Mabee's salamander (*Ambystoma mabeei*).

Pg 30; Rare, Threatened and Endangered Species. We recommend rewriting a section in the first paragraph that says "state-recommended-endangered species, the canebrake rattlesnake" to read "state Endangered species, the canebrake rattlesnake".

Pg 39; 3.3 Wetlands/Water Quality Protection. We recommend that at least 100-foot naturally vegetated buffers be maintained on all streams and wetlands on site. We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, we prefer stream crossings to be constructed via clear-span bridges. However, if this is not possible, we recommend countersinking any culverts below the streambed at least 6 inches, or the use of bottomless culverts, to allow passage of aquatic organisms. We also recommend the installation of floodplain culverts to carry bankfull discharges.

Pg 82; 3.10 Habitat Conservation. We recommended including language in this section that states that coordination with VDGIF regarding the protection and management of wildlife including threatened or endangered species, exclusive of listed insects, and their habitats is

performed. We also recommend including reference to VDGIF's online wildlife database, the Virginia Fish and Wildlife Information Service (VAFWIS).

Dam Neck Camp Pendleton

Pg 1-10; 1.6 Partnerships. We recommend including in the pertinent paragraph that VDGIF also provides guidance regarding the management and protection of Threatened or Endangered wildlife, exclusive of listed insects.

Pg 2-19; 2.5.2 Mammals. Throughout the INRMP, whitetail deer are referred to as "White-tailed deer", which is incorrect. We recommend updating the spelling for this animal throughout the entire document.

Pg 2-20; 2.6 Rare, Threatened and Endangered Species and Significant Ecological Communities. The bald eagle has been de-listed federally. It continues to be listed state Threatened. We recommend updating the status of this species throughout the document.

Pg 3-2; 3.2 Wetlands and Water Quality Protection. We recommend that at least 100-foot naturally vegetated buffers be maintained on all streams and wetlands on site. We recommend conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50% of the streamflow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures. Due to future maintenance costs associated with culverts, and the loss of riparian and aquatic habitat, we prefer stream crossings to be constructed via clear-span bridges. However, if this is not possible, we recommend countersinking any culverts below the streambed at least 6 inches, or the use of bottomless culverts, to allow passage of aquatic organisms. We also recommend the installation of floodplain culverts to carry bankfull discharges.

Pg 3.36; 3.12.1 Nuisance Wildlife. It is unlawful to trap and relocate wildlife. Any species defined as a nuisance species may lawfully be killed at any time of year. We recommend clarification in this section.

Pg 3-37; Miscellaneous Vertebrates. We recommend clarification on this section. As stated above, the relocation of wildlife is unlawful.

Pg 3-38; 3.12.3 Invasive Species. We recommend adding red-eared slider (*Trachemys scripta elegans*) to the current list of invasive species. We further recommend that a removal plan for this species be developed and reviewed by VDGIF.

Thank you for the opportunity to comment on the INRMPs. We are willing to assist the Navy, when possible, in implementing the actions identified in this plan. Please contact our Region 1 Wildlife, Fisheries, and Wildlife Diversity biologists at 804-829-6580 if we can be of further assistance in this regard. Please contact Amy Ewing at 804-367-2211 with any questions regarding this environmental review.

Sincerely,

Amy Ewing
For

Raymond T. Fernald, Manager
Nongame and Environmental Programs

CC: Ellie Irons, VDEQ

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Enclosure 2. Mutual Agreement

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Enclosure 3. State and Federal Permits

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OFFICIAL WILDLIFE KILL PERMIT

Virginia Department of Game and Inland Fisheries
Ver.2019.3

CASE # GFK20010514

Damage Control Assistance Program (DCAP) Tags Requested: Kill Permit Only
(Authorized in counties with no full antlerless deer season)

To Whom It May Concern
Permission is hereby grant to:

AUSTIN, TAYLOR SCOTT	**taylor.s.austin@navy.mil**
Name (landowner, lessee or airport)	E-Mail

1321 NORTHWEST BLVD	**CHESAPEAKE**	**VA**	**23322**
Address	City	State	Zip

Telephone number(s)

and those persons named below: (State law prohibits persons convicted of wildlife violations from being designated as a shooter or carrying out the authorized activity for the landowner/lessee).

CO authorized kill permit team and/or Navy personnel identified by installation NRM.

To Kill:	**25** (Quantity)	Species: **DEER**	**5** (Quantity)	Species: **BEAR**	**0** (Quantity)	Species: **ELK**
Additional Species:	**Squirrel Rabbit**		*Airport Species:*	**Turkey; Oppussum; Hog; Bobcat; Beaver; Bear; Muskrat; Coyote; and Nutria.**		

damaging the property of **US Navy** in **550 - Chesapeake City** (County or City)

for the period from **1/1/2020** to **12/31/2020**

Time Restrictions: **None**

Damage control is limited to the location described below or on the attachment. No one except those listed on this permit may assist or be present during the damage control activities. Additionally, the landowner/lessee acknowledges that all damage control operations will comply with local firearm ordinances. This permit authorizes the killing of wild animals pursuant to Section 29.1-516, and 29.1-529 of the Code of Virginia. Unless otherwise authorized on this permit, deer killed on this permit must be antlerless. Permit must be carried and available for inspection during damage control activities.

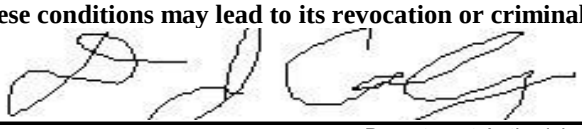
Has the landowner/leasee been issued a kill permit previously on the requested parcel(s) of land? **Yes**

Has the parcel been hunted in the previous hunting season for deer or bear? **Yes**

How does the landowner/lessee plan to dispose of the carcass(es) - *Required within 24 hours after killing a deer or bear*

How Disposed:	**Burial** **Charitable Organization** **Personal Use**	*Describe if Other:*	

Upon request and receipt the landowner/lessee agrees to the conditions of this permit and understands that failure to comply with these conditions may lead to its revocation or criminal prosecution.



Department Authorizing Agent

1/24/2020
Date

1. Area type:	**Agricultural**	*Description of control area:*
2. Total acres in property/parcel:	**3400**	US Navy base Northwest Annex, Chesapeake, Va.
3, Total acres of crop/orchard:	**750**	
4. Total number of animals killed under this permit:	**0**	May kill or trap as required. Approved for deer, bear, turkey, squirrel, rabbit, fox, coyote, bobcat, beaver, muskrat, nutria, opossum, hog as needed.
5. Total number of Deer under this permit *(complete applicable):*		
Antlered Bucks: 0 / **Button Bucks: 0** / **Does: 0**		
6. Total number of Bear under this permit:	**0**	
7. Total number of Elk under this permit:	**0**	
List Damage Type and Any Additional Comments		
Disease, Contamination, Predation. May kill or trap as required. Approved for deer, bear, turkey, squirrel, rabbit, fox, coyote, bobcat, beaver, muskrat, nutria, opossum, hog as needed.		

§ 29.1-529. Killing of deer, elk or bear damaging fruit trees, crops, livestock, or personal property; wildlife creating a hazard to aircraft or motor vehicles.

A. Whenever deer, elk or bear are damaging fruit trees, crops, livestock or personal property utilized for commercial agricultural production in the Commonwealth, the owner or lessee of the lands on which such damage is done shall immediately report the damage to the Director or his designee for investigation. If after investigation the Director or his designee finds that deer or bear are responsible for the damage, he shall authorize in writing the owner, lessee or any other person designated by the Director or his designee to kill such deer or bear when they are found upon the land upon which the damages occurred. However, the Director or his designee shall have the option of authorizing nonlethal control measures rather than authorizing the killing of elk or bear, provided that such measures occur within a reasonable period of time; and whenever deer cause damage on parcels of land of five acres or less, except when such acreage is used for commercial agricultural production, the Director or his designee shall have discretion as to whether to issue a written authorization to kill the deer. The Director or his designee may limit such authorization by specifying in writing the number of animals to be killed and duration for which the authorization is effective and may in proximity to residential areas and under other appropriate circumstances limit or prohibit the authorization between 11:00 p.m. and one-half hour before sunrise of the following day. The Director or his designees issuing these authorizations shall specify in writing that only antlerless deer shall be killed, unless the Director or his designee determines that there is clear and convincing evidence that the damage was done by deer with antlers. Any owner or lessee of land who has been issued a written authorization shall not be issued an authorization in subsequent years unless he can demonstrate to the satisfaction of the Director or his designee that during the period following the prior authorization, the owner or his designee has hunted bear or deer on the land for which he received a previous authorization.

B. Subject to the provisions of subsection A, the Director or his designee may issue a written authorization to kill deer causing damage to residential plants, whether ornamental, noncommercial agricultural, or other types of residential plants. The Director may charge a fee not to exceed actual costs. The holder of this written authorization shall be subject to local ordinances, including those regulating the discharge of firearms.

C. Whenever wildlife is creating a hazard to the operation of any aircraft or to the facilities connected with the operation of aircraft, the person or persons responsible for the safe operation of the aircraft or facilities shall report such fact to the Director or his designee for investigation. If after investigation the Director or his designee finds that wildlife is creating a hazard, he shall authorize such person or persons or their representatives to kill wildlife when the wildlife is found to be creating such a hazard. As used in this subsection, the term "wildlife" shall not include any federally protected species.

D. Whenever deer are creating a hazard to the operation of motor vehicle traffic within the corporate limits of any city or town, the operator of a motor vehicle or chief law-enforcement officer of the city or town may report such fact to the Director or his designee for investigation. If after investigation the Director or his designee finds that deer are creating a hazard within such city or town, he may authorize responsible persons, or their representatives, to kill the deer when they are found to be creating such a hazard.

E. Whenever deer are damaging property in a locality in which deer herd population reduction has been recommended in the current Deer Management Plan adopted by the Board, the owner or lessee of the lands on which such damage is being done may report such damage to the Director or his designee for investigation. If after investigation the Director or his designee finds that deer are responsible for the damage, he may authorize in writing the owner, lessee or any other person designated by the Director or his designee to kill such deer when they are found upon the land upon which the damages occurred. The Director or his designee also may limit such authorization by specifying in writing the number of animals to be killed and the period of time for which the authorization is effective. The requirement in subsection A of this section, that an owner or lessee of land demonstrate that during the period following the prior authorization deer or bear have been hunted on his land, shall not apply to any locality that conducts a deer population control program authorized by the Department.

F. The Director or his designee may revoke or refuse to reissue any authorization granted under this section when it has been shown by a preponderance of the evidence that an abuse of the authorization has occurred. Such evidence may include a complaint filed by any person with the Department alleging that an abuse of the written authorization has occurred. Any person aggrieved by the issuance, denial or revocation of a written authorization can appeal the decision to the Department of Game and Inland Fisheries. Any person convicted of violating any provision of the hunting and trapping laws and regulations shall be entitled to receive written authorization to kill deer or bear. However, such person shall not (i) be designated as a shooter nor (ii) carry out the authorized activity for a person who has received such written authorization for a period of at least two years and up to five years following his most recent conviction for violating any provision of the hunting and trapping laws and regulations. In determining the appropriate length of this restriction, the Director shall take into account the nature and severity of the most recent violation and of any past violations of the hunting and trapping laws and regulations by the applicant. No person shall be designated as a shooter under this section during a period when such person's hunting license or privileges to hunt have been suspended or revoked.

G. The Director or his designee may authorize, subject to the provisions of this section, the killing of deer over bait within the political boundaries of any city or town, or any county with a special late antlerless season, in the Commonwealth when requested by a certified letter from the governing body of such locality.

H. The parts of any deer or bear killed pursuant to this section or wildlife killed pursuant to subsection C shall not be used for the purposes of taxidermy, mounts, or any public display unless authorized by the Director or his designee. However, the meat of any such animal may be used for human consumption. The carcass and any unused meat of any such animal shall be disposed of within 24 hours of being killed. Any person who violates any provision of this subsection is guilty of a Class 3 misdemeanor.

I. It is unlawful to willfully and intentionally impede any person who is engaged in the lawful killing of a bear or deer pursuant to written authorization issued under this section. Any person convicted of a violation of this subsection is guilty of a Class 3 misdemeanor.

Commonwealth of Virginia
Department of Game and Inland Fisheries
VIRGINIA CONSERVATION POLICE
7870 Villa Park Drive, P.O. Box 90778, Henrico, VA 23226-0778

Kill Permit Reporting Guidelines

Ver. 2019.4

Virginia Kill Permit Recipients:

This letter is in reference to the required reporting of wildlife killed under your permit. Failure to report your required kill information may result in the denial of future or subsequent kill permits under §29.1-529 (F).

Within 30 days of the expiration of your permit, please report the following information:

GENERAL INFORMATION	
Case Number on permit	
Landowner/Lessee/Airport listed on permit	
Reporter's Name	
Reporter's Phone	
Reporter's Email	

HARVEST INFORMATION	TOTAL NUMBER
Total number of animals killed	
Elk	
Bears	
Antlered Bucks	
Button Bucks	
Does	

Reporting Options:

- Visit https://www.dgif.virginia.gov/killpermit and submit information using the form on website

OR

- Direct mail this page with the tables above completed to:

Virginia Department of Game and Inland Fisheries
1132 Thomas Jefferson Rd
Forest, VA 24551
Attention: Deer Management Program

We appreciate your cooperation in this matter and look forward to continuing to serve you.

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Enclosure 4. Annual Review Tracking Form

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INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Naval Support Activity Hampton Roads Northwest Annex

INRMP Review

Date of Annual Review/Update	Name and Title of Reviewer(s)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

DATE	SECTION/PAGE	COMMENT	REVIEWER

DATE	SECTION/PAGE	COMMENT	REVIEWER

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Appendix B

National Environmental Policy Act and Coastal Consistency Documentation

Enclosure 1 **Environmental Checklists and Work Permits**

Enclosure 2 **Documentation of Public Review**

Enclosure 3 **Coastal Consistency Determination**

Enclosure 4 **Finding of No Significant Impacts (FONSI)**

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Enclosure 1 Environmental Checklists and Work Permits

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DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION MID-ATLANTIC
1510 GILBERT ST.
NORFOLK, VA 23511-2737

IN REPLY REFER TO
COMNAVREGMIDLANTINST 11011.12B
N4
SEP 2 2 2017

COMNAVREG MIDLANT INSTRUCTION 11011.12B

From: Commander, Navy Region Mid-Atlantic

Subj: OBTAINING WORK PERMITS

Ref: (a) OPNAVINST 11010.20H CH-1
(b) SECNAV M-5210.1 of Jan 2012
(c) OPNAVINST 5215.17A

Encl: (1) Work Permit

1. Purpose

a. Provide guidance for the preparation and processing of work permits for all new construction, repair, maintenance, and alteration of Commander, Navy Region Mid-Atlantic (COMNAVREG MIDLANT) controlled Class I or II property not administered by Naval Facilities Engineering Command, Mid-Atlantic (NAVFAC MIDLANT). This process will help ensure that all project work will be completed in compliance with applicable laws and regulations, within a reasonable time period and cost, and at the level of quality commensurate with the requirement and NAVFAC criteria.

b. Alteration, demolition, construction, installation, maintenance, and repair or replacement to base structures and grounds requires a system to ensure that all concerned parties understand and approve changes per applicable laws, regulations, and standard building practices prior to beginning work. A work permit procedure will minimize the need for costly deficiency correction resulting from non-approved alterations, demolition, construction, installations, repairs, maintenance, or replacements.

c. The following procedures apply to activities constructing new facilities or changing an existing facility footprint on COMNAVREG MIDLANT held Class I property or performing any work on COMNAVREG MIDLANT held Class II property that disturbs the real property asset or its components, including alteration, demolition, construction, installation, maintenance, repair or replacement of any part of the building. Examples include, but are not limited to, the following: door alterations; modifications to building structures and grounds; moving/penetrating walls; altering fire/emergency systems; new additions to buildings; electrical installations; hard-wired equipment installations/modifications; plumbing modifications/installations; installations of items on roofs; painting; carpeting removal/installation; furniture electrical connections; and moving electrical equipment. All non-NAVFAC activities initiating such work shall first obtain a work permit prior to work execution.

d. Definitions: Reference (a) defines the following terms:

(1) Class I Property. Land.

(2) Class II Property. Real property improvements to land such as buildings, structures, ground improvement structures, and utilities.

(3) Alteration. Work and materials required to adjust interior arrangements or other physical characteristics of an existing real property facility so it may be more effectively adapted to, or utilized for its designated purpose.

(4) Construction. Work and materials used to build a new facility or alter an existing facility.

(5) Installation. Work and materials to support incorporation of personal property in an other-than-new real property facility.

(6) Repair. Work and material used to renew or replace deteriorated components of a facility for continued utilization in existing designated purpose.

(7) Maintenance. Work and material used to maintain components of a facility for continued utilization in existing designated purpose.

(8) Substantial Work. Any work that increases the dimension of a facility or feature, adds or removes permanent interior or exterior walls, adds or removes electrical or plumbing fixtures, ties into existing utilities, removes shrubbery or trees, adds windows or interior/exterior access doors, creates additional emissions or waste/storm water, or requires excavation.

2. Cancellation. COMNAVREGMIDLANTINST 11011.12A.

3. Action

a. Requesting activity shall:

(1) Notify the installation Public Works Officer (PWO) that work is being planned that falls under the scope of this instruction. Typically, notification will occur via Maximo service request to be reviewed at a subsequent work induction board.

(2) Obtain concurrence from any additional approval authorities deemed necessary by the PWO. Construction documents that have been prepared by a Professional Engineer (PE) or Registered Architect (RA) may be required at the discretion of the PWO.

(3) Provide funding for all labor required to review the work permit requests (e.g. planning, design, etc.) as well as construction oversight.

(4) Display the work permit at the site, and for complying with all requirements and stipulations as set forth by the reviewers. Failure to comply with the work permitting process will require reimbursement for work or services to correct hazardous or unsafe conditions, improper installations, building system adjustment or corrections, and/or removal of improvement.

(5) Fund the project in its entirety, including unforeseen change orders that are discovered during the design or construction phases. For substantial renovation or repair, activity shall provide funds to NAVFAC for construction oversight.

(6) Provide as applicable: as-built drawings, DD1354, product certifications, environmental impact documentation, updated panel schedules, lists of equipment and warranted items, Operation and Maintenance Support Information (OMSI) manuals, maintenance requirements, and Maximo Computerized Maintenance Management System (CMMS) information to the designated Public Works Department (PWD) approval authority. As-built drawings shall be provided in Autocad native format and PDF format.

b. Work Permit Approval Authorities shall:

(1) Upon receipt of the plans and specifications of the project, review and determine if the proposed project can be accomplished safely, per applicable codes, and does not unduly impact other activities or facilities.

(2) Provide approval by signature on enclosure (1), or list the specific reason(s) for disapproval, making comments and alternative suggestions for acceptable solutions. If funded, provide quality assurance during the construction process to confirm that completed work complies with agreed upon requirements and stipulations.

4. Records Management. Records created as a result of this directive, regardless of media and format, shall be managed per SECNAV Manual 5210.1 of January 2012.

5. Review and Effective Date. Per OPNAVINST 5215.17A, CNRMA will review this instruction annually on the anniversary of its effective date to ensure applicability, currency, and consistency with Federal, DoD, SECNAV, and Navy policy and statutory authority using OPNAV 5215/40 review of instruction. This instruction will automatically expire 5 years after effective date unless reissued or canceled prior to the 5-year anniversary date, or an extension has been granted.

M. R. MOORE
Captain, U.S. Navy
Chief of Staff

Releasability and distribution: This instruction is cleared for public release and is available electronically only via CNIC G2 Portal/Organization/Mid-Atlantic Website, https://g2.cnic.navy.mil/CNRMA/Pages/Default.aspx

COMNAVREGMIDLANTINST 11011.12B
SEP 2 2 2017

CNRMA REGIONAL ENGINEER AUTHORIZED

WORK PERMIT

Permit required for any proposed modification to

NRMA Class I (grounds) and Class II (facilities) property.

Note: Work Permits are allotted a minimum of 24 hours turn around before final approval.

Location: _____

Description of work: _____

_____

_____

_____

Expected Project Duration: _____

Note: Requesting Activity is responsible for code compliance, construction safety, and funding for this project, including all change orders resulting from unforeseen conditions. If project is expected to extend more than **14 days** past Expected Project Duration, **the permit must be renewed.**

REQUESTOR CONTACT INFORMATION

Note: Requesting Activity is responsible for completing this Work Permit Request and submitting it to the Installation PWO for final approval. All routing to be performed by requestor.

Activity & Point of Contact (Print): _____

Point Of Contact Phone: (___) _____

POC E-MAIL(.mil only): _____

Enclosure (1)

Updates and correspondence will be transmitted via e-mails.

Printed name of Authorizing Official: _____

Signature of Authorizing Official: _____

_____ _____

(PWO or Deputy PWO) Date

Work Permit Instructions
Page 1: a) **Location:** Provide building number and command name. b) **Description:** Provide a brief description of work to be done. c) **Expected Project Duration:** Provide time frame in which project will be performed and completed. d) **Requestor contact information:** Provide information requested. e) **Signature of Authorizing Official:** MUST be signed by PWD personnel.
Page 2: a) **WORK PERMIT INSTRUCTION PAGE**
Page 3: a) **Description of Proposed Work:** Provide a detailed description of work to be done. Include/attach diagrams, square footage, design documents and specifications from a PROFESSIONAL ENGINEER/REGISTERED ARCHITECT, Home Depot, Lowes, etc. **Indicate Organization to Perform the Work:** Command name of the personnel who are performing and completing the project.
Page 4: a) **Requestor:** Name of project POC. b) **Command:** Name of requesting command. c) **Date:** Date of when permit was filled out. d) **Phone Number:** POC phone number.

e) **Stock Number:** An OFFICIAL National Stock Number (NSN) MUST be provided in order to receive **ANY** HAZMAT (Paint, Wood Stain, etc.)
f) **Material Description:** Nomenclature of item. If requesting paint, include color and type. For specialty items not commonly ordered, please attach detailed image/description of item.
g) **Unit of Issue:** ex. Each (EA), Pack (PK), Gallon (GAL), etc.
h) **Qty:** Quantity of each item being requested.
i) **Unit Cost:** Cost of individual unit (i.e. 1 sheet of ½" plywood costs $X)
j) **Total Cost:** Total cost of all units (i.e. 20 sheets of ½" plywood cost $$$XYZ)
k) **Grand Total:** Total cost of all materials requested.

Page 5:

a) **Regional Fire Inspection Review:** Will be determined by PWD if portion needs to be completed.
b) **Environmental Review:** Will be determined by PWD if portion needs to be completed.
c) **Regional Safety Review:** Will be determined by PWD if portion needs to be completed.
d) **Dig Permit Obtained:** Will be determined by PWD if portion needs to be completed.
e) **Site Approval Obtained:** Will be determined by PWD if portion needs to be completed.
f) **Design & Construction Review:** Will be determined by PWD if portion needs to be completed.
g) **Signature of FMS:** If FMS is assigned, MUST be signed by the requesting command's FMS.
h) **Other Notes/Comments:** Notes/Comments made by PWD or any Specialists.

Page 6:

a) **Activity Log:** For Self-Help use only.

Note: Detailed drawings and descriptions are required for project material/tool issuance.

Description of proposed work:

-(Sketches, job plans, or contractor proposals must be attached with this request.
-The Regional Engineer or designee must review and approve all construction, modifications, alterations, and installations prior to work execution.
-For Substantial Work, design documents and specifications from a Professional Engineer and/or Registered Architect may be required.
-The requesting Activity is responsible for funding such designs and NAVFAC design reviews.)

(Use this space to list proposed work and/or sketch out proposed design, etc.)

Indicate organization to perform the work. (Circle one)

PWD technician(s) Activity contract Self-Help

(NAVFAC MIDLANT may require that projects with moderate or greater safety or performance risk may require construction oversight by the Public Works Department. The requesting Activity must fund this construction oversight.)

BILL OF MATERIALS

REQUESTOR: _____ COMMAND: _____

DATE: _____ PHONE NUMBER: _____

Stock Number	Material Description	U/I	BM Qty	Unit Cost	Total Cost

Grand Total $: _____

Enclosure (1)

Required: Requesting Activity is responsible for obtaining all signatures below. The individual Program Manager will determine if a signature below is not applicable and will mark NR with a legible signature or stamp if the scope of work does not require indicated review or permit.

Note: Please print, sign and date to authenticate approval and expedite resource distribution.

☐ Rm # Regional Fire Inspection Review: _____

☐ Rm # Environmental Review: _____

☐ Rm # Regional Safety Review: _____

☐ Rm # Asbestos Program Manager Review: _____

☐ Rm # Dig Permit Obtained: _____

☐ Rm # Site Approval Obtained: _____

☐ Rm # Design & Construction review: _____

☐ Rm # Signature of FMS/AM: _____

☐ Other Notes/Comments

_____

_____

_____

ACTIVITY LOG
(SELF-HELP STAFF ONLY)

Date	Time	Action	Initials

Enclosure 2 Documentation of Public Review

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THE DAILY ADVANCE
215 S. Water Street
Elizabeth City, NC 27909
252.335.0841

CLIPPING OF LEGAL ADVERTISEMENT ATTACHED HERE

PUBLIC NOTICE

The Department of the Navy is seeking public comment on the Integrated Natural Resources Management Plan **(INRMP)** for Naval Security Activity Norfolk, Northwest Annex. Under the authority of the Sikes Act (16 USC Section 670a), the Department of Defense is required to prepare an INRMP for the conservation and rehabilitation of natural resources on military installations. A draft INRMP has been prepared for Naval Security Activity Norfolk, Northwest Annex, and is available for public review and comment at the Chesapeake Public Library, 298 Cedar Rd. Chesapeake, VA and the Currituck Co. Library, 4251 Caratoke Hwy, Barco, NC.

Written comments must be postmarked by 1 June 2005. Mail comments to Mr. Brian Hostetter, Regional Natural Resources Specialist, 1450 Gator Blvd. Norfolk, VA 23521.

5/5, 12, 19

NORTH CAROLINA
PASQUOTANK COUNTY

AFFIDAVIT OF PUBLICATION

Before the undersigned, a Notary Public of said County and State, duly commissioned, qualified and authorized by law to administer oaths, personally appeared

TIM HOBBS

who, being first duly sworn, deposes and says that he is

PUBLISHER
(Owner, partner, publisher, or other officer or employee authorized to make this affidavit)

of THE DAILY ADVANCE engaged in the publication of a newspaper known as THE DAILY ADVANCE, published, issued, and entered as second class mail in the City of Elizabeth City in said County and State; is authorized to make this affidavit and sworn statement; that the notice or other legal advertisement, true copy of which is attached hereto, was published in THE DAILY ADVANCE on the following dates:

May 05, 12, 19 2005

and that the said newspaper in which such notice, paper, document, or legal advertisement was published was, at the time of each and every such publication, a newspaper meeting all of the requirements and qualifications of Section 1-597 of the General Statutes of North Carolina and was a qualified newspaper within the meaning of Section 1-597 of the General Statutes of North Carolina.

(Signature of person making affidavit)

Sworn to and subscribed before me, this 31 day of May, 2005

Notary Public

My Commission expires 10-04-07

THE VIRGINIAN-PILOT
NORFOLK, VIRGINIA
AFFIDAVIT OF PUBLICATION

The Virginian-Pilot

GEO-MARINE, INC.
STE. C
11846 ROCK LANDING DR
NEWPORT NEWS VA 23606

REFERENCE: 39060831
13147206 PUBLIC NOTICE

State of Virginia
City of Norfolk

This day, D. Johnson personally appeared before me and after being duly sworn, made oath that:

1) She is affidavit clerk of The Virginian-Pilot, a newspaper published by Landmark Communications Inc., in the cities of Norfolk, Portsmouth, Chesapeake, Suffolk, and Virginia Beach, Commonwealth of Virginia and in the state of North Carolina 2)That the advertisement hereto annexed has been published in said newspaper on the date stated.

Public Notice
The Department of the Navy is seeking public comment on the Integrated Natural Resources Management Plan (INRMP) for Naval Security Activity Norfolk, Northwest Annex. Under the authority of the Sikes Act (16 USC Section 670a), the Department of Defense is required to prepare an INRMP for the conservation and rehabilitation of natural resources on military installations. A draft INRMP has been prepared for Naval Security Activity Norfolk, Northwest Annex, and is available for public review and comment at the Chesapeake Public Library, 298 Cedar Rd. Chesapeake, VA and the Currituck Co. Library, 4251 Caratoke Hwy, Barco, NC. Written comments must be post-marked by 1 June 2005. Mail comments to Mr. Brian Hostetter, Regional Natural Resources Specialist, 1450 Gator Blvd. Norfolk, VA 23521.
VP May 4, 5 & 6, 2005 13147206

PUBLISHED ON: 05/04 05/05 05/06

TOTAL COST: 365.28 AD SPACE: 32 LINE
FILED ON: 05/06/05

Legal Affiant: D. Johnson

Subscribed and sworn to before me in my city and state on the day and year aforesaid this 6th day of May.

Notary: [signature] My commission expires January 31, 2008

Enclosure 3 Coastal Consistency Determination

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DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION, MID-ATLANTIC
1510 GILBERT ST.
NORFOLK, VA 23511-2737

IN REPLY REFER TO:
5090
N453/22/5822
DEC 8 2005

Ms. Ellie Irons
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Room 631
Richmond, VA 23219

Dear Ms. Irons:

SUBJECT: FEDERAL COASTAL CONSISTENCY DETERMINATION FOR TIMBER HARVESTING AT NAVBAL SUPPORT ACTIVITY (NAVSUPPACT) NORFOLK, NORTHWEST ANNEX

NAVSUPPACT Norfolk, Northwest Annex proposes to harvest timber on approximately 293 acres to support the mission of the Relocatable Over-The-Horizon Radar (ROTHR) facility.

Enclosed is the Federal Coastal Consistency Determination (CCD) for the proposed Timber Harvest at NAVSUPPACT Norfolk, Northwest Annex, Chesapeake, Virginia. This Federal CCD is being submitted in accordance with Section 307(c)(1) of the Federal Coastal Zone Management Act of 1972 as amended.

The Department of the Navy has determined that the proposed action is not reasonably likely to affect a land use, water use, or natural resource of the Commonwealth of Virginia's coastal zone and is therefore consistent, to the maximum extent practicable, with the federally approved enforceable policies of the Virginia Coastal Resource Management Program.

The attached Federal CCD addresses the enforceable policies of the Commonwealth of Virginia's Coastal Resource Management Program. Other issues such as historic/cultural resources, natural resources, wildlife, etc. are addressed in an Environmental Assessment that will be forwarded to your office for review once it is completed.

To aid in your review, an electronic copy of the CCD is included. Our point of contact is Mr. Charles Wilson at (757) 462-8564, extension 389, or E-Mail charles.h.wilson1@navy.mil.

Sincerely,

Cheryl F. Barnett

CHERRYL F. BARNETT
Environmental Director
By direction of the Commander

Enclosure

FEDERAL COASTAL CONSISTENCY DETERMINATION
PROPOSED TIMBER HARVEST
NAVAL SUPPORT ACTIVITY, NORFOLK, NORTHWEST ANNEX

November 23, 2005

Proposed Federal Agency Action

The Navy proposes to harvest approximately 293 acres (118 hectares) of timber in the vicinity of the Relocatable Over-the-Horizon Radar (ROTHR) receiver located at Naval Support Activity (NAVSUPPACT) Norfolk, Northwest Annex. Enclosure (1), figures 1, 2, and 3 indicate the timber harvest site. The purpose of the proposed timber harvest is to restore the operational efficiency of the ROTHR. Trees and other vegetation in three locations within the ROTHR receiver antenna clearance angle zone are currently impeding the antenna's operational capability.

The ROTHR receiver antenna array requires a specific vertical clearance angle to the horizon to operate properly. Any obstruction within this line-of-sight to the horizon will impair the capability of the antenna to receive the high frequency energy radiated by the transmitter site and reflected by the targets, thus adversely impacting the ability of the system to function as designed. At the ROTHR receiver site, trees and other vegetation have increased in height since construction of the antenna and are now within the clearance angle zone. This is drastically impairing the operation of the system.

An Environmental Assessment (EA) is being prepared for this project. This Coastal Consistency Determination (CCD) will be included as an Appendix to the EA. The two viable alternatives addressed in the EA are to harvest the timber and allow it to regenerate naturally and by planting; or to harvest the timber and manage the land for multiple purposes emphasizing both wildlife and forestry objectives such as shrub/scrub vegetation, emergent wetlands, grasslands, and pine and hardwood forests.

Under the preferred alternative, the 293 acres of timber will be sold to the highest bidder and harvested using standard coastal plain logging equipment and methods. This alternative would require an approximate 6-month completion schedule.

Background

The Coastal Zone Management Act (CZMA), enacted in 1972, created the National Coastal Management Program for management and

control of the uses of and impacts on coastal zone resources. The program is implemented through federally approved state coastal management programs (CMPs).

Federal approval of a state CMP triggers the CZMA Section 307 federal consistency determination requirement. Section 307 mandates that federal actions within a state's coastal zone (or outside the coastal zone, if the action affects land or water uses or natural resources within the coastal zone) be consistent to the maximum extent practicable with the enforceable policies of the state CMP. Federal agency actions include direct and indirect federal agency activities, federally approval activities, and federal financial assistance activities. Accordingly, federal agency activities (direct, indirect, or cumulative) reasonably affecting the state's coastal zone must be fully consistent with the enforceable policies of the state's CMP, unless compliance is otherwise prohibited by law. There are no categorical exemptions or exclusions to or from the Section 307 federal consistency requirement.

The Commonwealth of Virginia has developed and implemented a federally approved Coastal Resources Management Program (CRMP). The nine enforceable policies of the Virginia CRMP address: fisheries; subaqueous lands; wetlands; primary sand dunes; point and non-point source pollution; shoreline sanitation; air pollution; and coastal lands management.

Program and Policy Analysis

Fisheries Management: The proposed timber harvest will not affect fish stocks, breeding, or spawning areas. The surface drainage in the proposed impact area flows into Mill Stream and an unnamed tributary of the Northwest River, both of which are channelized streams that have been straightened and deepened to expedite drainage. Implementation of the action will include the use of Forestry Best Management Practices (BMPs) for Water Quality in Virginia, a set of state-approved practices and methods designed to minimize the impacts of timber harvesting and other forest management activities on soil and water resources. Such practices would include minimizing the use of mechanized harvesting equipment near any drainage ditch or stream area and constructing temporary culverts or bridges at any stream or ditch crossing.

Subaqueous Lands Management: The proposed action will have no effect on subaqueous lands. There are no state-owned bottomlands within or adjacent to the proposed project

Wetlands Management: Timber harvesting will occur in three zones, as shown in Enclosure (1), figure 3. Of the three zones; Zone 1 contains no wetlands; Zone 2 contains palustrine forested, palustrine unconsolidated bottom, and palustrine scrub-shrub wetlands; and Zone 3 contains palustrine forested and palustrine unconsolidated bottom wetlands. A silvicultural exemption to Section 404 of the Clean Water Act allows normal and established silvicultural activities in wetlands as long as state BMPs are implemented. Virginia BMPs will be implemented during all timber harvesting associated with this project. Use of BMPs will minimize impacts to wetland areas during timber harvesting operations.

Dunes Management: The proposed action will not affect primary coastal sand dunes, as no such dunes exist on NAVSUPPACT Norfolk, Northwest Annex.

Point Source Pollution Control: The proposed action will not involve point source discharge of pollutants, and does not require a Virginia Pollutant Discharge Elimination System (VPDES) permit.

Non-Point Source Control: The proposed action will not involve dredging or filling of Virginia's navigable waters. Measures to minimize erosion and sedimentation during harvest operations will include BMPs such as avoiding harvesting equipment operation during times of high soil moisture, such as after significant rain events, and using non-mechanized harvest methods such as cabling-out of logs around water surfaces. Under the proposed alternatives discussed in the project EA, replacement of timber removed would occur through natural regeneration and manual planting of softwood and hardwood trees, or with natural regeneration and manual planting of both trees and alternative plant communities (such as shrub/scrub vegetation, herbaceous vegetation, and grasslands) targeted for specific wildlife species. Reestablishment of vegetation is expected to occur rapidly, and progress will be continuously evaluated. Due to the generally flat topography within the harvest area and the use of BMPs, minimal non-point source water pollution should occur.

Shoreline Sanitation Management: The proposed action will involve neither the demolition nor installation of septic tanks.

Air Pollution Control: The proposed action will result in standard emissions related to trucks and mechanized timber harvesting equipment that will be *de minimis*.

Coastal Lands Management: The proposed action will not adversely affect coastal lands subject to the Chesapeake Bay Preservation Act. The entire project lies within the Chowan River-Dismal Swamp watershed.

Conclusion

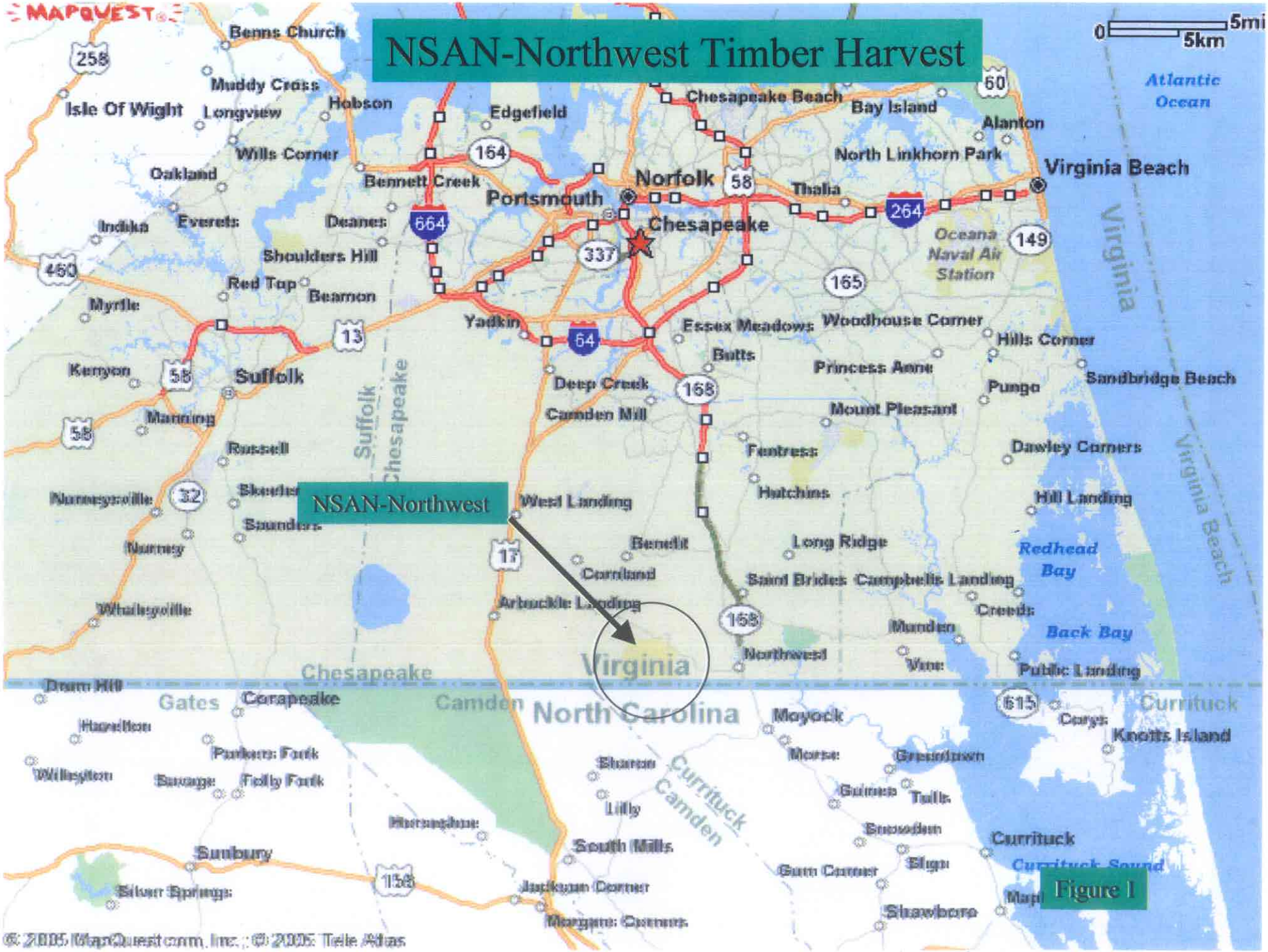
After careful consideration of the administrative record, we have determined that the proposed action will have minimal effect on a land use, water use, or natural resource of the Commonwealth of Virginia's coastal zone. The Navy's proposed action would be conducted in a manner that would be fully consistent or "consistent to the maximum extent practicable" with the applicable enforceable policies of the Coastal Resources Management Program. The project will not require permits under Section 10 of the River and Harbors Act, or Sections 401 and 404 of the Clean Water Act, and Commonwealth of Virginia law.

Cheryl F. Barnett
Signature

12/8/05
Date

CHERRYL F. BARNETT
Environmental Director

Enclosures (3)


NSAN-Northwest Timber Harvest
NSAN-Northwest
MAPQUEST
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Atlantic Ocean
Virginia Beach
Norfolk
Portsmouth
Chesapeake
Suffolk
Virginia
North Carolina
Chesapeake
Gates
Camden
Currituck
Currituck Sound
Redhead Bay
Back Bay
Oceana Naval Air Station
Benns Church
Muddy Cross
Isle Of Wight
Longview
Hobson
Edgefield
Chesapeake Beach
Bay Island
Alanton
North Linkhorn Park
Wills Corner
Oakland
Bennett Creek
Thalia
Indika
Everets
Deanes
Shoulders Hill
Red Top
Beamon
Myrtle
Yadkin
Essex Meadows
Woodhouse Corner
Hills Corner
Butts
Princess Anne
Sandbridge Beach
Kenyon
Deep Creek
Pungo
Camden Mill
Mount Pleasant
Manning
Russell
Fentress
Dawley Corners
Nuneysville
Skeeter
West Landing
Hutchins
Hill Landing
Saunders
Nurney
Benefit
Long Ridge
Cornland
Saint Brides
Campbells Landing
Whaleyville
Arbuckle Landing
Creeds
Munden
Northwest
Vine
Public Landing
Drum Hill
Corapeake
Moyock
Corys
Knotts Island
Hazelton
Parkers Fork
Morse
Greentown
Willeyton
Savage
Folly Fork
Sharon
Guinea
Tulls
Lilly
Horseshoe
Snowden
Currituck
South Mills
Sunbury
Gum Corner
Sligo
Silver Springs
Jackson Corner
Shawboro
Morgans Corners
258
164
664
337
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149
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64
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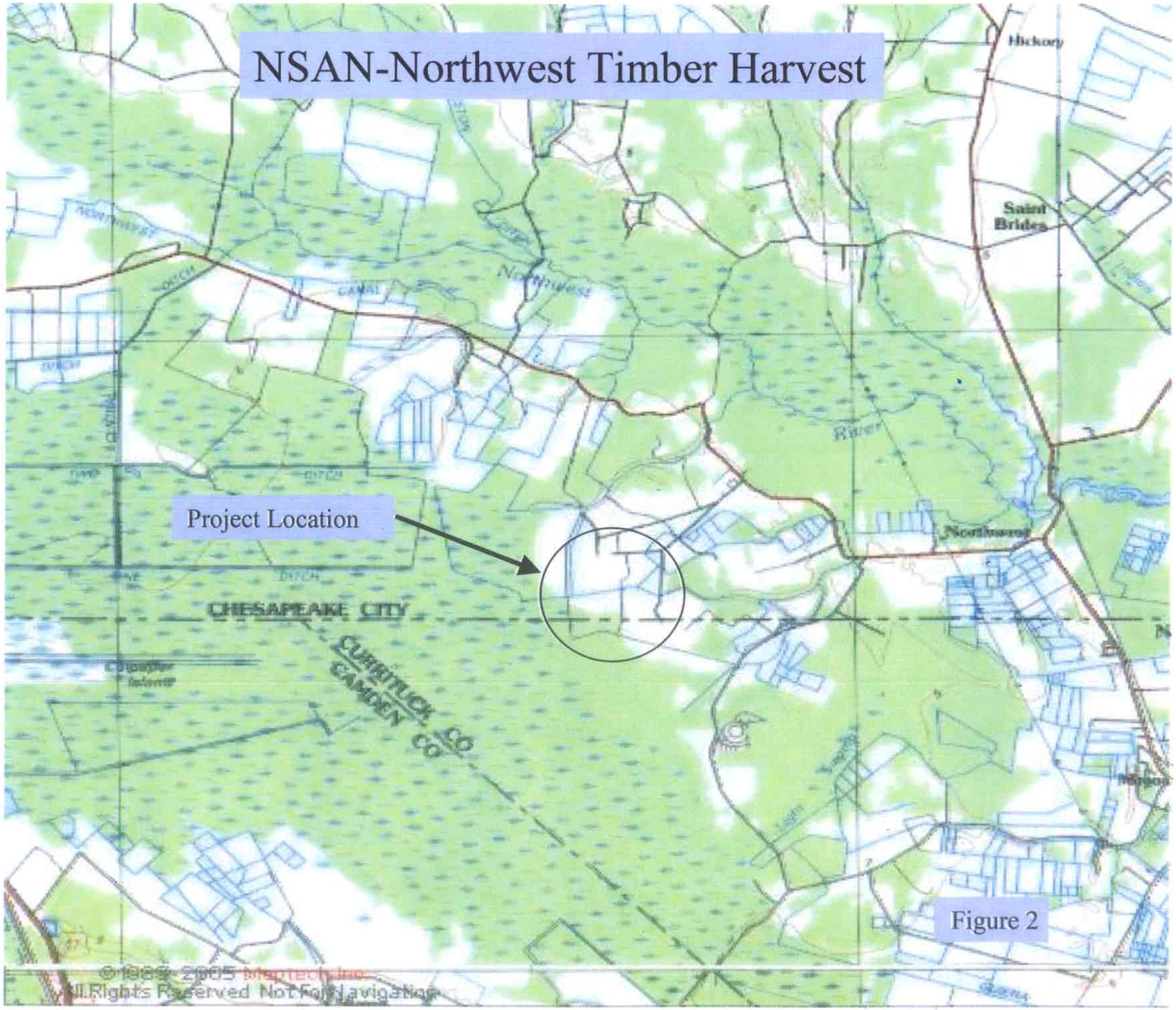
615
158
© 2005 MapQuest.com, Inc.; © 2005 Tele Atlas

Figure 1


NSAN-Northwest Timber Harvest
Project Location
CHESAPEAKE CITY
CURRITUCK CO
CAMDEN CO
Hickory
Saint Brides
Northwest
River
Northwest
Figure 2
©1989-2005 Maptech Inc.
All Rights Reserved Not For Navigation

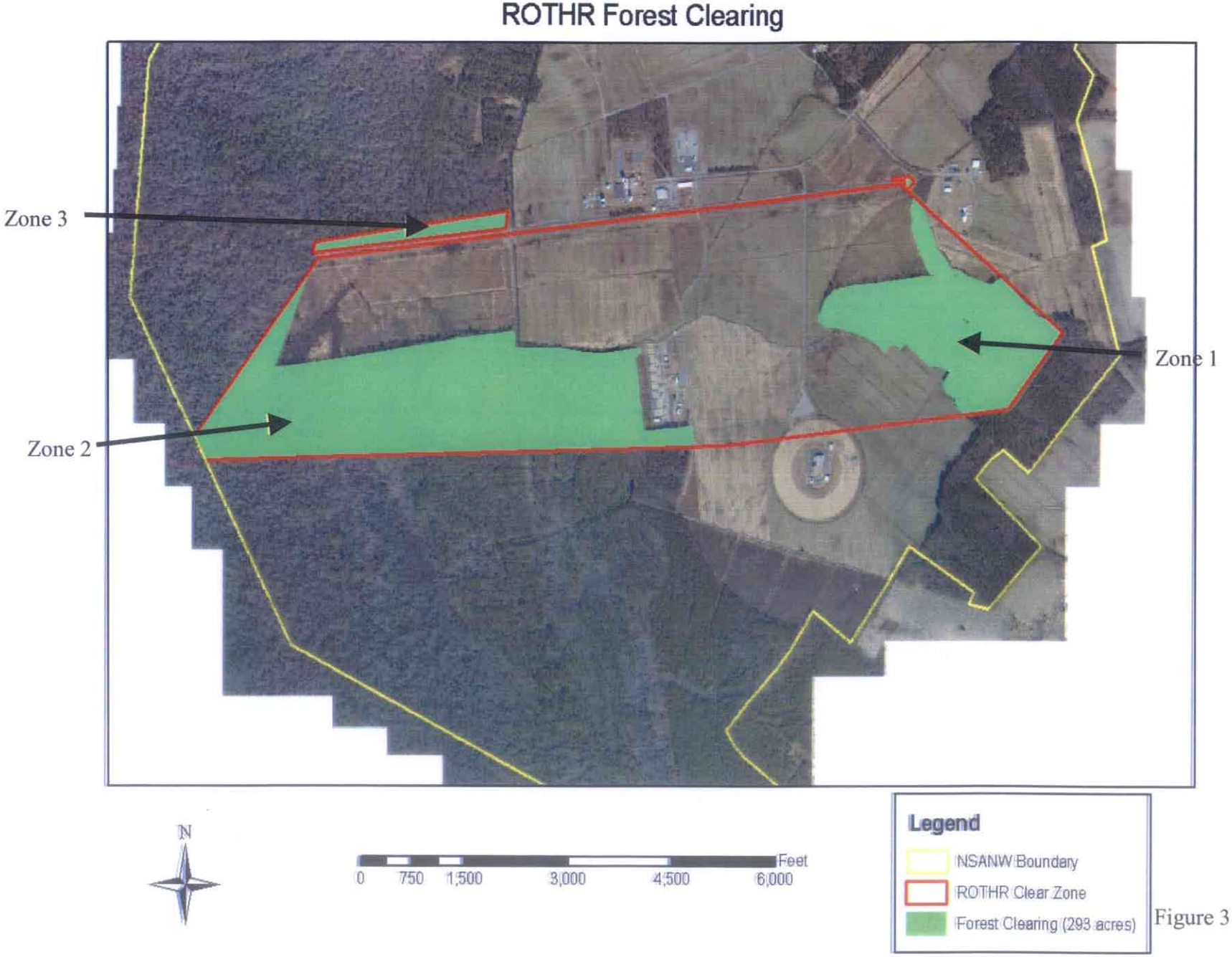

ROTHR Forest Clearing
Zone 3
Zone 2
Zone 1
N
0
750
1,500
3,000
4,500
6,000
Feet
Legend
NSANW Boundary
ROTHR Clear Zone
Forest Clearing (293 acres)

Figure 3

Appendix C

Commanding Officer Designations and Authorizations

Enclosure 1 **Designation Letter**

Enclosure 2 **Commanding Officer Environmental Policy**

Enclosure 3 **Commanding Officer Authorization to Carry and Utilize Firearms on the Installation**

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Enclosure 1. Designation Letter

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DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL SUPPORT ACTIVITY HAMPTON ROADS
7918 BLANDY ROAD SUITE 100
NORFOLK, VA 23551-2419

5090
Ser N00/861
14 Nov 18

From: Commanding Officer, Naval Support Activity Hampton Roads
To: Mr. Taylor S. Austin, CIV

Subj: APPOINTMENT AS NAVAL SUPPORT ACTIVITY HAMPTON ROADS INSTALLATION NATURAL RESOURCES MANAGER

Ref: (a) OPNAVINST 5090.1D Manual 5090.1

1. Reference (a) requires that Navy installations have a formally appointed Natural Resources Manager/Coordinator. By notice of this letter, you are appointed to this position for the Naval Support Activity Hampton Roads Headquarters Complex, Lafayette River Annex, Portsmouth Annex, and Northwest Annex properties.

2. Your responsibilities are:

a. Function as the primary point of contact for the installation's natural resource management program and serve as Natural Resource Management Liaison between public works, environmental, medical, supply, housing, tenant commands, and pest management program as needed.

b. Ensuring that the Commanding Officer (CO) is informed regarding: natural resources issues, conditions of natural resources objectives of the Integrated Natural Resources Management Plan (if applicable), and potential or actual conflicts between mission requirements and natural resources mandates.

c. Ensure that inherently governmental decisions made on behalf of the installation and CO are in compliance with the Sikes Act.

d. Function as the primary point of contact for acquiring and maintaining consistence with all natural resources permits.

3. This appointment is effective immediately and remains in effect unless revoked or until you are properly relieved.

J. P. KLINE

Copy to:
Linda Hicks

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION, MID-ATLANTIC
1510 GILBERT ST.
NORFOLK, VA 23511-2737

IN REPLY REFER TO:

From: Commander, Navy Region Mid-Atlantic
To: Emmett Carawan, Natural Resources Manager, NAVFAC MIDLANT
SUBJ: APPOINTMENT AS THE INSTALLATION INTEGRATED NATURAL RESOURCE COORDINATOR

Ref: (a) OPNAV Instruction 5090.1C, Chapter 24: Natural Resource Management Program

1. Reference (a) requires that Navy installations have a formally appointed Natural Resource Coordinator. By notice of this letter, you are appointed to this position for all Navy installations in Hampton Roads under your cognizance.

2. Your responsibilities are:
   a. Develop, coordinate, and ensure implementation of the installation Integrated Natural Resource Management Plan (INRMP), if applicable, and that it is reviewed and updated annually.
   b. Function as the primary point of contact for the installation's natural resource management program and serve as natural resource management liaison between public works, environmental, medical, supply, housing, tenant commands, and pest management program as needed.
   c. Ensuring that the CO is informed regarding: natural resources issues, conditions of natural resources, objectives of the INRMP (if applicable), and potential or actual conflicts between mission requirements and natural resources mandates.
   d. Ensuring that inherently governmental decisions made on behalf of the installation and CO with regards to Sikes Act compliance.
   e. Function as the primary point of contact for acquiring and maintaining consistency with all natural resources permits and the State Coastal Zone Program.

3. This appointment is effective immediately and remains in effect unless revoked or until you are properly relieved.

Sincerely,

W. DAVID NOBLE

W. DAVID NOBLE
By Direction
Commanding Officer

Copy to:
NAVFAC MIDLANT

Enclosure 2. Commanding Officer Environmental Policy

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DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL SUPPORT ACTIVITY, HAMPTON ROADS
7918 BLANDY ROAD, SUITE 100
NORFOLK, VIRGINIA 23551-2419

5090
Ser N00/193
10 Apr 15

From: Commanding Officer, Naval Support Activity, Hampton Roads

Subj: NAVAL SUPPORT ACTIVITY HAMPTON ROADS ENVIRONMENTAL POLICY

1. Naval Support Activity, Hampton Roads is committed to environmental compliance with Local, State and Federal environmental laws, regulations, and policies. We acknowledge that environmental stewardship is essential to the safe, healthful, and compliant execution of our mission and the preservation and protection of our land, air, and water.

2. We are committed to preventing pollution at its source whenever possible. To achieve our goals, we have adopted the following guidelines for our environmental management system:

a. Integrate sound practices into our operational decisions that could impact the environment.

b. Continually improve our environmental performance through the use of effective management and planning.

c. Ensure implementation of pollution prevention measures and waste minimization programs.

d. Develop attainable objectives and targets and implement sustainable practices to reduce environmental impacts.

e. Conduct regular Environmental Management System Audits to continually assess our progress toward our environmental goals.

f. Educate our personnel, tenants and contractors on their responsibilities to the environment.

g. Foster communication throughout Naval Support Activity, Hampton Roads on environmental commitments and performance.

h. Sustain our partnerships with Local, State, and Federal regulatory agencies and maintain continuous environmental compliance with existing and new regulations and guidelines.

J. D. FREEMAN

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Enclosure 3. Commanding Officer Authorization to Carry and Utilize Firearms on the Installation

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DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL SUPPORT ACTIVITY, HAMPTON ROADS
7918 BLANDY ROAD, SUITE 100
NORFOLK, VIRGINIA 23551-2419

5090
Ser N00/084
2 Mar 16

From: Commanding Officer, Naval Support Activity, Hampton Roads
To: Public Works Officer, Naval Support Activity, Hampton Roads

Subj: AUTHORIZATION TO CARRY FIREARMS IN PERFORMANCE OF OFFICIAL DUTIES

Ref: (a) COMNAVREGMIDLANTINST 11015.2
(b) OPNAVINST 5530.14E
(c) OPNAVINST 3591.1F

1. Per references (a) through (c), authorization is granted for Mr. Lawrence McGrogan (GS-9), Mr. Mark Edwards (GS-9), Mr. Wilbur Carawan (GS-12), and Ms. Michael Wright (GS-12) to carry firearms (specifically .22 caliber rifles, .177 and .22 caliber air rifles, 12-gauge shotguns, and 15mm launchers) onboard Naval Support Activity (NAVSUPPACT), Hampton Roads installations to include NAVSUPPACT Hampton Roads, Northwest Annex, and NAVSUPPACT Hampton Roads, Portsmouth Annex in performance of official duties. Additional approval is granted to Mr. Lawrence McGrogan (GS-9) to carry a 9mm pistol. This approval is subject to the following conditions:

a. Use of firearms is restricted to disposal of wounded, nuisance and/or diseased wildlife, or control of invasive species.

b. Personnel listed will be in radio or phone contact with Security Dispatch at all times when performing disposal or control procedures and keep Security Dispatch aware of their location.

c. Weapons will not be used for law enforcement purposes.

d. Per reference (b), all weapons will be government-owned. The use of privately-owned weapons is prohibited, unless additional authorizations/exceptions are obtained. The only ammunition authorized will be government-owned, officially procured and issued for use in the specific weapon carried, unless additional authorizations/exceptions are obtained.

e. Personnel listed will receive documented training in the use of these firearms. Training will be equivalent, or similar to the training and qualification program outlined in reference (c). Specifically, for the 12-gauge shotgun, the course of fire outlined in reference (c) shall be utilized. Additionally, personnel listed

shall be familiar with safety precautions for weapons handling that are detailed in reference (c).

f. Weapons and ammunition will be properly stored, secured and checked at the NAS Oceana, Natural Resources Center, and Building 78.

g. Personnel listed will keep tenant commands informed of disposal or control procedures conducted in restricted areas.

2. Point of contact is Ms. Michael Wright, Natural Resources Team Leader who may be reached at (757) 433-3461, or email: michael.f.wright@navy.mil

J. D. FREEMAN

Copy to:
Naval Support Activity Hampton Roads Security (N3AT)

Enclosure 4. Finding of No Significant Impacts(FONSI)

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DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY

FINDING OF NO SIGNIFICANT IMPACT FOR ENVIRONMENTAL ASSESSMENT FOR THE IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP) FOR NAVAL SUPPORT ACTIVITY, NORFOLK, NORTHWEST ANNEX, CHESAPEAKE, VIRGINIA AND CURRITUCK COUNTY, NORTH CAROLINA

Pursuant to the Council on Environmental Quality regulations (40 Code of Federal Regulations § 1500-1508) implementing procedural provisions of the National Environmental Policy Act (NEPA), the Department of the Navy, gives notice that an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) have been prepared for the development and implementation of an Integrated Natural Resources Management Plan (INRMP) for Naval Support Activity, Norfolk, Northwest Annex, Chesapeake, Virginia and Currituck County, North Carolina and an Environmental Impact Statement (EIS) is not being prepared.

Proposed Action:
The proposed action (Alternative 2) is to develop and implement an INRMP consistent with the military use of the property and the goals and objectives established in the Sikes Act Improvement Act (SAIA). The goal of the INRMP is to implement an ecosystem based natural resources program that provides for conservation of natural resources in a manner that is consistent with the military mission; integrates and coordinates all natural resources management activities; provides for sustainable multipurpose uses of natural resources; and provides for public access for use of natural resources subject to safety and military security considerations. The proposed INRMP would address and implement land management, forest management, fish and wildlife management, outdoor recreation, cultural resources protection, conservation education, and natural resources program administration. A total of 47 ongoing and new management actions and projects are proposed to meet compliance and stewardship objectives for natural resources management at the installations.

Existing Conditions:
Naval Support Activity, Northwest (NSA-NW) lies along the southeastern border of Virginia and the northeastern border of North Carolina. The area surrounding NSA-NW is largely undeveloped and is comprised of agricultural land and forested wetlands. NSA-NW is located within the historic boundaries of

the Great Dismal Swamp; however, much of the Great Dismal Swamp was ditched and drained for agriculture and timber production. Impacts to relevant resources that were evaluated for each alternative included land use, soil resources, wetlands and water quality, coastal zone resources, vegetation, wildlife, threatened and endangered species, cultural resources, air quality, environmental justice and socioeconomics.

Alternatives Analyzed:
The no action alternative (Alternative1) is the continued implementation of the management objectives and practices specified in the natural resources plans for NAVSUPPAXT Norfolk, Northwest Annex (U.S. Navy 1998). The existing management plans provide valuable information on natural resources management; however, the plans do not set time frames for implementation of or provide cost estimates for natural resources projects. Also, many of the project management recommendations provided in the current natural resources plans have been completed, and new projects described in the proposed INRMP would not be implemented under this alternative. In addition, no EA was completed for development of the existing plans, nor were they provided for public review. Consequently, the existing plans do not meet the SAIA requirements for an INRMP. The no action alternative is carried forward as a baseline for comparison to the other alternatives as required by CEQ regulations.

Environmental Effects:
This EA demonstrated that implementation of the proposed action would result in no impact, positive impacts, or minimal negative impacts to environmental resources. The greatest potential negative impact would be from annual prescribed burning, which has the potential to increase air emissions. However, benefits from prescribed burning, including reducing the risk of catastrophic wildfire and managing early successional habitat, which is important to a number of wildlife species on the bases, would also be provided. Additionally, impacts to air quality would be minimized through the use of proper smoke management procedures and optimizing the burning schedule. Because Northwest Annex is in a marginal nonattainment area for ozone, an applicability analysis is required under the General Conformity Rule of the CAA. The applicability analysis provided in the EA demonstrates under both alternatives emissions from prescribed burning would be well below *de minimis* levels for annual criteria pollutant emissions.

FINDING OF NO SIGNIFICANT IMPACT FOR ENVIRONMENTAL ASSESSMENT FOR THE IMPLEMENTATION OF AN INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP) FOR NAVAL SUPPORT ACTIVITY NORFOLK NORTHWEST ANNEX, CHESAPEAKE VIRGINIA AND CURRITUCK COUNTY, NORTH CAROLINA

Findings:

Based on information gathered during preparation of the EA, the Department of the Navy finds that implementing the proposed action will not significantly impact the quality of the environment. The EA and FONSI addressing this action may be obtained by interested parties by contacting Commander, Atlantic Division, Naval Facilities Engineering Command, 1510 Gilbert Street, Norfolk, Virginia 23511-2699 (Attn: Mr. Chris Petersen), telephone (757) 322-4560. A limited number of copies of the EA are available to fill single copy requests.

7 Sept 2006
Date

W. G. SHEAR, JR.
Rear Admiral, U. S. Navy
Deputy Commander, Navy
Installations Command

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Appendix D

List of Stakeholders and OMUs

Enclosure 1 List of Stakeholders

Enclosure 2 List of Operations Management Units

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Enclosure 1. List of Stakeholders

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Appendix X - Stakeholders of NSAHR Natural Resources.

Navy	
Command Navy Region Mid-Atlantic	Major Shore Commands of NSAHR
Morale, Welfare, and Recreation Department	Naval Facilities Engineering Command, Mid-Atlantic
NSAHR Commanding Officer	Navy Recycling Program
Navy Personnel	NSAHR Environmental Office
Other Naval Facilities in the Hampton Roads area	
Federal, State, and Local Agencies	
City of Chesapeake, Virginia	Currituck County, North Carolina
National Oceanic and Atmospheric Administration National Marine Fisheries Service	North Carolina Department of Environment and Natural Resources
North Carolina Natural Heritage Commission	North Carolina Wildlife Resources Commission
United States (U.S.) Army Corps of Engineers	USDA Natural Resources Conservation Service
USDA Wildlife Services	U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service	U.S. Forest Service
U.S. Geological Survey	Virginia Army National Guard
Virginia Department of Conservation and Recreation – Division of Natural Heritage	Virginia Department of Forestry
Virginia Department of Game and Inland Fisheries	Virginia Department of Health
Partners, Non-Governmental Organizations, Universities, and Individuals	
Center for Conservation Biology	Christopher Newport University
College of William and Mary	Cooperative Ecosystems Studies Unit
Department of Defense (DoD) Partners In Amphibian and Reptile Conservation	Dependents of Navy Personnel
DoD Partners in Flight	Elizabeth City State University
FrogWatch	Institute for Bird Populations
Military Retirees	National Audubon Society
National Military Fish and Wildlife Association	North Carolina Native Plant Society
Old Dominion University	Sportsman Quality Management Board
South Atlantic Landscape Conservation Cooperative	The Nature Conservancy of North Carolina
The Nature Conservancy of Virginia	Virginia Herpetological Society
Virginia Native Plant Society	Virginia Zoological Park
Elizabeth River Project	National Environmental Education Foundation
Chesapeake Bay Foundation	

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Enclosure 2. List of Operations Management Units

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Summary of the Operations Management Unit Actions

- Update Installation-wide jurisdictional determinations every five years, or as required by USACE regulatory requirements, and continue to obtain individual determinations for any proposed action with potential to disturb wetlands.
- Coordinate with the appropriate regional Environmental Checklist Coordinator and NRMs to assist project proponents in submitting preconstruction notifications and joint permit applications, and in obtaining all necessary wetlands permits, or other appropriate NR related permits when required.
- Review all plans where tree removal is proposed to ensure compliance with this INRMP and associated instructions. Develop recommendations for tree protection measures or mitigation for lost trees, or assist with the selection of alternate sites.
- Review new and revised landscaping plans and species lists to ensure conformance with EO 13148, EO 13112, and Navy policy on beneficial landscaping.
- Promote the use of beneficial landscaping practices and the importance of using native species, including plants that will attract pollinators.
- Coordinate with MWR personnel on natural resources issues such as tree care, erosion control, reducing nonpoint pollution at recreational facilities on an as-needed basis, wildlife protection, and human/wildlife conflict avoidance.
- Participate in National Arbor Day Foundation's Tree City USA program. Submit a recertification application, forest work plan, and proclamation in support of Arbor Day to the VDOF by 31 December each year.
- Oversee agricultural and ditch maintenance practices to ensure adequate vegetative cover and 3-ft (1-m) buffers are maintained.
- Coordinate with NAVFAC Mid-Atlantic environmental staff on enforcement of conservation measures on agricultural outlease parcels.
- Continued distribution of the Installation snake identification pamphlet to educate residents and employees about the presence of venomous snakes, and the creation of a pamphlet that identifies protection measures for timber (canebrake) rattlesnake Coastal Plain population and other snake species.
- Continue providing educational materials on black bears, poisonous plants, zoonotic diseases, and other NR-related topics to ensure the safety of Installation personnel and recreational users.
- Remove or assist with the removal of miscellaneous nuisance wildlife and invasive species in the Core Management Unit in accordance with this INRMP's identified plans, including implementation of management strategies developed upon results of the nutria and coyote surveys and the nuisance wildlife management plan that is currently being prepared for the Installation.
- Complete the Environmental Checklist (see Appendix X), as needed, for those natural resources management actions that may affect a regulated or other Navy managed

environmental resource. Conduct associated consultations and required mitigations, and acquire associated permits in coordination with the appropriate Navy environmental media manager.

- Maintain nest boxes for birds and bats.
- Consider implementing ditch modifications designed to slow runoff, trap sediment, and reduce erosion in major ditches that drain into Mill Stream.
- Conduct prescribed burns in accordance with the Installation's most current Prescribed Burn and Smoke Management Plan to reduce vegetation and support military operations.
- Update the Installation's Prescribed Burn and Smoke Management Plan annually to reflect accomplishments and goals for each year.
- Maintain the firebreaks and fire lines for each burn unit as needed.
- Treat no more than one-third of the early successional habitat acreage in the Operations Management Unit annually to maintain continuous early successional habitat. Avoid conducting prescribed burning and mowing treatments from mid-April through late July, to avoid impacting bird nesting success and timber (canebrake) rattlesnake Coastal Plain population activity.
- Consider establishing hedgerows by eliminating mowing between select agricultural fields to improve wildlife habitat by increasing cover and roosting habitat.
- Implement invasive plant species management based on the results of the recently completed invasive species inventory survey for NSAHR NWA, using the following two methodologies for control of invasive plant species: early detection and rapid response for new populations that have a high probability for eradication; and a phased removal approach of other species that are more widespread and where removal in a single targeted effort is not feasible (Navy 2018).
- Implement management strategies developed upon results of the nutria and coyote surveys and the nuisance wildlife management plan that is currently being prepared for the Installation.
- Control pine, sweetgum, and other competing species around planted Atlantic white cedar stands.

Appendix E

Wetland and Watershed Maps/Information

Enclosure 1 **Preliminary Wetland Jurisdictional Determination**

Enclosure 2 **Wetland Jurisdictional Determination**

Enclosure 3 **50ft Wetland/Riparian Buffer Map**

Enclosure 4 **Watershed/Hydrologic Unit Map**

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Enclosure 1 Preliminary Wetland Jurisdictional Determination

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

November 29, 2018

PRELIMINARY JURISDICTIONAL DETERMINATION

Eastern Virginia Regulatory Section
NAO-2018-1479 (Northwest River)

LCDR John Pergerson, Public Works Officer, NSA Hampton Roads
c/o: Taylor Austin, Natural Resources Manager
1321 Northwest Blvd.
Chesapeake, Virginia 23322

Dear LCDR Pergerson:

This letter is in regard to your request for a preliminary jurisdictional determination for waters of the U.S. (including wetlands) on property known as the Naval Support Activity (NSA), Northwest Annex, located on a 3,661 acre parcel on Ballahack Road, in Chesapeake, Virginia. For that part of NSA Northwest Annex located in North Carolina, a separate jurisdictional determination was done by the Corps of Engineers Wilmington District.

The map entitled "Aquatic Resources Map for NSA Northwest Wetland Delineation, Chesapeake County, VA and Currituck County, NC", prepared by Tetra Tech dated August 2012 and Corps date stamped as received on August 22, 2012 (*copy enclosed)* provides the location(s) of waters and/or wetlands on the property listed above. The basis for this delineation includes application of the Corps' 1987 Wetland Delineation Manual, the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region*, the positive indicators of wetland hydrology, hydric soils, hydrophytic vegetation, and the presence of an ordinary high water mark. This letter is not confirming the Cowardin classifications of these aquatic resources.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this

preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination. This preliminary jurisdictional determination and associated wetland delineation map may be submitted with a permit application.

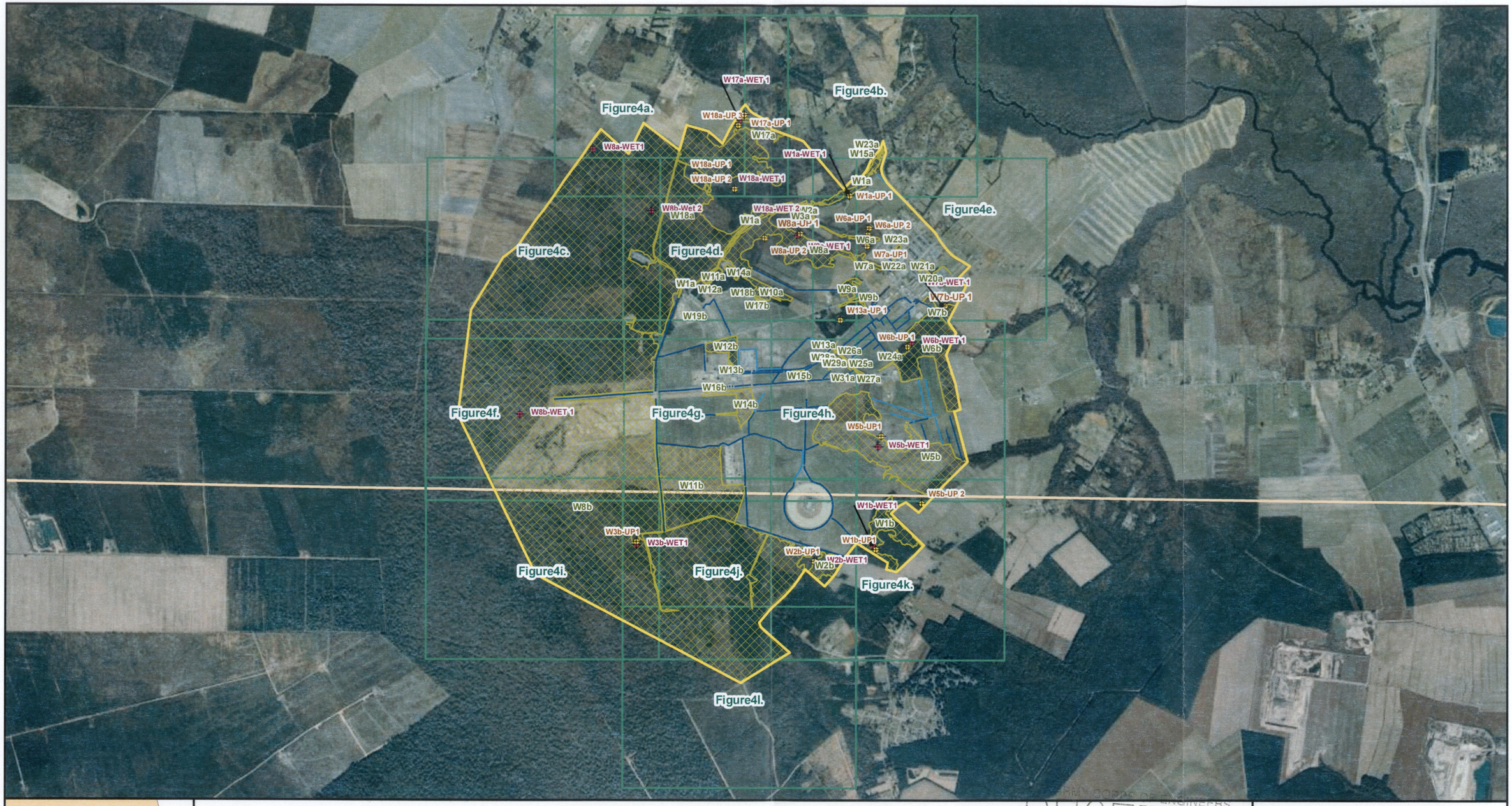
Enclosed is a copy of the “Preliminary Jurisdictional Determination Form”. Please review the document, sign, and return one copy to me either via email (brian.c.denson@usace.army.mil) or via standard mail to US Army Corps of Engineers, Regulatory Office, and ATTN: Brian Denson, 803 Front Street Norfolk, Virginia 23510 within 30 days of receipt and keep one for your records. This delineation of waters and/or wetlands can be relied upon for no more than five years from the date of this letter. New information may warrant revision.

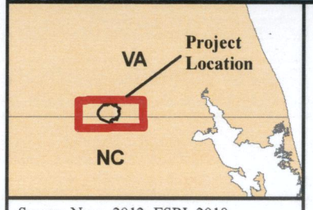
If you have any questions, please contact me, either via telephone at (757) 201-7792 or via email at brian.c.denson@usace.army.mil.

Sincerely,

Brian Denson
Project Manager
Eastern Virginia Regulatory Section

Enclosure(s): Referenced figures, Supplemental Information, Preliminary Jurisdictional Determination Form





Source: Navy, 2012; ESRI, 2010.

Legend

- Installation Boundary
- State Boundary
- Roads
- Wetlands
- Wetland Plots
- Upland Plots

Stream Classification

- Perennial
- Intermittent

0 1,250 2,500 5,000 Feet

0 375 750 1,500 Meters

RECEIVED
AUG 22 2012
BY

Sheet Key. Aquatic Resources Map for NSA Northwest Wetland Delineation, Chesapeake County, VA and Currituck County, NC.

Prepared For: NAVFAC Naval Facilities Engineering Command

Prepared By: TETRA TECH

Date: 08/2012

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PRELIMINARY JURISDICTIONAL DETERMINATION FORM

BACKGROUND INFORMATION:

A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD):
Thursday, November 29, 2018

B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:
Requestor Name: LCDR John Pergerson, Public Works Officer, NSA Hampton Roads
Point of Contact: Taylor Austin, Natural Resources Manager
Mailing Address: 1321 Northwest Blvd.
City: State: Zip: Chesapeake, Virginia 23322
Daytime Telephone: 757-421-8240

C. DISTRICT OFFICE: Norfolk District (CENAO-REG)

FILE NAME: Northwest Annex Basewide Delineation Confirmation

FILE NUMBER: NAO-2018-1479

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)

State: **VIRGINIA** County/parish/borough: City:

Center coordinates of site (lat/long in degree decimal format):

Latitude: 36.5614 ° N Longitude: -76.2572 ° W

Universal Transverse Mercator: WGS 84

Name of nearest waterbody: Northwest River

Identify (estimate) amount of waters in the review area:

Non-wetland waters: 64,246.5 linear feet; width (ft); and/or acres.

Cowardin Class:

Stream Flow:

Wetlands: 2,075.77 acres

Cowardin Class:

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal:

Non-Tidal:

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☒ Office (Desk) Determination. Date: November 29, 2018
☒ Field Determination. Date(s): July 31, 2012

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

3. This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA:

Data reviewed for preliminary JD (check all that apply) - checked items should be included in case file and, where checked and requested, appropriately reference sources below.

☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:

☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.

☒ Office concurs with data sheets/delineation report.

☐ Office does not concur with data sheets/delineation report.

☐ Data sheets prepared by the Corps:

☐ Corps navigable waters' study:

☒ U.S. Geological Survey Hydrologic Atlas:

☐ USGS NHD data.

☒ USGS 8 and 12 digit HUC maps.

☒ U.S. Geological Survey map(s). Cite scale & quad name:

☒ USDA Natural Resources Conservation Service Soil Survey.

Citation:

☒ National wetlands inventory map(s). Cite name:

☐ State/Local wetland inventory map(s):

☐ FEMA/FIRM maps:

☒ 100-year Floodplain Elevation: (National Geodetic Vertical Datum of 1929)

☒ Photographs: ☒ Aerial (Name & Date): Google earth, VGIN, CIR, Digital Globe

or ☒ Other (Name & Date): LIDAR

☒ Previous determination(s):

File no. and date of response letter: NAO-2009-1177, September 14, 2012

☐ Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

DENSON.BRIAN.C.1168799671

Digitally signed by DENSON.BRIAN.C.1168799671
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=DENSON.BRIAN.C.1168799671
Date: 2018.11.29 13:50:32 -05'00'

Signature
Regulatory Project Manager
(REQUIRED)

2018-11-29

Date

Signature of person requesting Preliminary JD
(REQUIRED, unless obtaining the signature is impracticable)

Date

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Table 1. Wetland Summary for NSA Northwest

State	Wetland ID	NC-WAM Category[1]	USFWS Cowardin Classification[2]	Wetland Area (acre)	Comments
Virginia	W1a	N/A	PFO	10.60	Mill Stream channel with wetland fringe, about 15 feet wide.
	W2a	N/A	PFO	0.19	Open water feature at head of wetland.
	W3a	N/A	PFO	0.01	Forested depression.
	W4a	N/A	PFO	0.82	Perennial stream channel with wetland fringe.
	W5a	N/A	POW	0.05	Man-made pond, used for storm water.
	W5b	N/A	PFO/PSS	111.55	Continues into VA, previously cut over wetland area.
	W6a	N/A	PFO	1.93	Wetland with intermittent channel along center line.
	W6b	N/A	PFO	53.90	Forested wetland dominated by *Acer rubrum* and *Liquidambar styraciflua.*
	W7a	N/A	PFO	2.59	Wetland with ephemeral channel along center line.
	W7b	N/A	PFO	4.77	Forested wetland dominated by *L. stunaiflua* and *Osmunda regalis.*
	W8a	N/A	PFO	49.16	Wetland with intermittent channel and small trees and ground cover.
	W8b	N/A	PEM/PFO	1624.60	Mostly forested wetland behind Iams Range and west end of ROTHR
	W9a	N/A	PFO	4.53	Disturbed area with connection to S3a.
	W9b	N/A	PFO	1.32	Narrow forested wetland with roadside ditches on northwest and northeast sides.
	W10a	N/A	PFO	7.55	Wetland channel with dry edge and secondary growth.
	W11a	N/A	PFO	1.78	Isolated wetland with groundwater hydrology.
	W12a	N/A	PFO	0.30	Small forested headwater wetland that connects to W1a.
	W12b	N/A	PFO	9.43	Forested wetland dominated by *Lonicera sp., L. Styraciflua.*
	W13a	N/A	PFO/PEM	0.04	Culverted wetland system, with aquatic vegetation.

State	Wetland ID	NC-WAM Category[1]	USFWS Cowardin Classification[2]	Wetland Area (acre)	Comments
Virginia (cont.)	W13b	N/A	PFO	0.55	Forested wetland across from W12b.
	W14a	N/A	POW/PFO	1.43	Lunker Lake open water system with southern forested fringing area.
	W14b	N/A	PSS	12.42	Contour area between ROTHRs and firing range.
	W15a	N/A		0.02	Depressional wetland with stained leaves.
	W15b	N/A	PFO	1.43	Small forested wetland with ditch running north and south of it.
	W16a	N/A	PFO	0.07	Floodplain for Mill Stream, separated by berm. Connects to W1a.
	W16b	N/A	PSS/PEM	1.13	Small wetland by roadside ditch.
	W17a	N/A	PFO	4.31	Narrow drainage way with ditch under Ballahack Road.
	W17b	N/A	Farmed wetland	0.11	Small area of standing water in currently farmed ag fields.
	W18a	N/A	PFO	163.39	Mostly old timber or ag lands, with multiple ditches transecting area. Includes W3b and covers forested areas in western portion of property.
	W18b	N/A	Farmed wetland	0.32	Small area of standing water in currently farmed ag fields.
	W19b	N/A	Farmed wetland	0.07	Small area of standing water in currently farmed ag fields.
	W20a	N/A	PFO	0.55	Wetland that drains into S5a and a culvert connects it to W21a.
	W21a	N/A	PFO/PSS	0.97	Open water with fringing wetland.
	W22a	N/A	POW/PSS	0.21	Forested wetland, hydrological connection between S6a and W7a.
	W23a	N/A	PFO/PSS	0.34	Open water with strong fringing wetland vegetation.
	W24a	N/A	POW/PSS	0.34	Forested wetland connects to S13a.
	W25a	N/A	PFO/PSS	0.39	Roadside ditch with wetland and herbaceous emergent vegetation.

State	Wetland ID	NC-WAM Category[1]	USFWS Cowardin Classification[2]	Wetland Area (acre)	Comments
Virginia (cont.)	W26a	N/A	PEM/PSS	1.54	Roadside ditch with wetland and herbaceous emergent vegetation.
	W27a	N/A	PFO/PEM/PSS	0.14	Forested wetland with lower landscape and pine dominant.
	W28a	N/A	Farmed Wetland	0.17	Standing water and algae mat with wetland vegetation.
	W29a	N/A	Farmed Wetland	0.15	Standing water and algae mat with wetland vegetation.
	W30a	N/A	Farmed Wetland	0.06	Emergent wetland connects S35a and S32a.
	W31a	N/A	Farmed Wetland	0.46	Emergent wetland connects S33a and S32a.
	W32a	N/A	Farmed Wetland	0.08	Small area of standing water in currently farmed ag fields.
North Carolina	W1b	Headwater Forest	PFO	23.36	Forested wetland with relict ditches through the area.
	W2b	Headwater Forest	PFO/PSS	8.89	Forested wetland with relict ditches through the area.
	W11b	Headwater Forest	PFO	95.57	Forested wetland connected to W4b and continues into Virginia, includes area west of Iams Range.
			Total	2203.58	

Table 2. Waterbodies Summary for NSA Northwest

State	Waterbody #	Segment Classification[1]	Length (ft)	Mapping Method[2]	Comments
Virginia	S1a	Intermittent Ditch	11.9	GPS Survey	Roadside ditch along Ballahack Rd., draining NW off property
	S2a	Perennial Ditch	1157.0	Digital Orthophoto/ GPS Survey	Drains into W7a, approximately 5 ft wide.
	S3a	Perennial ditch	2539.6	GPS Survey	Intermittent flow connects W8a to W9a.
	S3b	Perennial Ditch	2799.6	GPS Survey	Six foot wide ditch.
	S4a	Perennial ditch	2747.7	Digital Orthophoto/ GPS Survey	Enters from NC and travels across site to NE property boundary.
	S4b	Perennial Ditch	2170.0	Digital Orthophoto/ GPS Survey	Channel has been widened and dredged, with beaver dam at corner of Red Range.
	S5a	Perennial Ditch	264.3	GPS Survey	Flows south towards open water pond.
	S5b	Perennial Ditch	1787.1	GPS Survey	Agriculture ditch, from corner of Red Range to beaver dam.
	S6a	Perennial Ditch	99.5	GPS Survey	Hydrological connects to W22a.
	S6b	Perennial Ditch	716.5	Digital Orthophoto/ GPS Survey	Agriculture ditch connecting to S5b, about six feet wide.
	S7a	Intermittent Ditch	159.7	Digital Orthophoto/ GPS Survey	Underground culvert feeds ditch, with a hydrological connection to W22a.
	S7b	Intermittent Ditch	16.5	GPS Survey	Short ditch between roadside and W12b.
	S8a	Perennial Ditch	793.6	Digital Orthophoto/ GPS Survey	Open water ditch with vegetation in channel.
	S8b	Intermittent Ditch	1082.3	GPS Survey	Ditch from Crosscut Rd to Relay Rd, receives run off from agriculture and parking lot.
	S9a	Perennial Ditch	705.2	Digital Orthophoto/ GPS Survey	Open water ditch, channel ends before reaching woods.
	S9b	Perennial Ditch	1594.6	GPS Survey	Long roadside ditch, along north edge of Relay Road.
	S10a	Perennial Ditch	700.2	Digital Orthophoto/ GPS Survey	Flows into S9a, with herbaceous vegetation.
	S10b	Perennial Ditch	65.0	GPS Survey	Culvert separates this ditch from S9b.

State	Waterbody #	Segment Classification[1]	Length (ft)	Mapping Method[2]	Comments
Virginia (cont.)	S11a	Perennial Stream	2844.4	Digital Orthophoto/ GPS Survey	Large, 10ft wide channel, with herbaceous vegetation.
	S11b	Perennial Ditch	172.4	GPS Survey	Culvert separates this ditch from S9b and S10b.
	S12a	Perennial ditch	371.8	Digital Orthophoto/ GPS Survey	Herbaceous and woody vegetation in channel, roadside ditch.
	S12b	Intermittent Ditch	748.1	GPS Survey	Roadside channel that widens as it turns east into agricultural ditch.
	S13a	Perennial stream	960.8	Digital Orthophoto/ GPS Survey	Average of 4 ft. wide stream with sedges and algae.
	S13b	Intermittent Ditch	699.7	GPS Survey	Ag ditch north of upland strip along Relay Road.
	S14a	Perennial Ditch	886.0	Digital Orthophoto/ GPS Survey	Agriculture ditch with a defined bed and bank.
	S15a	Perennial Ditch	875.1	Digital Orthophoto/ GPS Survey	Agriculture ditch with a defined bed and bank.
	S15b	Perennial Ditch	1241.2	Digital Orthophoto/ GPS Survey	Ag ditch from forested area through field, average 8 foot width.
	S16a	Perennial Ditch	243.8	GPS Survey	Agriculture ditch with a defined bed and bank, approximately 10 ft wide. Continuation of stream within W1a.
	S16b	Intermittent Ditch	420.3	Digital Orthophoto/ GPS Survey	Agriculture ditch, average 3 ft wide.
	S17a	Perennial Ditch	221.6	Digital Orthophoto/ GPS Survey	Agriculture ditch with a defined bed and bank.
	S17b	Perennial Ditch	392.8	Digital Orthophoto/ GPS Survey	USGS, roadside ditch, average 5 ft wide.
	S18a	Perennial Ditch	178.7	Digital Orthophoto/ GPS Survey	Agriculture ditch with a defined bed and bank.
	S18b	Perennial Ditch	574.5	Digital Orthophoto/ GPS Survey	Ag ditch connected to W5b, average width of 7 feet.
	S19a	Perennial Ditch	308.6	GPS Survey	Agriculture ditch with herbaceous vegetation.
	S19b	Perennial Ditch	11.9	Digital Orthophoto/ GPS Survey	Ag ditch, separated from S18b by culvert.

State	Waterbody #	Segment Classification[1]	Length (ft)	Mapping Method[2]	Comments
Virginia (cont.)	S20a	Perennial ditch	200.8	GPS Survey	Agriculture ditch with a defined bed and bank, flows through culvert into W7b.
	S20b	Perennial Ditch	247.7	Digital Orthophoto/ GPS Survey	Ag ditch, approximately 6 feet wide.
	S21a	Perennial ditch	1672.3	Digital Orthophoto/ GPS Survey	Highly culverted ditch with hydrophytic vegetation.
	S21b	Perennial Ditch	1557.5	Digital Orthophoto/ GPS Survey	Ag ditch, approximately 6 feet wide.
	S22a	Perennial Ditch	967.8	Digital Orthophoto/ GPS Survey	Highly culverted ditch with hydrophytic vegetation.
	S22b	Perennial Ditch	429.6	Digital Orthophoto/ GPS Survey	Ag ditch, connects to W5b.
	S23a	Perennial Ditch	1319.9	Digital Orthophoto/ GPS Survey	Herbaceous and woody vegetation in channel, roadside ditch.
	S24a	Perennial Ditch	419.9	Digital Orthophoto/ GPS Survey	Herbaceous and woody vegetation in channel, roadside ditch.
	S24b	Perennial Ditch	12.4	Digital Orthophoto/ GPS Survey	Ditch between culverts, approximately 4 feet wide.
	S25a	Intermittent Ditch	820.6	Digital Orthophoto/ GPS Survey	Herbaceous and woody vegetation in channel, roadside ditch.
	S25b	Intermittent Ditch	953.6	Digital Orthophoto/ GPS Survey	Ag ditch, not maintained.
	S26a	Intermittent Ditch	1042.5	Digital Orthophoto/ GPS Survey	Agriculture ditch with a defined bed and bank and herbaceous vegetation.
	S26b	Perennial Ditch	1827.9	Digital Orthophoto/ GPS Survey	Maintained ditch across ag field, approximately 8 feet wide.
	S27a	Intermittent Ditch	1950.4	Digital Orthophoto/ GPS Survey	Herbaceous and woody vegetation in channel, roadside ditch.
	S27b	Perennial Ditch	690.9	Digital Orthophoto/ GPS Survey	Ag ditch, with a deep channel.
	S28a	Intermittent ditch	1079.8	Digital Orthophoto/ GPS Survey	Defined bed and bank, connects to W6b.
	S28b	Intermittent Ditch	611.7	Digital Orthophoto/ GPS Survey	Four foot wide ditch, between culverts.

State	Waterbody #	Segment Classification[1]	Length (ft)	Mapping Method[2]	Comments
Virginia (cont.)	S29a	Perennial ditch	538.8	Digital Orthophoto/ GPS Survey	Hydrophytic vegetation along bank, connects to W5b.
	S29b	Intermittent Ditch	32.4	Digital Orthophoto/ GPS Survey	Four foot wide ditch, between culverts.
	S30a	Perennial Ditch	558.2	Digital Orthophoto/ GPS Survey	Defined bed and bank, some woody vegetation.
	S30b	Perennial Ditch	1293.4	Digital Orthophoto/ GPS Survey	Ag ditch, east to west across the field, ends before reaching the road edge.
	S31a	Intermittent Ditch	751.8	Digital Orthophoto/ GPS Survey	Defined bed and bank, some woody vegetation.
	S31b	Perennial Ditch	1668.3	Digital Orthophoto/ GPS Survey	Ag ditch, cuts through deep spoil by S4b.
	S32a	Perennial Ditch	1419.8	GPS Survey	Defined bed and bank, connects to W27a.
	S32b	Perennial Ditch	1061.1	Digital Orthophoto/ GPS Survey	Ditch through field, passes under wastewater treatment facility, and into W12b.
	S33a	Perennial Ditch	259.4	Digital Orthophoto/ GPS Survey	Connects S32a to W26a, minimal vegetation.
	S33b	Perennial Ditch	424.6	Digital Orthophoto/ GPS Survey	Ditch flows east and receives water from ag field.
	S34a	Perennial Ditch	264.8	Digital Orthophoto/ GPS Survey	Connects to W26a, with minimal hydrophytic vegetation.
	S34b	Perennial Ditch	51.5	Digital Orthophoto/ GPS Survey	Short segment separated from S32b by culvert, flows into W12b.
	S35a	Perennial Ditch	318.7	Digital Orthophoto/ GPS Survey	Connects to W30a, with minimal hydrophytic vegetation.
	S35b	Perennial Ditch	501.1	Digital Orthophoto/ GPS Survey	Ag ditch, separated from S36b by culvert.
	S36a	Perennial ditch	1465.4	GPS Survey	Six foot wide channel with minimal hydrophytic vegetation.
	S36b	Perennial Ditch	846.3	Digital Orthophoto/ GPS Survey	Ag ditch, flows into S16a through a spoil pile.
	S37a	Perennial ditch	2495.5	GPS Survey	Four foot wide channel with minimal hydrophytic vegetation

State	Waterbody #	Segment Classification[1]	Length (ft)	Mapping Method[2]	Comments
Virginia (cont.)	S37b	Intermittent Ditch	456.9	Digital Orthophoto/ GPS Survey	Flows during storm events through a culvert under the antenna/communications building.
	S38b	Intermittent Ditch	265.4	GPS Survey	Separated from S37b by culvert
	S40b	Perennial Ditch	1356.1	Digital Orthophoto/ GPS Survey	Ag ditch, flows into S26b.
	S42b	Perennial Ditch	1767.8	Digital Orthophoto/ GPS Survey	Modified USGS stream, connects to W6b and W7b.
North Carolina	S1b	Intermittent Ditch	1148.7	Digital Orthophoto/ GPS Survey	Roadside ditch at the end of Shotgun Road, average 8 feet wide.
	S2b	Perennial Ditch	1548.5	Digital Orthophoto/ GPS Survey	Modified USGS stream, flows between W6b and W7b, continues into VA.
	S23b	Perennial Ditch	4360.3	Digital Orthophoto/ GPS Survey	Circular ditch around training facility, break at south center, flows into S21b and S25b, continues into VA.
	S39b	Perennial Ditch	250.2	Digital Orthophoto/ GPS Survey	Separated from S1b by culvert, continues into VA.
	S41b	Perennial Ditch	3900.6	Digital Orthophoto/ GPS Survey	Agriculture ditch, flows through W1b, approximately 4ft wide.
		Total	75454.9		

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

November 29, 2018

Supplemental Preapplication Information

Project Number: NAO-2018-1479
Applicant: US NAVY
Project Location: Northwsest Annex

1. A search of the Virginia Department of Historic Resources data revealed the following:

   ☐ No known historic properties are located on the property.

   ☒ The following known architectural resources are located on the property: See Attached List

   ☒ The following known archaeological resources are located on the property: See Attached List

   ☐ The following known historic resources are located in the vicinity of the property (potential for effects to these resources from future development):

NOTE:

1) The information above is for planning purposes only. In most cases, the property has not been surveyed for historic resources. Undiscovered historic resources may be located on the subject property or adjacent properties and this supplemental information is not intended to satisfy the Corps' requirements under Section 106 of the National Historic Preservation Act (NHPA).

2) Prospective permittees should be aware that Section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant.

2. A search of the data supplied by the U.S. Fish & Wildlife Service, the Virginia Department of Conservation and Recreation and the Virginia Department of Game and Inland Fisheries revealed the following:

   ☐ No known populations of threatened or endangered species are located on or within the vicinity of the subject property.

   ☒ The following federally-listed species may occur within the vicinity of the subject property: Northern Long Eared Bat

   ☒ The following state-listed (or other) species may occur within the vicinity of the subject property: canebrake rattlesnake (state endangered) and Dismal Swamp southeastern shrew (state threatened).

Please note this information is being provided to you based on the preliminary data you submitted to the Corps relative to project boundaries and project plans. Consequently, these findings and recommendations are subject to change if the project scope changes or new information becomes available and the accuracy of the data.

Endangered Species and Historic Locations

Generated: 9/14/2012
Center: (-76.2648, 36.5656)
Buffer Radius: 1 mi.

Endangered Species (VA DCR)

- **NHR ID (Legal Status, Type): Site Name - Site Description**
- S_528 (SL, Conservation Site): NORTHWEST RIVER: HEADWATERS - This site supports many rare plants, animals and vegetative communities. It also serves as a direct link with the Great Dismal Swamp - protection of this corridor is crucial for long-term health of the Northwest River. 11/02
- S_1577 (SL, Conservation Site): GREAT DISMAL SWAMP: SMITH RIDGE - In addition to supporting rare animals and characteristic vegetation of the original Great Dismal Swamp, this site serves as a vital link/corridor for swamp and riverine flora and fauna. 11/02
- S_1744 (SL, Conservation Site): GREAT DISMAL SWAMP: NSGA NORTHWEST - This site supports many rare plant and animal species, and adds to long-term viability of the remaining Great Dismal Swamp. Protection of this area is critical. 11/02
- S_146 (SL, Conservation Site): NORTHWEST RIVER: MIDDLE SECTION - In addition to supporting many rare plants, animals and significant natural communities, this site is part of a large, relatively unfragmented riparian system. Protection is critical. 11/02
- E_3425 (NL, General Location): no name - Vascular Plant

Architectural Resources

- **DHR ID: Resource Name - Eligibility (Eligibility Date) - Optional Comment**
- 131-0061: Northwest Baptist Church - eligibility unknown
- 131-0069: House, 3644 Campbell Road - eligibility unknown
- 131-0030: Lasalle House - eligibility unknown - comment: destroyed

- 131-0064: Farmhouse, 1408 Ballahack Rd - eligibility unknown
- 131-0062: Nicholas Farm - eligibility unknown
- 131-0063: Farmhouse, 1233 Ballahack Rd - eligibility unknown
- 131-0879: Naval Security Group Activity, NW (Communication Stations) - not eligible (11/6/1997) - comment: temp file
- 131-0070: Farmhouse, 3857 Campbell Rd - eligibility unknown
- 131-0065: Farmhouse, 1837 Ballahack Rd. - eligibility unknown
- 131-0132: Triple R Ranch Homestead, 3531 Bunch Walnuts Rd (Deford Family Cemetery) - eligibility unknown - comment: see 131-5406
- 131-0068: Gertie School - eligibility unknown
- 131-0066: Cemetery, Ballahack Road - eligibility unknown
- 131-0067: Farmhouse, 3916 Bunch Walnuts Road - eligibility unknown
- 131-5395: NW Annex Bethel Baptist Chapel Cemetery - eligibility unknown - comment: also 44CS0227; see 131-5406

Archaeological Resources

- **DHR ID: Resource Name - Eligility (Eligibility Date) - Optional Comment**
- 44CS0210: - eligibility unknown
- 44CS0219: - eligibility unknown
- 44CS0145: - eligibility unknown
- 44CS0208: - eligibility unknown
- 44CS0146: - eligibility unknown
- 44CS0216: - eligibility unknown
- 44CS0147: - eligibility unknown
- 44CS0211: - eligibility unknown
- 44CS0200: - eligibility unknown
- 44CS0209: - eligibility unknown
- 44CS0222: - eligibility unknown
- 44CS0201: - eligibility unknown
- 44CS0220: - eligibility unknown
- 44CS0242: - eligibility unknown
- 44CS0243: - not eligible (10/15/2010)
- 44CS0203: - eligibility unknown
- 44CS0228: - eligibility unknown
- 44CS0229: - eligibility unknown
- 44CS0213: - eligibility unknown
- 44CS0226: - eligibility unknown
- 44CS0241: - eligibility unknown
- 44CS0215: - eligibility unknown
- 44CS0214: - eligibility unknown
- 44CS0212: - eligibility unknown
- 44CS0224: - eligibility unknown
- 44CS0217: - eligibility unknown
- 44CS0231: - eligibility unknown
- 44CS0221: - eligibility unknown
- 44CS0227: - eligibility unknown
- 44CS0205: - eligibility unknown
- 44CS0223: - eligibility unknown

- 44CS0206: - eligibility unknown
- 44CS0187: - eligibility unknown
- 44CS0188: - eligibility unknown
- 44CS0189: - not eligible (8/30/1994)
- 44CS0204: - eligibility unknown
- 44CS0218: - eligibility unknown
- 44CS0017: Backwood Road site - eligibility unknown
- 44CS0050: Northwest Canal - eligibility unknown
- 44CS0003: - eligibility unknown
- 44CS0232: - eligibility unknown
- 44CS0199: - eligibility unknown
- 44CS0225: - eligibility unknown
- 44CS0196: - eligibility unknown
- 44CS0197: - eligibility unknown
- 44CS0150: - eligibility unknown
- 44CS0149: - eligibility unknown
- 44CS0148: - eligibility unknown
- 44CS0230: - eligibility unknown
- 44CS0202: - eligibility unknown
- 44CS0198: - eligibility unknown
- 44CS0207: - eligibility unknown
- 44CS0143: - eligibility unknown
- 44CS0144: - eligibility unknown

Cold Water Trout Streams

- none

TE Stream Reaches

- none

Anadromous Fish Use Areas

- none

Colonial Water Birds

- none

Federal_State Listed Species

- **Common Name - Genus species subspecies - Federal Status - State Status**
- Rattlesnake, canebrake - Crotalus horridus - - State Endangered
- Shrew, Dismal Swamp southeastern - Sorex longirostrisfisheri - - State Threatened

Bald Eagle Nest - (Center for Conservation Biology, 2009)

- none

Bald Eagle Nest Buffer - 660'

- none

Bald Eagle Concentration Area

- none

Critical Habitat

- none

NMFS Essential Fish Habitat (2004)

- none

Submerged Aquatic Vegetation Beds

- none

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Enclosure 2. Wetland Jurisdictional Determination

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U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2012-01913** County: **Camden County** U.S.G.S. Quad: **Moyock**

NOTIFICATION OF JURISDICTIONAL DETERMINATION

Property Owner/Applicant: **LCDR John K. Pergerson**
Public Works Officer, Northwest Annex

Telephone Number: **757-421-8240**

Size (acres)	**835.9**	Nearest Town	**Moyock**
Nearest Waterway	**Shingle Landing Creek**	River Basin	**Albemarle-Chowan**
USGS HUC	**03010205**	Coordinates	Latitude: **36.5384181525511**
			Longitude: **-76.2705344714199**

Location description: **The review area for this jurisdictional determination (JD) is comprised of the North Carolina portion of the Naval Support Activity (NSA), Northwest Annex located in Currituck County, North Carolina. The portion of the installation in Virginia will be covered under a separate JD issued by the Norfolk District.**

Indicate Which of the Following Apply:

A. Preliminary Determination

X **There are waters, including wetlands, on the above described project area, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). The waters, including wetlands, have been delineated, and the delineation has been verified by the Corps to be sufficiently accurate and reliable. Therefore this preliminary jurisdiction determination may be used in the permit evaluation process, including determining compensatory mitigation. For purposes of computation of impacts, compensatory mitigation requirements, and other resource protection measures, a permit decision made on the basis of a preliminary JD will treat all waters and wetlands that would be affected in any way by the permitted activity on the site as if they are jurisdictional waters of the U.S. This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction.**

_ There are wetlands on the above described property, that may be subject to Section 404 of the Clean Water Act (CWA)(33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). However, since the waters, including wetlands, have not been properly delineated, this preliminary jurisdiction determination may not be used in the permit evaluation process. Without a verified wetland delineation, this preliminary determination is merely an effective presumption of CWA/RHA jurisdiction over all of the waters, including wetlands, at the project area, which is not sufficiently accurate and reliable to support an enforceable permit decision. We recommend that you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

B. Approved Determination

_ There are Navigable Waters of the United States within the above described property subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA)(33 USC § 1344). Unless there is a change in law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ There are waters of the U.S., including wetlands, on the above described project area subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ We recommend you have the waters of the U.S. on your property delineated. As the Corps may not be able to accomplish this wetland delineation in a timely manner, you may wish to obtain a consultant to conduct a delineation that can be verified by the Corps.

_ The waters of the U.S., including wetlands, on your project area have been delineated and the delineation has been verified by the Corps. We strongly suggest you have this delineation surveyed. Upon completion, this survey should be reviewed and

verified by the Corps. Once verified, this survey will provide an accurate depiction of all areas subject to CWA jurisdiction on your property which, provided there is no change in the law or our published regulations, may be relied upon for a period not to exceed five years.

_ The waters of the U.S., including wetlands, have been delineated and surveyed and are accurately depicted on the plat signed by the Corps Regulatory Official identified below on _____. Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

_ There are no waters of the U.S., to include wetlands, present on the above described project area which are subject to the permit requirements of Section 404 of the Clean Water Act (33 USC 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

X The property is located in one of the 20 Coastal Counties subject to regulation under the Coastal Area Management Act (CAMA). You should contact the Division of Coastal Management in Elizabeth City, NC, at (252) 264-3901 to determine their requirements.

Placement of dredged or fill material within waters of the US, including wetlands, without a Department of the Army permit may constitute a violation of Section 301 of the Clean Water Act (33 USC § 1311). Placement of dredged or fill material, construction or placement of structures, or work within navigable waters of the United States without a Department of the Army permit may constitute a violation of Sections 9 and/or 10 of the Rivers and Harbors Act (33 USC § 401 and/or 403). If you have any questions regarding this determination and/or the Corps regulatory program, please contact **Billy Standridge at (910) 251-4595 or Billy.W.Standridge@usace.army.mil**.

C. Basis For Determination: N/A. An Approved JD has not been completed.

D. Remarks: This is a reissuance of a PJD that was originally issued on November 28, 2012. See attached Aquatic Resources Map prepared by Tetra Tech dated 08/2012.

E. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

F. Appeals Information for Approved Jurisdiction Determinations (as indicated in Section B. above)

If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Jason Steele, Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **N/A**.
It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: _____

Date: **July 24, 2018** Expiration Date: N/A

SAW-2012-01913

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete our Customer Satisfaction Survey, located online at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Copy Furnished:

Mr. Pete Crum
NAVFAC MIDLANT
9324 Virginia Avenue
Norfolk, VA 23511-3905

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: **NAVFAC MIDLANT**	File Number: **SAW-2012-01913**	Date: **July 24, 2018**

Attached is:	See Section below
☐ INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
☐ PROFFERED PERMIT (Standard Permit or Letter of permission)	B
☐ PERMIT DENIAL	C
☐ APPROVED JURISDICTIONAL DETERMINATION	D
☒ PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/Missions/CivilWorks/RegulatoryProgramandPermits.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
District Engineer, Wilmington Regulatory Division, Attn: Billy Standridge	Mr. Jason Steele, Administrative Appeal Review Officer CESAD-PDO U.S. Army Corps of Engineers, South Atlantic Division 60 Forsyth Street, Room 10M15 Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

_____ Signature of appellant or agent.	Date:	Telephone number:

For appeals on Initial Proffered Permits send this form to:

District Engineer, Wilmington Regulatory Division, Attn: Billy Standridge, 69 Darlington Avenue, Wilmington, North Carolina 28403

For Permit denials, Proffered Permits and approved Jurisdictional Determinations send this form to:

Division Engineer, Commander, U.S. Army Engineer Division, South Atlantic, Attn: Mr. Jason Steele, Administrative Appeal Officer, CESAD-PDO, 60 Forsyth Street, Room 10M15, Atlanta, Georgia 30303-8801 Phone: (404) 562-5137

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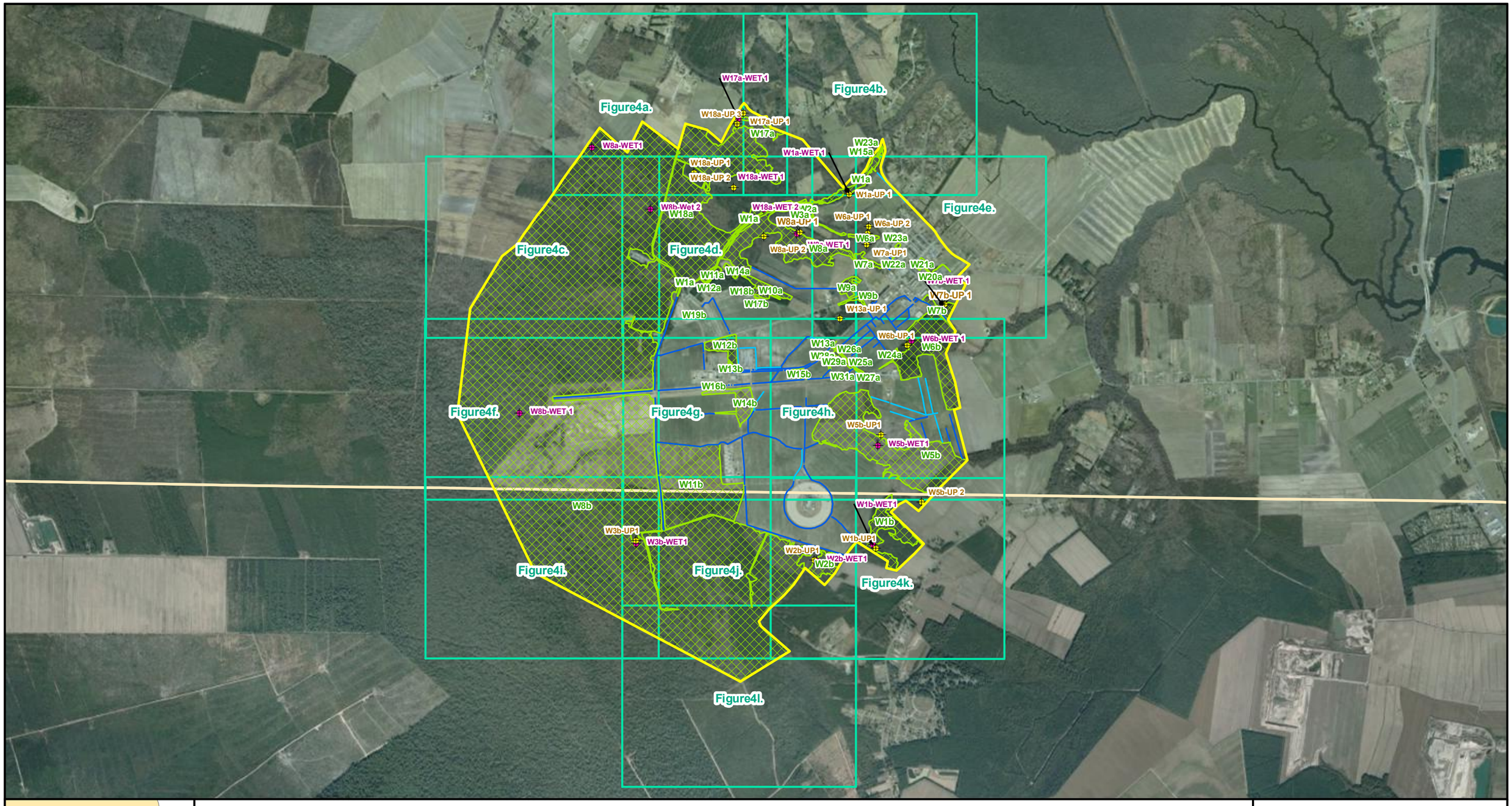

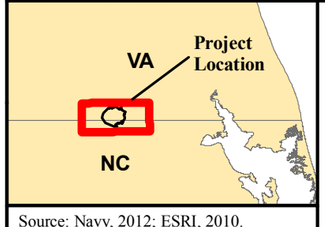

Source: Navy, 2012; ESRI, 2010.

Legend

- Installation Boundary
- State Boundary
- Roads
- Wetlands
- Wetland Plots
- Upland Plots
- Stream Classification
  - Perennial
  - Intermittent

0 1,250 2,500 5,000 Feet

0 375 750 1,500 Meters

N

Sheet Key. Aquatic Resources Map for NSA Northwest Wetland Delineation, Chesapeake County, VA and Currituck County, NC.

Prepared For:	NAVFAC Naval Facilities Engineering Command	
Prepared By:	TETRA TECH	Date: 08/2012

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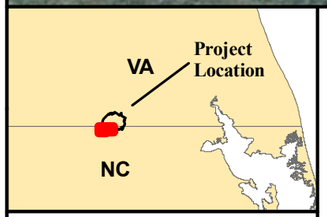

Source: Navy, 2012; ESRI, 2010.

Legend

- Installation Boundary
- State Boundary
- Roads
- Wetlands
- Wetland Plots
- Upland Plots
- Stream Classification
  - Perennial
  - Intermittent

0 125 250 500 Feet

0 37.5 75 150 Meters

N

Figure 4i. Aquatic Resources Map for NSA Northwest Wetland Delineation, Chesapeake County, VA and Currituck County, NC.

Prepared For:	NAVFAC Naval Facilities Engineering Command	
Prepared By:	TETRA TECH	**Date:** 08/2012

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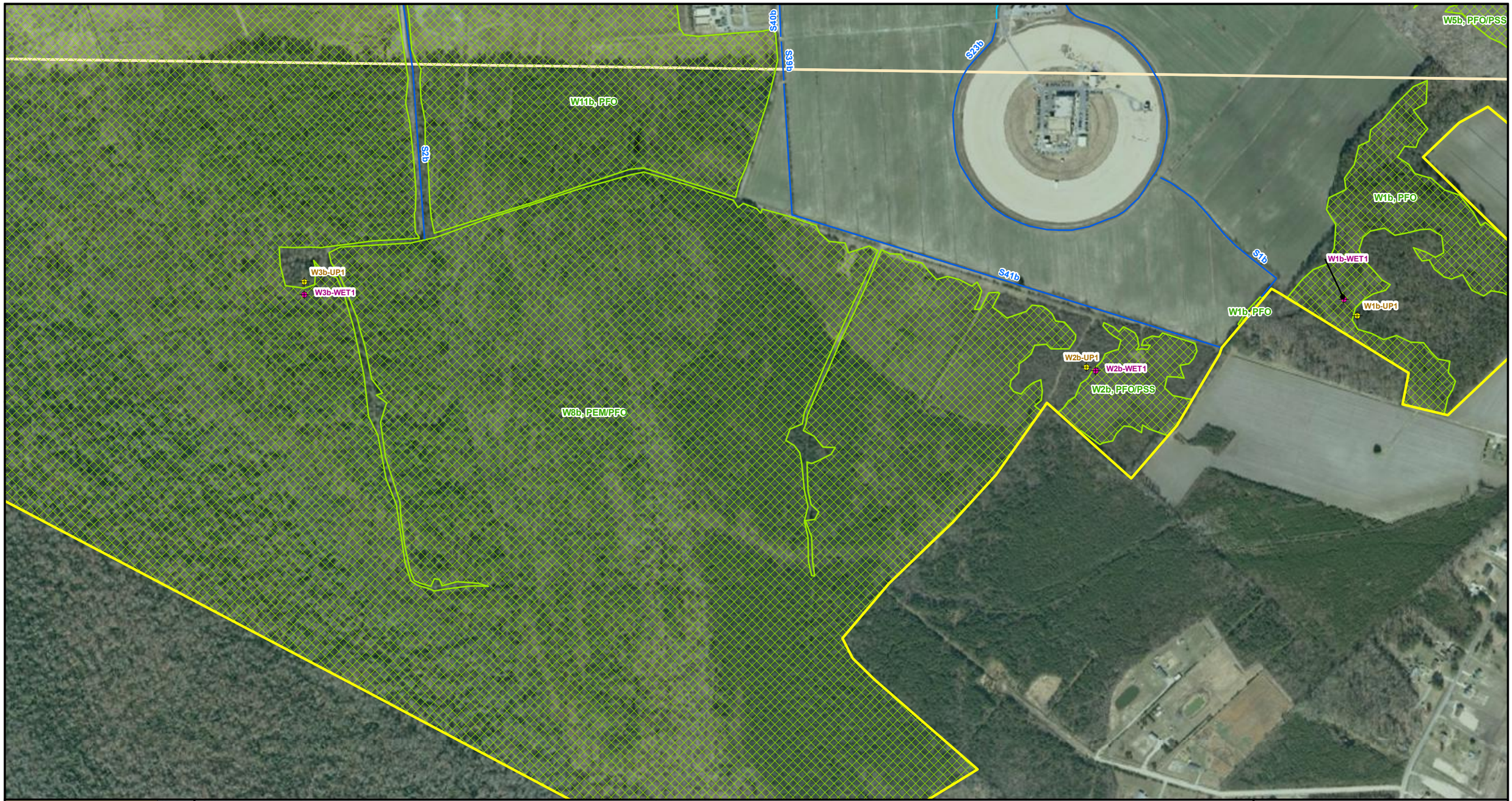

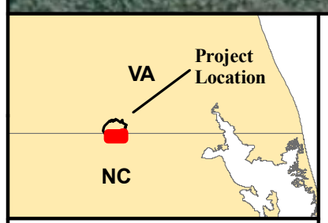

Source: Navy, 2012; ESRI, 2010.

Legend

- Installation Boundary
- State Boundary
- Roads
- Wetlands
- Wetland Plots
- Upland Plots
- Stream Classification
  - Perennial
  - Intermittent

0 125 250 500
Feet
Meters
0 37.5 75 150

N

Figure 4j. Aquatic Resources Map for NSA Northwest Wetland Delineation, Chesapeake County, VA and Currituck County, NC.

Prepared For:	NAVFAC Naval Facilities Engineering Command	
Prepared By:	TETRA TECH	**Date:** 08/2012

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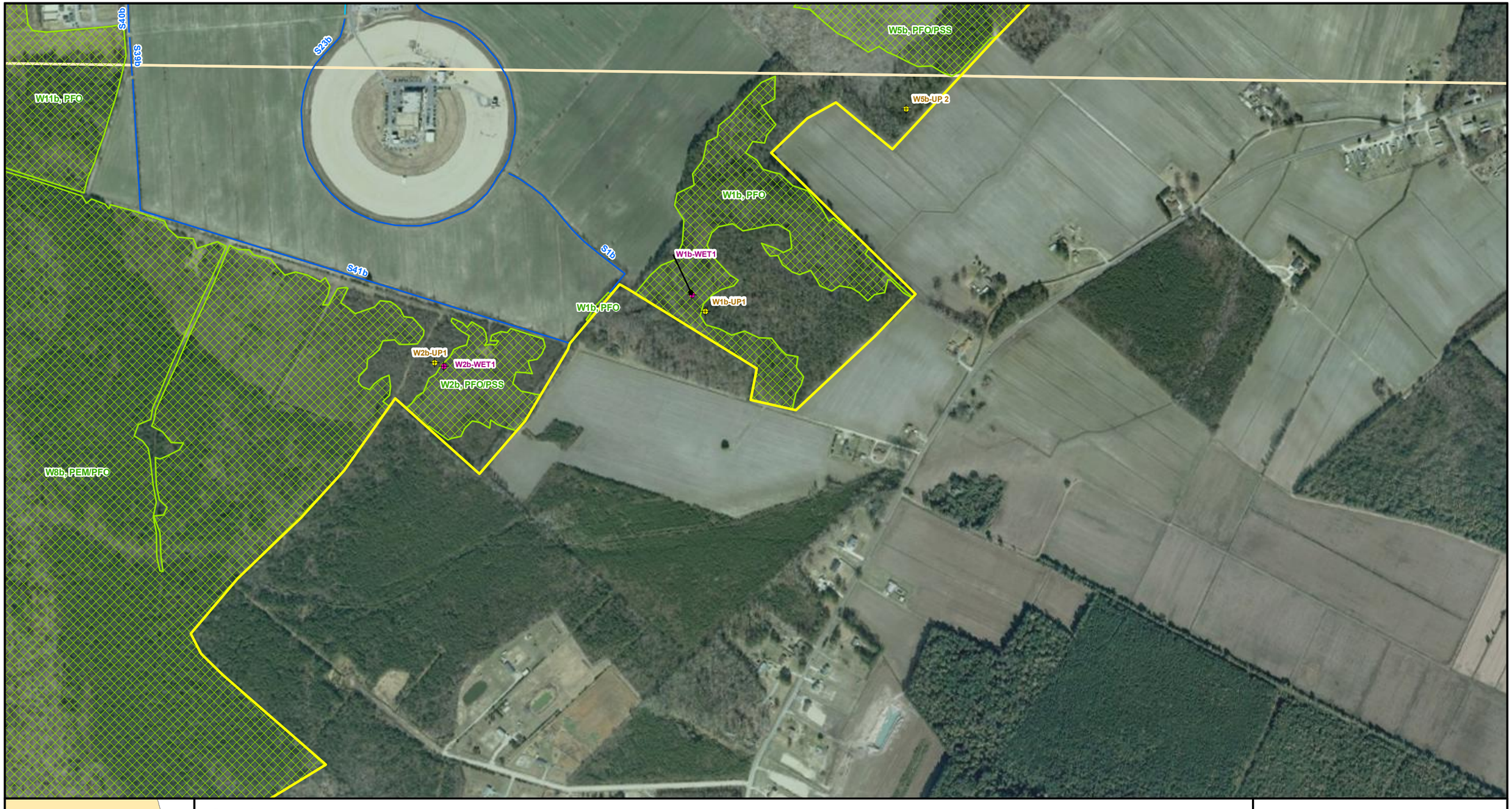

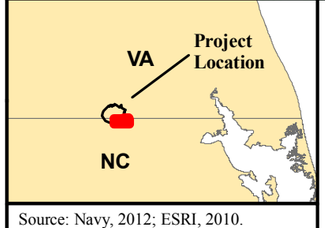

Source: Navy, 2012; ESRI, 2010.

Legend

- Installation Boundary
- State Boundary
- Roads
- Wetlands
- Wetland Plots
- Upland Plots

Stream Classification

- Perennial
- Intermittent

0 125 250 500 Feet

0 37.5 75 150 Meters

N

Figure 4k. Aquatic Resources Map for NSA Northwest Wetland Delineation, Chesapeake County, VA and Currituck County, NC.

Prepared For:	NAVFAC Naval Facilities Engineering Command	
Prepared By:	TETRA TECH	Date: 08/2012

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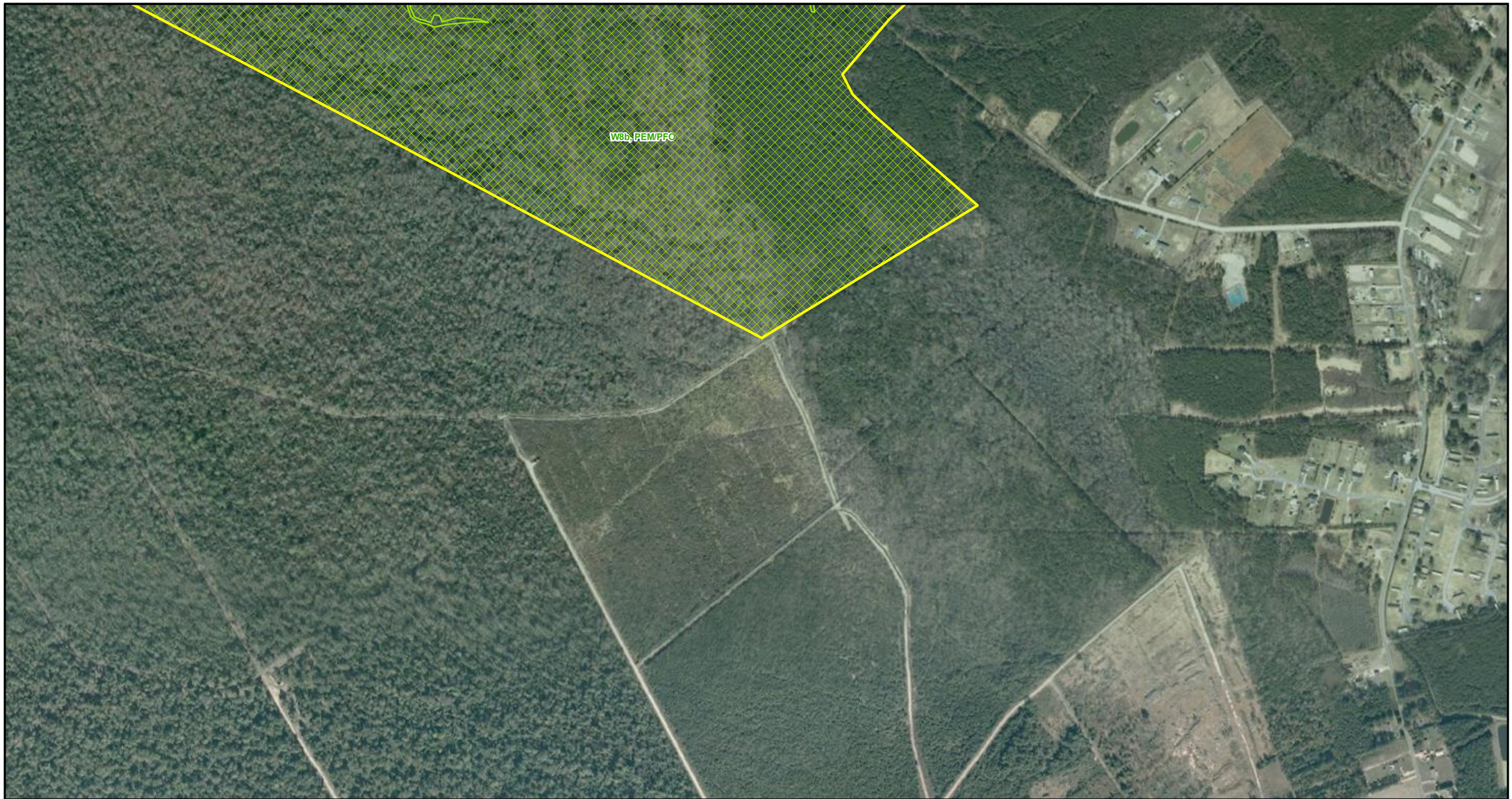

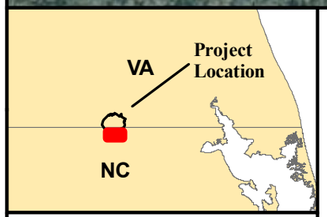

Source: Navy, 2012; ESRI, 2010.

Legend

- Installation Boundary
- State Boundary
- Roads
- Wetlands
- Wetland Plots
- Upland Plots

Stream Classification

- Perennial
- Intermittent

0 125 250 500 Feet

0 37.5 75 150 Meters

N

Figure 4l. Aquatic Resources Map for NSA Northwest Wetland Delineation, Chesapeake County, VA and Currituck County, NC.

Prepared For:	NAVFAC Naval Facilities Engineering Command	
Prepared By:	TETRA TECH	**Date:** 08/2012

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Enclosure 3. 50ft Wetland/Riparian Buffer Map

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Naval Support Activity Hampton Roads, Northwest Annex (N57095-NW)

Wetland/Waterway Protection Area Reference Map

Legend

- Wetland
- Wetland Buffer (50 feet)
- **Installation Boundary**

This map is generated from data contained in the CNRMA GeoReadiness Center (GRC). The information contained in CNRMA GRC is not to be construed or used as a "legal description" nor is it survey grade. Plans and maps from this database are believed to be accurate but accuracy is not guaranteed and the burden for determining accuracy, completeness, and appropriateness for use rests solely on the user accessing this information. The user acknowledges and accepts all inherent limitations of this maps and data, including the fact that they are dynamic and in a constant state of maintenance, correction, and revision. Data owners should be consulted if field verification or additional information is needed.

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Map created by K. Dean Wright,
NAVFAC MIDLANT EV
GIS Coordinator, on 04 JUN 2015

Coordinate System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984

0 400 800 1,600 2,400 3,200 Feet

0 100 200 400 600 800 Meters

N
W E
S

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Enclosure 4. Watershed/Hydrologic Unit Map

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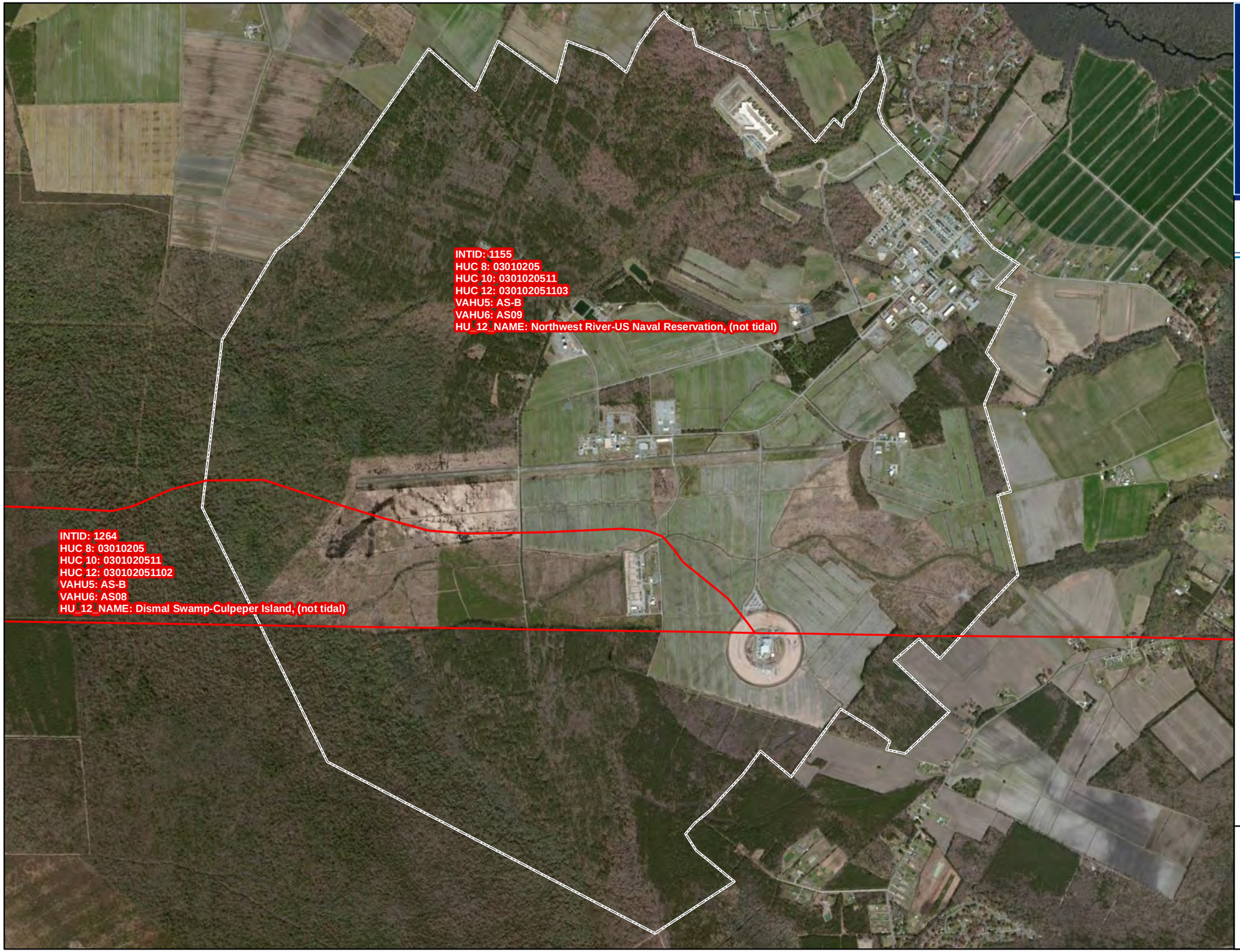
NAVSUPPACT HAMPTON ROADS VA - NORTHWEST CHESAPKE

N57095-NW

Installation Watershed Map



NAVFAC Naval Facilities Engineering Command

ENVIRONMENTAL BUSINESS LINE, MID-ATLANTIC REGION

Legend

- Watershed Boundary
- **Installation Boundary**

This map is generated from data contained in the CNRMA GeoReadiness Center (GRC). The information contained in CNRMA GRC is not to be construed or used as a "legal description" nor is it survey grade. Plans and maps from this database are believed to be accurate but accuracy is not guaranteed and the burden for determining accuracy, completeness, and appropriateness for use rests solely on the user accessing this information. The user acknowledges and accepts all inherent limitations of this maps and data, including the fact that they are dynamic and in a constant state of maintenance, correction, and revision. Data owners should be consulted if field verification or additional information is needed. This material is For Official Use Only.

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Map created by K. Dean Wright,
NAVFAC MIDLANT EV
GIS Coordinator, on 6/4/2015

Coordinate System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984

0 410 820 1,640 2,460 3,280 Feet

0 115 230 460 690 920 Meters

N W E S

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Appendix F

Flora and Fauna Lists, IPaC Reports

Enclosure 1	**Flora, Fauna, and Vegetation Communities of NSAHR NWA**
Enclosure 2	**Fauna of NSAHR HQ, NSAHR LRA, and NSAHR PA**
Enclosure 3	**Animal Species of Greatest Conservation Need for the Virginia Mid-Atlantic Coastal Plain**
Enclosure 4	**Plant Species of Greatest Conservation Need for the Virginia Mid-Atlantic Coastal Plain**
Enclosure 5	**Protection Wildlife Species of North Carolina**
Enclosure 6	**Protection Plant Species of North Carolina**
Enclosure 7	**Invasive Plant Species of Virginia**
Enclosure 8	**Invasive Plant Species of North Carolina**
Enclosure 9	**IPaC Reports**

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Enclosure 1. Flora, Fauna, and Vegetation Communities of NSAHR NWA

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Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
		S1B/S2N		SR	S1B, S3N	Bird	American bittern	*Botaurus lentiginosus*	NSA	Year round in coastal Virginia	breed mainly in freshwater marshes with tall vegetation. In winter they move to areas where water bodies don't freeze, especially near the coast, where they occasionally use brackish marshes. Wintering birds may also forage in dry grasslands and other terrestrial habitats.	Yes
		S1BS5N				Bird	American Coot	*Fulica americana*	NSA	Common in VA during winter and non-breeding times.	Ponds, lakes, marshes; in winter, also fields, park ponds, salt bays. For breeding season requires fairly shallow fresh water with much marsh vegetation. At other seasons may be in almost any aquatic habitat, including ponds or reservoirs with bare shorelines, open ground near lakes, on salt marshes or protected coastal bays. Migrants sometimes are seen out at sea some distance from land.	Yes
				SR	S2B,S5N	Bird	American Kestrel	*Falco sparverius*	NSA	Common year-round	Open country, farmland, cities, wood edges. Inhabits any kind of open or semi-open situation, from forest clearings to farmland to desert, wherever it can find adequate prey and some raised perches. In breeding season, may be limited to habitats that also provide appropriate nesting sites. In winter, females may tend to be found in more open habitats than males.	yes
		S3B/S3N / WL	II	SC	S2S3B,S3N	Bird	American oystercatcher	*Haematopus palliatus*	NSA	Common to abundant permanent resident on immediate coast of Eastern Shore; locally common in Tangier area of Chesapeake Bay. Uncommon to rare transient in lower Chesapeake Bay. Record from York River (Sarah Creek)	In the winter, oystercatchers can be found roosting on wave-tossed shell mounds and elevated sections of dredge spoil islands. During feeding, wintering oystercatchers were found on old oysterbeds, intertidal mudflats, and along intertidal creeks and rivers. In general, oystercatchers are found on beaches, mudflats and borders of salt marshes; rarely found inland but may venture to tilled grounds.	yes
	ST	S1B	I	SC	S3B,S2N	Bird	Bachman's Sparrow	*Peucaea aestivalis*	NSA	a few counties in central VA	mature pine forest or savanna with the open grassy understory	Yes
BGEPA		S3S4B/S3S4N / WL		NC ST	S3B,S3N	Bird	Bald eagle	*Haliaeetus leucophalus*	NSA	breeding, all seasons	Tree nests are usually in very tall tree, standing above surrounding forest, up to 180' or more above ground.	yes
		S3B/S3N / WL	III	SC	S2S3B,S3N	Bird	Barn owl	*Tyto alba*	NSA	Common year round on the coastal plain of VA and NC.	Woodlands, groves, farms, barns, towns, cliffs. Typically in open or semi-open country in lowlands. May nest in forest or city if nearby area has good open foraging territory, such as farmland, marsh, prairie, desert.	yes
		S2B/S1N	II	SC	S2B,S3N	Bird	Black skimmer	*Rynchops niger*	NSA	Breeds along the coastline of Va and NC, Year-round resident on NC coast.	Mostly ocean beaches, tidewater. Favors coastal waters protected from open surf, such as lagoons, estuaries, inlets, sheltered bays. Nest site on ground on open sandy beach, shell bank, sandbar; sometimes on gravel roof. Nest is shallow scrape in sand.	No
			II	SR	S2B	Bird	Black-billed cuckoo	*Coccyzus erythropthalmus*	NSA	Breeding resident in VA and NC	Forest edge and open woodland, both deciduous and coniferous, with dense deciduous thickets. Found in extensive tracts of dry upland woods where it uses the midstory canopy and the overstory canopy for most activities. Nests in groves of trees, forest edges, moist thickets, overgrown pastures; in deciduous or evergreen tree or shrub. Is a low or ground nesting species.	yes
		S3B/S4N / WL	III	W1	S3B,S3N	Bird	Black-crowned Night-Heron	*Nycticorax nycticorax*	NSA	NC - Tidewater, [nesting sites only] Year-round resident	Maritime thickets or forests, almost always on small islands. Most wetland habitats across North America, including estuaries, marshes, streams, lakes, and reservoirs.	Yes
		S1B		SR	S1B	Bird	Black-necked Stilt	*Himantopus mexicanus*	NSA	NC - Tidewater [breeding evidence] It seldom shows up away from its few favored sites in the state; most birders see the species only in the Pea/Bodie islands area. Unlike most other shorebird species, which may straggle into late fall or early winter, stilts are quite cold intolerant, and depart the state promptly by mid-fall. This is one of the rarest shorebirds found away from the coast, with just a handful of far inland records.	For nesting and foraging, it is restricted to fresh to brackish, still waters -- mainly impoundments, dredge spoil ponds, and sewage treatment ponds, along and close to the coast. Nearly all sites in the state are man-made bodies of water. Grassy marshes, mudflats, pools, shallow lakes (fresh and alkaline). Found at all seasons at the margins of shallow water in very open country, especially where there is much marsh growth. For nesting, requires bare open ground near water, with little vegetation.	No
		S3B / WL		SR	S2B	Bird	Blue-winged warbler	*Vermivora pinus*	NSA	Uncommon summer passage migrant at NSA. Occurs mid to eastern North America and the eastern coast of South America.	Breeds inn brushy hillsides, second growth, partly open situations with saplings, bogs, woodland edge and clearings, stream edges, overgrown pastures, swamps. Nests close to or on ground, in bushes, weeds, or grasses, or under bushes, or between exposed roots of stump. Migration and winter habitats include brushy areas, scrub, and open woodland.	yes
		S3B/S5N / WL		SC	S3B,S5N	Bird	Brown creeper	*Certhia americana*	NSA (N)	Uncommon winter resident at NSA.	Forest, woodlands, forested floodplains and swamps. Scrub and parks are also used in winter and during migration. Most often found in coniferous and mixed forests. Found in Standing snag/hollow tree,	yes
		S2B/S3N		SR	S3B,S4N	Bird	Brown Pelican	*Pelecanus occidentalis*	NSA	year round	estuaries and coastal marine habitats	Yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
		S3S4B / WL	IV			Bird	Canada Warbler	*Cardellina canadensis*	NSA	Migratory though the western portions of VA and NC	Forest undergrowth, shady thickets. Breeds in mature mixed hardwoods of extensive forests and streamside thickets. Prefers to nest in moist habitat: in luxuriant undergrowth, near swamps, on stream banks, in rhododendron thickets, in deep, rocky ravines and in moist deciduous second-growth.	No
		S3/S4B / WL	II	SC	S2B	Bird	Cerulean Warbler	*Setophaga cerulea*	NSA (N)	Rare spring transient, in the coastal plain.	Deciduous forests, especially in river valleys. Breeds in mature hardwoods either in uplands or along streams. Prefers elm, soft maple, oak, birch, hickory, beech, basswood, linden, sycamore, or black ash. Nests only in tall forest with clear understory. In winter in tropics, found mostly in forest and woodland borders in foothills and lower slopes.	Yes
			IV	W1	S4B	Bird	Chimney swift	*Chaetura pelagica*	NSA	NC - Coastal Plain. Breeds throughout most of North America, winters in South America	Nest in chimneys and on other vertical surfaces in dim, enclosed areas, including air vents, wells, hollow trees, and caves. They forage over urban and suburban areas, rivers, lakes, forests, and fields. Not on Currituck Co listing	Yes
				W1	S4B	Bird	Chuck-will's-widow	*Antrostomus carolinensis*	NSA	Breeds in most of VA and NC (except western mountainous regions)	Dry woodlands in the southeast, from pine barrens to oak-hickory and mixed deciduous woodlands. Not on Currituck Co listing	Yes
		S1B/S1N		W2	S3B,S2N	Bird	Common Gallinule	*Gallinula galeata*	NSA	NC - Tidewater and Coastal Plain, [breeding season only] Year-round resident in coastal NC.	Marshes, ponds, canals, ditches, and rice fields where pools with submerged or floating vegetation are interspersed with emergent or shoreline vegetation, this species forages for plant materials and macroinvertebrates on the water surface, among submerged plants, and in shoreline and upland vegetation.	No
				W1	S2S3B	Bird	Common nighthawk	*Chordeiles minor*	NSA	NC - Tidewater and Coastal Plain. Breeding evidence only. Breeds throughout most of North America, winters in South America	Forage over open areas near woods or wetlands. They nest on the ground in open areas such as gravel bars, forest clearings, coastal sand dunes, or sparsely vegetated grasslands. Not on Currituck Co listing	Yes
		S3B / WL	II	E	S2B	Bird	Common Tern	*Sterna hirundo*	NSA	Breeds commonly on the coast of the Eastern Shore. Common transient and summer resident on coast and in the Bay. Less common transient inland, rare winter visitor	Nest site is on bare ground or surrounded by low vegetation; sometimes on floating mat of dead vegetation	no
		S3B/S3N				Bird	Cooper's hawk	*Accipiter cooperii*	NSA	Non breeding individuals in eastern US my occur from New England south to Middle America. Species observed but uncommon at NASO and NSA.	Nesting - Mixed deciduous-coniferous dense forest with eastern hemlock as the dominant coniferous species. Prefer large basal area and canopy cover. Commonly near wetland openings or source of water, on level ground or lower slopes, typically several hundred meters from paved roads. Speces avoid southern exposures. Also found in pine plantation with deformed tree canopy tree tops. **Non breeding** - Ridges and coastlines,. Similar to nesting habitat except open woodlands and fields may be utilized to a greater extent.	yes
PT	SE	S1B/S1N	I	SC	S1	Bird	Eastern Black Rail	*Laterallus jamaicensis jamaicensis*	NSA	B - Spring/Summer; Uncommon to rare transient and local summer resident and rare winter visitor in the Coastal Plain. Peak counts occur along the coast in late spring and early summer. According to the Breeding Bird Atlas, there is no record of breeding in Virginia	This is a very secretive species. It shows more of a tendency toward dry fields than other species in this family. Its nest is usually found in tussocks of grass in drier locations up from water. Favor brackish marshes and the drier parts of the salt marsh, found the least in fresh water marshes; they use a wide range of vegetation heights, varying from 6in. of matted grass to 3ft. of sedges. Prefer salt marshes but also found along inland tidal creeks and marshes. Along the seacoast occurs above and in bank of beaches along edges of Salicornia flats and in salt meadow cordgrass. It is occasionally found in wet savannahs	yes
			III	W1	S3B	Bird	Eastern Whip-poor-will	*Antrostomus vociferus*	NSA	Breeds throughout VA and NC	Eastern forests with open understories. They can be found in both purely deciduous and mixed deciduous-pine forests, often in areas with sandy soil. Not on Currituck Co listing	Yes
		S3B/S3N / WL	III	W2	S3B,S5N	Bird	Forster's tern	*Sterna forsteri*	NSA	Commonly breeds in coastal NC, Uncommon in the winter in the VA and NC coastal plain	Marshes (fresh or salt), lakes, bays, beaches. During summer is mostly around marshes, either coastal salt marsh or large marshy lakes in the interior. May visit any waters during migration. Winters mostly along coast, especially around estuaries, inlets, coastal lagoons, sheltered bays.	Possible
		S2B/S1N	I	SC	S1, S2B	Bird	Glossy Ibis	*Plegadis falcinellus*	NSA	NC - Tidewater, [breeding evidence only] Breeds in coastal VA and NC; Rare in the Tidewater zone in the warmer months, and very rare in winter	Nests with other waders on small coastal islands. Forests or thickets on maritime islands. Inland wetland habitats such as shallow lakes, swamps and marshes, ponds, rivers, floodplains, wet meadows and irrigated agricultural fields, as well as occasionally using coastal lagoons, mudflats and estuaries	Yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
		SHB/S1N	I	SR	S1B, S1N	Bird	Golden Eagle	*Aquila chrysaetos*	NSA	Found mostly in the western half of the U.S., they are rare in eastern states.	They avoid developed areas and uninterrupted stretches of forest. They are found primarily in mountains up to 12,000 feet, canyonlands, rimrock terrain, and riverside cliffs and bluffs. Partially or completely open country, especially around mountains, hills, and cliffs. They use a variety of habitats ranging from arctic to desert, including tundra, shrublands, grasslands, coniferous forests, farmland, and areas along rivers and streams.	no
		S2B/S5N		W2,W5	S3S4B,S5N	Bird	Golden-crowned Kinglet	*Regulus satrapa*	NSA (N)	nonbreeding	trees and shrubs in winter	Yes
			IV	W1,W5	S3B, S1N	Bird	Grasshopper sparrow	*Ammodramus savannarum*	NSA	Uncommon breeder in SE VA and NE NC.	Grassland, hayfields, prairies. Breeds in rather dry fields and prairies, especially those with fairly tall grass and weeds and a few scattered shrubs. Also nests in overgrown pastures and hayfields, and sometimes in fields of other crops.	yes
		S3B/S5N WL				Bird	Great blue heron	*Ardea herodias*	NSA	Resident at NASO. In the east US region - southern New England south to northern South America. Oserved at	Freshwater and brackish marshes, along lakes, rivers, bays, lagoons, ocean beaches, mangroves, fields, and meadows. Nests commonly high in trees in swamps and forested areas, less commonly in bushes, or on ground, rock ledges, and coastal cliffs.	yes
		S2S3B/S3N				Bird	Great egret	*Ardea alba*	NSA	Summer resident at NASO. Breeds Maine south through the Gulf states. During non-breeding saso,n occurs regularly north to North Carolina, southern U.S, and CA	Marshes, swampy woods, tidal estuaries, lagoons, mangroves, streams, lakes, and ponds; also fields and meadows.	yes
	ST	S2B	I	T	S1S2B	Bird	Gull-billed Tern	*Gelochelidon (Sterna) nilotica*	NSA	Coastal summer breeding - not likely to be found inland or along rivers. Uncommon summer resident along coast of Eastern Shore; uncommon transient on coast south of Cape Henry, rare in lower Chesapeake Bay. Only three records away from coast. Breeds along coast of Eastern Shore	All known breeding colonies are located on the barrier islands of the Eastern Shore (FIPS 001,131) ; unusual nesting record away from coast at Craney Island--nest with 2 eggs, 05 July 1964. Breeds on gravelly or sandy beaches. Winters in salt marshes, estuaries, lagoons and plowed fields, less frequently along rivers, around lakes and in fresh-water marshes.	no
	ST	S1B	I	E	S1B,S1N	Bird	Henslow's Sparrow	*Ammodramus henslowii*	NSA	Rare transient, summer resident and winter visitor in the coastal plain with the only known summer occurrences now in Accomack County. Also recorded in New Kent County and Sussex County during the breeding season.	Breeds in grasslands, previously in grassy marshes.	yes
		S1B/S5N		SR	S2B,S5N	Bird	Hermit thrush	*Catharus guttatus*	NSA (N)	A rare non-breeding resident at NSA. Observed in Grayson, Highland, Russell, Smyth, and Washington counties in VA.	Open humid coniferous and mixed forest and forest edge, dry sandy and sparse jackpine, less frequently in deciduous forest and thickets; in migration and winter also chaparral, riparian woodland, arid pine-oak, desert scrub.	yes
		S2B/S3N	II	W1,W3	S3B,S3N	Bird	King Rail	*Rallus elegans*	NSA	Locally common transient and summer resident (mainly in fresh and brackish marshes), in Coastal Plain, rare winter resident and rare elsewhere in state. Peak counts occur along the coast during winter.	Occurs in freshwater or brackish marshes, in emergent vegetation of extensive marshes along streams, ponds, and rivers Also occasionally uses rice fields and wet meadows, freshwater swamps dominated by shrubs, sloughs, edges of sluggish streamsand sometimes seen foraging in roadside ditches. It is found breeding in shallow water rice fields, fresh to brackish marshes, roadside ditches, low bushes, and occasionally in oat and wheat fields. It is not know to breed in coastal salt marshes	yes
		S3B/S3N / WL	III	SC	S2S3B	Bird	Least Bittern	*Ixobrychus exilis*	NSA	Common transient and uncommon summer resident of Coastal Plain (30 April - 20 Sept.), rare and local transient and summer resident. inland. Peak counts occur along the coast during Spring and summer. Only four winter records.	Prefers marshes with fresh or brackish water with tall vegetation. Often in cattails or areas where vegetation is at least 3ft. tall . All seasons generally in freshwater marshes, especially where the vegetation is at least 3ft.(1m) high; commonly in cattails (typha spp.). Common in brackish marshes but infrequent in salt marshes	yes
		S2B	III	SC	S3B	Bird	Least Tern	*Sternula antillarum*	NSA	NC - Tidewater [breeding evidence] Somewhat less numerous in the Tidewater zone (around brackish water, mainly). Very rare to rare non-breeder farther inland, where it is mostly a post-breeding visitor or early fall migrant (including some storm-carried records). Along the coast, mainly present from early Apr to mid-Sep; departs early, with very few remaining into Oct; exceptionally from mid-Mar to mid-Nov, but no conclusive winter records (Dec thru Feb).	The species forages over the inshore ocean and in sounds/estuaries, rarely at fresh or brackish water. Nests on beaches, sand flats, open dunes, gravel rooftops.	No
		S2B/S3N	II	SC	S3B,S3N	Bird	Little blue heron	*Egretta caerulea*	NSA	Common transient and summer resident and uncommon winter resident along the coast. It is an irregularly uncommon transient and summer visitor farther inland. Breeding and peak counts all occur on the Eastern Shore and in Virginia Beach. This species is believed to breed between 20 May and 20 June	Nest in variety of trees along edge of water, usually hardwood . Forage on mudflats and shallow water areas, prefering fresh water. In Virginia Beach, this species can be found year-round just along the areas of the coastal spit/Back Bay and False Cape	yes
	ST	S1B/S2N	I	SC, W2	S2S3B,S3N	Bird	Loggerhead Shrike	*Lanius ludovicianus*	NSA	year round	Only this subspecies breeds in the Piedmont and Coastal Plain Provinces, but both this subspecies and the other subspecies resident in Virginia. Species is a permanent resident near the Fall Line but rare farther east.	yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
	ST	S1B/S2N				Bird	Loggerhead Shrike, migrant	*Lanius ludovicianus migrans*	NSA	Winters in Hampton, Newport News, Norfolk, Suffolk, and Virginia Beach.	Prefers open grassland that is grazed or mowed to keep grass short. An abundance of perching sites such as fences, woody vegetation or hedgerows is also important. This species usually nests in easern redcedar or hawthorne. During periods of cold weather or snow cover, shrikes sometimes move from hedgerow habitats to woodlots.	yes
		S2B		SR	S2B	Bird	Magnolia Warbler	*Setophaga magnolia*	NSA	migration	Low conifers; in migration, other trees. Breeds most commonly in areas of short young spruce; also in young hemlocks and pines, and in dense understory of taller coniferous forest. During migration may be in any kind of deciduous shrubs or low trees. In winter in tropics, often in second-growth and scrub as well as edges of taller forest.	Yes
		S1S2B/S3N	III	SR	S2B	Bird	Northern harrier	*Circus cyaneus*	NSA	Commonly winters in the southeast. An uncommon year-round resident in coastal VA and NC	Marshes, fields, prairies. Found in many kinds of open terrain, both wet and dry habitats, where there is good ground cover. Often found in marshes, especially in nesting season, but sometimes will nest in dry open fields.	yes
		S1B/S2N	I	ST	S2B,S2N	Bird	Northern Saw-whet owl	*Aegolius acadicus*	NSA	Winter non breedingin SE VA and NE NC	They winter in dense forests across the central and southern U.S.	yes
		S1B				Bird	Northern waterthrush	*Parkesia noveboracensis*	NSA	Common during migration	Swampy or wet woods, streamsides, lake shores; in migration, also thickets. Breeds mostly in coniferous forests with standing or sluggish water, as found in shrubby bogs and edges of northern lakes, less often along swift streams. In migration, may appear in any habitat; more frequent in thickets along edges of water. In winter in tropics, often in coastal mangrove swamps.	Yes
	ST	S1B/S2N	I	SE	S1B,S2N	Bird	Peregrine Falcon	*Falco peregrinus*	NSA	B - Spring/Summer; This is an uncommon transient and rare winter resident along the coast, and rare inland. It was formerly a rare summer resident in the Mountains and Valleys. After extensive reintroduction efforts, the peregrine falcon now breeds at several coastal sites.	Perches or nests on skyscrapers, water towers, cliffs, power pylons, and other tall structures	yes
		S1S2B/S4N		W2	S3B,S5N	Bird	Pied-billed Grebe	*Podilymbus podiceps*	NSA (N)	Year-round	Ponds, lakes, marshes; in winter, also salt bays. In breeding season, chooses sites with heavy marsh vegetation but with some open water also. In migration and winter, still most likely on marshy freshwater ponds, but also on more open waters, including estuaries and coastal bays.	Yes
FT	ST	S2B/S1N	II	ST	S1B,S1N	Bird	Piping Plover	*Charadrius melodus*	NSA	Uncommon breeding in SE Virginia and NE North Carolina.	Sandy beaches, tidal flats. Nests in open sandy situations near water, in a variety of settings: beaches along Atlantic Coast.	no
		S1B/S5N				Bird	Purple finch	*Haemorhous purpureus (Carpodacus purpureus)*	NSA	Nonbreeding in most of Virginia	In summer, Purple Finches are primarily birds of moist, cool evergreen forests. Also in mixed forests, along wooded streams, and in tree-lined suburbs. In winter they're more widespread, using forests, shrubby areas, weedy fields, hedgerows, and backyards.	Yes
FT	ST	S2N	I	ST	S2N	Bird	Red Knot -- Rufa subspecies	*Calidris canutus rufa*	NSA	Nonbreeder, locally common to abundant transient (10 May-5 Jun, 20 Jul-25 Sep) along coast, uncommon to rare winter and summer visitor. NC - Tidewater. Transient and winter resident, essentially only along the coast. Only fairly common in spring, and uncommon to fairly common in fall, along the entire coast. Small numbers can be seen in early summer. In the Tidewater zone, very rare migrant, and rare to absent in winter.	Outside of breeding season, it is found primarily in intertidal, marine habitats, especially near coastal inlets, estuaries, and bays. Knots favor tidal water for foraging, such as ocean and inlet beaches, or other sand flats; they are not as numerous on the extensive wet mud of tidal flats. They also forage in shallow water of coastal impoundments and pools.	Possible
		S2B/S4N		W2,W5	S3B,S4N	Bird	Red-breasted nuthatch	*Sitta canadensis*	NSA (N)	Ucommon winter resident at NSA. A nonbreeding resident of Va documented in the following counties in VA: Grayson, Highland, Madison, Montgomery, Rockingham, Russell, Smyth, and Washington	Coniferous and mixed forest, aspen woodland; in migration and winter also in deciduous forest, open woodland, parks, scrub, and riparian woodland. Nests in excavated cavity in tree stub or branch of dead tree, or dead top of live tree, also in abandoned woodpecker hole, natural cavity, or bird box; average of 4-5 m above ground.	Yes
FE	SE	SHB		SE	SHB	Bird	Roseate Tern	*Sterna dougallii dougallii*	NSA	Winter/fall migration; It is a rare transient and summer visitor near the coast. It formerly nested irregularly on Virginia's Eastern Shore, but there is no definite breeding record since 1927; Currently seen only during migration	The roseate tern nests on higher parts of sandy islands (including ridges or sand dunes) amidst vegetation which serves to conceal the nest. This species usually feeds over open water, often in tidal channels, tide rips, or over sandbanks where currents bring fish into relatively shallow water.	yes
		S2B	IV			Bird	Royal tern	*Thalasseus maximus*	NSA	Commonly breeds along the coastline from New Jersey south to NE NC.	Coasts, sandy beaches, salt bays. Favors warm coastal waters, especially those that are shallow and somewhat protected, as in bays, lagoons, estuaries. Common along tropical and subtropical shores, it is almost never found inland except after hurricanes.	Possible
			IV	W1	S3N	Bird	Rusty Blackbird	*Euphagus carolinus*	NSA	NC - Coastal Plain, [wintering habitat only] (most counties in the Coastal Plain	Swamps and other moist hardwood forests, usually near fields, wet areas, including flooded woods, swamps, marshes and the edges of ponds. These moist habitats are their favorite foraging areas in winter and during migration. Not on Currituck Co listing	Yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
		S2B/S3N	III	W3	SUB, S4N	Bird	Saltmarsh Sparrow	*Ammodramus caudacutus*	NSA	NC - Tidewater. Winters in coastal VA and NC.	Salt marshes where smooth cordgrass, saltmeadow grass, and blackgrass are bordered by cattail, read and marsh elder. During migration, sparrows found in a variety of habitats ranging from grassy marshes to agricultural fields. Not on Currituck Co listing.	yes
		S3S4B/S4N WL		SR	S2B,S5N	Bird	Savannah sparrow	*Passerculus sandwichensis*	NSA (N)	Common during winter, nonbreeding	Open fields, meadows, salt marshes, prairies, dunes, shores. Over most of range, found in open meadows, pastures, edges of marshes, alfalfa fields, pastures; also tundra in summer, shores and weedy vacant lots in winter. Northeastern "Ipswich" Savannah Sparrow lives on grassy coastal dunes; southwestern "Belding's" and "Large-billed" races inhabit salt marshes.	Yes
		S1B/S2N		W3	SUB, S3N	Bird	Short-eared Owl	*Asio flammeus*	NSA	Winter - uncommon. Tidewater and Coastal Plain. Winters from New England south to Florida and west to mid to southern California	Coastal marshes, grasslands and open areas, where they perch in low trees or on the ground.	yes
		S2B/S3N	II	SC	S2S3B,S3N	Bird	Snowy egret	*Egretta thula*	NSA	Abundant transient and summer resident (30 March-10 October) on coast, uncommon transient inland; usually uncommon winter resident on coast. This species is believed to breed approximately between 20 May and 1 July	Snowy egrets occur in fresh, brackish, and saltwater areas preferring sheltered areas such as salt marshes, rice fields and shallow coastal bays. Nests in shrubs and trees on islands, lake margins, or in swamps; usually with other waders and usually near tidal waters. Nests will also be located in cedar swamps, willow and other bottomwood ponds, and mangrove islands. This species forages in shallow water of ponds, lakes, marshes, bays, and other bodies of water. It has been shown to prefer fresh water to forage but will often be found in brackish and salt water	yes
		S1B		SR	S1B,S5N	Bird	Swainson's thrush	*Catharus ustulatus*	NSA (N)	Migratory and common during that time. Not a year-round resident as they breed into Canada, and winter in Central America.	Spruce forests and dense streamside woods; in migration, other woods. Breeds in far north and in mountains in coniferous forest with extensive leafy undergrowth; on Pacific Coast, also breeds in deciduous trees and thickets growing along streams. Occurs in many kinds of woodlands in migration. Winters in tropical forest.	Yes
		S2B	II		S3/S4B	Bird	Swainson's warbler	*Limnothlypis swainsonii*	NSA	Breeding resident in SE VA and the entire coastal plain of NC.	Rich, damp, deciduous floodplain and swamp forests; requires areas with deep shade from both canopy and understory cover (Meanley 1971, Bushman and Therres 1988). On the coastal plain, occurs in the shadiest parts of the forest, with dense upper canopy, lower canopy and shrubs, and little herbaceous cover. The shrub stratum is often nearly monospecific stands of giant cane (ARUNDINARIA GIGANTEA) in floodplain forest; sweet pepperbush or fetterbush in swamps at the northern end of range such as the Great Dismal Swamp in Virginia and Pocomoke Swamp in Maryland and Virginia and headwater swamps of the Atlantic Coastal Plain; or scrub palmetto in bottomlands.	Yes
		S2B/S3N		SC	S3B, S3N	Bird	Tricolored Heron	*Egretta tricolor*	NSA	NC - Tidewater. It breeds only coastally; it has never been found nesting in the state at sites away from brackish or salt waters. Not surprisingly, most post-breeding birds tend to stay along the coast, and thus it is a good find at inland lakes and ponds. Permanent resident along the coast, being migratory and thus more numerous in spring, late summer, and fall. In the Tidewater zone, generally rare at all seasons, and does not breed; very rare in winter. Farther inland, a rare post-breeding visitor, late Jun to early Sep; casual in spring.	Forests or thickets on maritime islands, salt and brackish waters, though it does occur with the others on fresh water pools and impoundments.	No
	ST	SHB	I			Bird	Upland Sandpiper	*Bartramia longicauda*	NSA	uncommon duirng migration	Native prairie and other dry grasslands, including airports and some croplands.	no
		S2B/S3N	IV	W3	S3B,S5N	Bird	Virginia Rail	*Rallus limicola*	NSA	NC - Tidewater [breeding season only] Typically only winters in lower Mid-Atlantic states; Permanent resident near the coast, with migratory movements; mostly a transient farther inland. Locally fairly common along the northern coast.	Brackish to nearly fresh marshes near coast; in lower elevations, mostly in freshwater marshlands with an adequate concentration of emergent vegetation (between 40 cm and 100 cm), such as cattails (Typha) and bulrush (Scirpus).	yes
		S1B?	I	E	S2	Bird	Wayne's black-throated green warbler	*Setophaga virens waynei syn Dendroica virens*	NSA	Breeds along the coast of VA and NC, migratory	associated with conifers across most of its breeding range, nesting in spruce, pine, fir, cedar, or cypress stands, depending on the location, from sea level to mountaintops. It also occurs in mixed and broadleaf forests in the southern parts of the breeding range. It shows no particular affinity for conifers or any other specific vegetation type during migration, when it can be found in virtually any vegetated habitat, even scrub and adjacent herbaceous growth and grasses.	Yes
		S1B		W2	S3B, S3N	Bird	White Ibis	*Eudocimus albus*	NSA	NC - Tidewater and Coastal Plain, [breeding sites only] Year-round resident along coastal NC and coastal SE VA, non-breeding farther inland.	Forests or thickets on maritime islands, freshwater marshes, coastal estuaries, mangroves, flooded pastures, mudflats, and swamps. They usually forage in shallow areas with less than 8 inches of water, but they also use lawns and parks	No
				W2	S3B	Bird	Willow flycatcher	*Empidonax traillii*	NSA	Breeding season or migration	wet thickets in open country, often along streams in broad valleys	Yes

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	SE	S1B	I	SC	S2B	Bird	Wilson's Plover	*Charadrius wilsonia*	NSA	It is an uncommon summer resident (25 Apr - 5 Sep) on the Eastern Shore, rare transient and summer visitor in the lower Chesapeake Bay and coast south of Cape Henry	Ocean beaches, lagoons, and salt flats.	no
		S2B/S4N		W2,W5	S3B,S5N	Bird	Winter wren	*Troglodytes hiemalis*	NSA (N)	nonbreeding - winter	Woodland underbrush; conifer forests (summer). Breeds mostly in moist coniferous forest with an understory of dense thickets, often close to water. Winters in very dense low growth in woods, especially along streambanks or among tangles, brushpiles, and fallen logs.	Possible
				W5	S3B	Bird	Worm-eating Warbler - Coastal Plain Population	*Helmitheros vermivorum*	NSA	NC - Coastal Plain, [breeding season only] Breeds along SE VA and NC coastline.	Nonriverine wet hardwoods, pocosins. Large tracts of deciduous and mixed forest overlap with moderate to steep slopes and patches of dense understory shrubs, although breeding populations are also found in low-elevation, coastal forests.	Yes
		S1B				Bird	Yellow-bellied flycatcher	*Empidonax flaviventris*	NSA	Uncommon winter resident, may see during migration. More towards the western parts of VA.	Woods; in summer, boreal forests, muskegs, bogs. Breeds in wet northern forest, especially in spruce bogs with ground cover of sphagnum moss, also in tamarack-white cedar swamps, and in willow-alder thickets along streams in dense coniferous forest. In winter, lives in undergrowth of tropical forest.	Yes
		S1B/S4N		SR	S2S3B,S5N	Bird	Yellow-bellied sapsucker	*Sphyrapicus varius*	NSA (N)	Common winter, nonbreeding	Woodlands, aspen groves; in winter, also orchards, other trees. In summer mostly in mixed coniferous and deciduous woods, especially around aspens. May be found in any kind of woods or even dry brush in migration. Winters mostly in deciduous trees.	Yes
		S2S3B/S3N	II	SR	S2B	Bird	Yellow-crowned Night-heron	*Nyctanassa violacea*	NSA	Common breeding in SE VA and NE NC.	Cypress swamps, mangroves, bayous, streams. Commonly occurs in shallow tidal waters, also along lowland rivers, where trees or other heavy cover nearby. Seldom in open marshes. Nests in mangrove or cypress swamps, riverside groves, thickets near water. Sometimes nests in trees within suburbs or cities.	yes
		S3	IV	SR	S3	Fish	Banded sunfish	*Enneacanthus obesus*	NSA	Distribution in VA: James, York, and Chowan drainages and the Dismal Swamp ·Occurs only in the USA in Atlantic and Gulf Slope drainages from southern New Hampshire to Perdido River in Florida, and south to central Florida.	Inhabits heavily vegetated lakes, ponds, sluggish sand or mud-bottomed pools and backwaters of creeks and small to large rivers. Not identified in past fish surveys	Yes
		S2	IV			Fish	Lake chubsucker	*Erimyzon sucetta*	NSA	Atlantic Slope from southern Virginia to southern Florida	Freshwater. Occurs in lakes, swamps, ponds, sloughs and impoundments over silt, sand or debris. Rarely found in streams. Habitat includes ponds, lakes, oxbows, sloughs, swamps, impoundments, quiet pools of creeks and small rivers, and similar waters of little or no flow that are clear and have bottoms of sand or silt mixed with organic debris; aquatic vegetation usually is present. It is intolerant of increased turbidity and siltation, which are responsible for the loss of several populations.	Possible
T(S/A)				T	S3	Herp	American alligator	*Alligator mississippiensis*	NSA	North Carolina south to Florida. BEHAVIOR: generally active when temperatures are warm from early spring through early fall. During winter they burrow into embankments, use dens created by trees along river banks or submerge into 'gator' holes for the winter.	bay lakes, rivers, creeks, marshes, swamps and ponds, with local populations distributed in patches along the entire coast.	Possible
				NC SC	S3	Herp	Carolina Watersnake	*Nerodia sipedon williamengelsi*	NSA	NC - Tidewater	Salt or brackish marshes. Found on the North Carolina Outer Banks and along the mainland perimeter of the Pamlico Sound and associated estuaries.	No
		S3 / WL	III			Herp	Carpenter frog	*Lithobates virgatipes (Rana viirgatipes)*	NSA	Large populations have been located in Seashore State Park Virginia Beach, Chesapeake, Sussex and Caroline counties. Common in NC. VA: caroline, Hanover, Sussex, Chesapeake, Suffolk, Virginia Beach.	It occupies habitats with still water and an abundance of aquatic or emergent vegetation. This species has been observed in cypress ponds, interdunal swales, tupelo swamps, acid swamps, and canals and is associated with sphagnum mats and other vegetation in coffee-colored waters of pine savanna bogs or ponds. This species is very closely associated with water and is rarely found on land.	yes
		S3 / WL	IV	W3	S3	Herp	Greater siren	*Siren lacertina*	NSA	Atlantic and Gulf Coastal Plains from Virginia south through Florida and west to parts of eastern Alabama.	Found in shallow, muddy bottomed, ponds, swamps, and ditches. Shallow roadside ditches, under rocks in swift flowing streams, weedy ponds and pools, muddy swamps, and weed-choked and mud-bottomed lakes	yes

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		S3 / WL	IV			Herp	Little grass frog	*Pseudacris ocularis*	NSA	Northern portion of its range is southeastern Virginia.	This species prefers grassy areas near bogs or ponds in pine savannas and pools or streams in hardwood forests and swamps. Breeding occurs in association with spring and summer rains. Eggs are laid singly on the bottom of shallow ponds and in vegetation. This species is most often found in moist grassy areas around ponds and cypress ponds. Breeding sites are largely restricted to flooded grassy areas including roadside ditches, logged areas, meadows, emergent shrub wetlands, flooded pastures.	yes
	ST	S1	II			Herp	Lizard, eastern glass	*Ophisaurus ventralis*	NSA	Coastal Plain of the southeastern United states from southeastern Virginia to southern Florida. Locally common in North Carolina.	Lays clutch in spring or summer. In Virginia, hatching has been observed in mid- to late August. Riparian, Grassland/herbaceous, Shrubland/chaparral, Woodland - Conifer, Woodland - Hardwood, Woodland - Mixed. damp grassy areas, maritime forests, open and scrubby woods (mesic hammock, pine flatwoods), vacant lots in coastal towns. can be found under debris in fields and vacant lots near ponds, marshes, and estuaries. It favors areas with sandy friable soils and abundant shelter on ground. Eggs are laid under or at base of grass clumps or under debris on ground.	yes
		S2B	II	SR	S3	Herp	Oak Toad	*Anaxyrus quercicus*	NSA	SE Virginia and NE NC	Much of the preferred habitat of this species has been altered. Natural stands of pine and pine-oak have been replaced with dense loblolly pine monoculture which seems to exclude this and other amphibian species.	yes
		S3 / WL	IV	SR	S3	Herp	Rainbow snake	*Farancia erytrogramma*	NSA	Coastal Plain of Va. The northern distributional limit of this species is in Charles Co., Maryland. This species is confined entirely to the N.A. Coastal Plain from Maryland south through peninsula Florida and eastern Louisiana.	These snakes are both aquatic and burrowers. They are exellent swimmers but usually prowl along stream or swamp bottoms. At times they burrow into muck or mud. They have been found in dry sand at depths of up to 10 feet. The young have been found beneath boards logs and other debris. Adults and juveniles are terrestrial for unknown periods of time and have been found in pine woods, mixed hardwood and pine woods, and open fields. Rainbow snakes are active on the surface during rains. Found in swamps, marshes (fresh and brackish), or slow moving streams and adjacent sandy soils generally under 100 feet in elevation. The habitat includes suitable muck and sand for burrowing and eels for food.	yes
	SE	S1	II	SC	S3	Herp	Rattlesnake, canebrake / timber	*Crotalus horridus*	NSA	Distributional data accumulated in the middle 1900's showed that this subspecies was restricted to southeastern Virginia. Most of those localities were in the lower York-James peninsula and in the southeastern corner east of the Dismal Swamp area.	Canebrakes occupy hardwood and mixed hardwood-pine forests, cane fields, and the ridges and glades of swampy areas. The prefered habitat is mature hardwood forests containing numerous logs and a layer of leaves and humus. They overwinter in the base of hollow trees or in stumps. Unique habitat associations include downed logs and bottomland hardwoods. They also occupy natural and anthropogenic open habitats adjacent to forests (e.g. clearcuts, agricultural fields) *11623*.	yes
	ST	S1S2	II	SR	S2?	Herp	Salamander, Mabee's	*Ambystoma mabeei*	NSA	Lower elevations of the Coastal Plain of the Carolinas and Virginia. NC: Bladen, Brunswick, Columbus, Hoke, Pender, Robeson, Sampson, Scotland. VA: Gloucester, Hampton, Isle of Wight, James City, Mathews, Southampton, Suffolk, Sussex, York. BEHAVIOR: Moves to breeding sites in fall and winter.	In Virginia, primary habitat includes fish-free ephemeral ponds or other waterbodies with significant amounts of surrounding hardwood or mixed forests. Adults and larvae have been observed depression ponds in the southeast corner of NWSY. Bog/fen, FORESTED WETLAND, Riparian, TEMPORARY POOL. Forest - Conifer, Forest - Hardwood, Forest - Mixed, Savanna, Woodland - Conifer, Woodland - Hardwood, Woodland - Mixed	Yes
		S3 / WL	IV			Herp	Salamander, many-lined	*Stereochilus marginatus*	NSA	Common and abundant in the Coastal Plain south of the James River.	Inhabits swamps and shallow cypress or gum ponds in savannahs. It is aquatic and in dry weather the adult hides under leaf litter, sphagnum mats, or rotten logs. They are most abundant in pools, slow streams, and swampy woods. They nest in logs near water, and prefer plant and stone laying sites. The female deposits the eggs on aquatic moss, twigs, or under the surface of submerged logs.	Possible
		S2S4	III		S3; W1,W5	Herp	Scarlet Kingsnake	*Lampropeltis elapsoides*	NSA	NC - Coastal Plain	Pine flatwoods, mesic pine-hardwood forests. Not on Currituck Co listing	Yes
		S3 / WL	II	SC	S3	Herp	Terrapin, northern diamond-backed	*Malaclemys terrapin terrapin*	NSA	Found in the Chesapeake Bay and ocean side of Eastern shore and southeast Virginia. Maybe found in coastal rivers as far as tidal influence. Activity season is April through October, and usually overwinter in the mud in channels and tidal flats.	This species breeds and lays eggs in the spring and summer. Females nest in the dunes from May through July. It is mostly on the ocean side of the eastern shore. They overwinter in the mud in channels and tidal flats. Shallow tidal creeks and tidal mud flats are the most important feeding areas for terrapins. Nests are typically built in sand above the high tide line or sometimes in other fine soils.	yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
	ST	S2	II			Herp	Treefrog, barking	*Hyla gratiosa*	NSA	Coastal Plain and some upland areas from North Carolina to southern Florida, disjunct populations occur in Delaware and adjacent Maryland, southwestern Kentucky and adjacent Tennessee, and in southeastern Virginia.	FORESTED WETLAND, Riparian, SCRUB-SHRUB WETLAND, TEMPORARY POOL. Forest - Conifer, Forest - Hardwood, Forest - Mixed, Savanna, Woodland - Conifer, Woodland - Hardwood, Woodland - Mixed. Benthic, Burrowing in or using soil, Fallen log/debris, Standing snag/hollow tree. Sandy areas in pine savannas and in low wet woods and swamps (e.g., willow oak-blackgum, cypress swamps). When inactive during cold or dry season, burrows under tree roots, vegetation, or in soil; otherwise mostly arboreal and thus dependent on trees near water.	yes
	CC		III			Herp	Turtle, spotted	*Clemmys guttata*	NSA	Distributed primarily east of the Blue Ridge Mountains, with the exception of certain parts of Augusta Co. VA	They are most active March through May and they are mainly diurnal during this time. They can be seen basking on logs, stumps and grass mats. They are not normally active past June. They spend much of their time in the water but a good deal of terrestrial activity occurs during the breeding season. They overwinter in the mud, or in muskrat burrows underwater. Preferred habitats of this species include shallow freshwater wetlands such as: vernal pools, sinkhole pools, ponds, ditches, flooded fields, streams, floodplains, bogs, marshy pastures, and forested wetlands. They may also occur in upper marshes of tidal creeks.	yes
	SE	S1	I	SR	S3	Herp	Turtle, eastern chicken	*Deirochelys reticularia reticularia*	NSA	Chicken turtles are known only from Seashore State Park, City of Virginia Beach. Also confirmed at Cape Henry, Va. One sighting in the Northwest River, City of Chesapeake, remains unconfirmed	shallow, still waters, particularly ephemeral and seasonal wetlands with abundant vegetation	yes
		S3 / WL		SR	S1S2	Invertebrate	Aaron's skipper	*Poanes aaroni*	NSA	Accomack, Essex, Henrico, King William, New Kent, Surry, Westmoreland, York, Chesapeake, Hampton, Norfolk, Poquoson, Portsmouth, Richmond, Suffolk, Virginia Beach. Currituck County south to the mainland of Hyde County North Carolina. Two broods; mid-May to mid-June (probably), and perhaps late August to early October	Primary habitat is brackish marshes, but the species moves well away from marshes to find suitable nectar sources. Thus, they can be seen in fields, wood margins, and marsh edges, as long as these habitats are within several hundred yards (?) of a brackish marsh. Some references say that smooth cordgrass (Spartina alterniflora) is the major foodplant, but Glassberg (1993) says that) may be a foodplant. The skipper nectars on many flowers in the marshes and adjacent fields. I have seen them nectaring on yellow thistle (Cirsium horridulum) in May; and on mistflower (Eupatorium coelestinum), camphorweed (Pluchea sp.), and various goldenrods (Solidago spp.) in September-October.	Yes
		S2S3		W3	S2S4	Invertebrate	Aralia Shoot Borer Moth	*Papaipema araliae*	NSA	NC - Coastal Plain. Closest record - Camden Co.	Key habitat feature is a lot of Aralia spinosa over a substantial area. Habitats are generally forested, often swamps but sometimes more mesic.	Yes
		SH				Invertebrate	Black Dash	*Euphyes conspicua*	NSA	Giles County and the cities of Suffolk and Chesapeake, VA	In Bog/fens, and shrubby or partially wooded (red maple) wetland areas associated with *carex stricta* . Does not occur in deep shade.	yes
		SU		W3	S2S3	Invertebrate	Buchholz's Zale	*Zale sp. 3 nr. Buchholzi*	NSA	NC - Coastal Plain. Closest record - Dare Co.	Longleaf Pine habitats. While Pond Pine (P. serotina) is also probably present at many of these sites -- associated with peatlands that usually closely adjoin Longleaf communities -- we do not have any records from Pond Pine Woodlands or other purely peatland habitats. Host - Probably stenophagous, feeding on a narrow range of hard pines. Wagner et al. (2011) report it feeding on Pitch Pine and Pond Pine in New Jersey but associated with Longleaf and Loblolly southward.	Yes
		S3 / WL				Invertebrate	Butterfly, creole pearly-eye	*Enodia creola*	NSA	North Carolina	Found in Coastal Plain bottomland forests near stands of cane (Arundinaria spp.). The butterflies do not nectar; they feed on sap, decaying fruit, mud or moist ground, etc.	yes
		S3 / WL				Invertebrate	Butterfly, great purple hairstreak	*Atlides halesus*	NSA	Montgomery, Chesapeake, Norfolk, Portsmouth, Radford, Suffolk, Virginia Beach.	In North Carolina, Great Purples are found throughout the state but far more common in the Coastal Plain. Feeds on American mistletoe, an evergreen parasitic subshrub, especially common in swamp forests, that usually grows high in mature hardwood trees.	yes
		S2	IV	W2	S3S4	Invertebrate	Butterfly, King's hairstreak	*Satyrium kingi*	NSA	Chesapeake, New Kent, Norfolk, Suffolk, Virginia Beach, Chesapeake. One brood with a very short flight season from early May to the end of June	Part of the conservation concern with this species surrounds the limited availability of its host plant, the Sweetleaf (Symplocos tinctoria). This plant can only live in the well-developed understory of stream-side forests.	Yes
		S3 / WL				Invertebrate	Butterfly, lace-winged road-skipper	*Amblyscirtes aesculapius*	NSA	Southampton, Chesapeake, Emporia, Franklin, Norfolk, Portsmouth, Suffolk, Virginia Beach. it occurs from southeast Virginia, south along Atlantic coastline to north Florida; thence, westward to eastern Texas and eastern Oklahoma.	The Lace-winged Roadside-Skipper prefers to live in moist areas with stands of giant cane (Arundinaria gigantea) growing nearby. These areas include moist deciduous woodlands, dirt roads that traverse swampy and boggy wetlands, wet areas along bottomland stream corridors, and moist areas along utility right-of-ways. Most often found where swampy wetlands occur.	yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
		SH / WL	III	SR	S2	Invertebrate	Butterfly, little metal mark	*Calephelis virginiensis*	NSA	Chesapeake, Suffolk, Virginia Beach. Three broods in Virginia, from March through October. May be extirpated north of Craven CO, NC	The Little Metalmark prefers open areas with its host plants, usually pine flatwoods, savannas and roadsides. Yellow Thistle (Cirsium horridulum) was considered the sole host plant, but others have more recently been cited.	yes
		S3S4/WL			S3S4	Invertebrate	Carolina roadside skipper	Amblyscirtes carolina	NSA	Southeast Virginia south to South Carolina; west to northern Mississippi.	Near streams and swamps in wet woods. Three broods from April-September	yes
		S3S4 / WL		W2	S3S4	Invertebrate	Carolina Roadside-Skipper	*Amblyscirtes carolina*	NSA	NC - Coastal Plain. Closet record - Camden Co and Pasquotank, NC and Southhampton, Co. VA	Moist woods (mainly hardwoods) near cane; host plant -- cane (Arundinaria). Habitats are edges and openings in swamps and bottomlands, borders of pocosins, and canals or ditches near cane. It is usually associated with cane in hardwoods, as opposed to pinewoods.	Yes
		S1S3				Invertebrate	Combneck Assassin Bug	*Ctenotrachelus shermani*	NSA	City of Virginia Beach at the First Landing/Seashore State Park and also reported at the city of Cheasepeake at the Northwest River Park	Species not thought to inhabit soil litter biotopes (light trapping advised)	Possible
		S3 / WL				Invertebrate	Comet darner	*Anax longipes*	NSA	Statewid in VA and NC but uncommon, Coastal Plain. Closet records - Camden Co and Virginia Beach, VA	Temporary and semi-permanent grassy ponds and pools. They lay their eggs among submerged vegetation. The comet darner is often seen flying back and forth over a pond.	Yes
				W3	SU	Invertebrate	Cypress Pinion	*Lithophane abita*	NSA	NC - Coastal Plain. Closest record - Camden Co.	Cypress swamp	Possible
				W3	S3?	Invertebrate	Dubious Tiger Moth	*Spilosoma dubia*	NSA	NC - Coastal Plain. Closest record - Camden Co.	Acidic wetlands. Longleaf Pine habitats, primarily savannas and flatwoods but with a significant number from dry-to-xeric sandhills. It also makes at least some use of pure peatlands and maritime forests. Probably polyphagous, feeding on many species of herbaceous and woody plants (Wagner, 2005); Forbes (1960) stated that one did well on Plantain (Plantago sp.). The habitat restrictions -- in North Carolina at least -- suggest there may be some association with heaths or hollies, which are among the few plants that are found in Longleaf Pine communities, peatlands, and maritime forests.	Yes
	SH			SR	S2	Invertebrate	Dusky Roadside Skipper	*Amblyscirtes alternata*	NSA	Chesapeake and Suffolk cities in Viriginia	The larval foodplant is the grass Gymnopogon ambiguus and possibly other grasses. Found in open grassy moist to dry, pine woods, including moist flatwoods, savannas, and sandhill ridges	Yes
		--		W3	S2S3	Invertebrate	Frosted Tan Wave Moth	*Scopula cacuminaria*	NSA	NC - Coastal Plain. Closest record - Camden Co.	Sandhills and other dry forests. Lettuce, dandelion and probably other Asteraceae	No
		SU		W3	SU	Invertebrate	Gray-banded Zale	*Zale sp. 2 nr. squamularis*	NSA	NC - Coastal Plain. Closest record - Dare Co.	Wetter or more mesic sites. In the Coastal Plain, we have records from Pond Pine Woodlands and other peatland habitats where Pond Pine is present; blackwater floodplain forests and Non-riverine Swamp Forests; and Wet Longleaf Pine Savannas and Flatwoods (but none from more xeric sandhill habitats). Host - Stenophagous, apparently feeding on just a few species of pine. Wagner et al. (2011) specifically mention Pitch Pine (Pinus rigida), Pond Pine (Pinus serotina), and state that perhaps other species of hard pine.	Yes
			III	SR	S3	Invertebrate	Hessel's hairstreak	*Callophrys hesseli*	NSA	Southern Maine south along the Atlantic coastal plain to northern Florida on the Gulf Coast.	Caterpillar Hosts: Atlantic white-cedar (Chamaecyparis thyoides) in the family Cupressaceae. Adult Food: Nectar from flowers including swamp milkweed, shadbush, sand myrtle, sweet pepperbush, highbush blueberry, buttonbush, and dogbane. Habitat: Coastal plains swamps and stream banks, associated barrens.	Yes
		--		W3	S2S3	Invertebrate	Live Oak Tussock Moth	*Orgyia detrita*	NSA	NC - Coastal Plain. Closest record - Dare Co.	Occurs in riparian forests where Bald Cypress may be the host, but is particularly abundant in peatland habitats, including Pond Pine Woodlands, High Pocosins, and stands of Peatland Atlantic White Cedar, where neither oaks nor cypress occur.	Yes
				W3	S3	Invertebrate	Louisiana Owlet Moth	*Macrochilo louisiana*	NSA	NC - Coastal Plain. Closest record - Camden Co.	Sedgy wetlands, wet meadows, fens, wetland edges; adults are nocturnal and come to light.	Yes
		--		W3	S1S2	Invertebrate	Masked Parahypenodes Moth	*Parahypenodes quadralis*	NSA	NC - Coastal Plain. Closest record - Dare Co.	Moist and sandy places; adults are nocturnal and come to light and bait. The host is unknown.	No
				W3	SU	Invertebrate	Modest Quaker Moth	*Ulolonche modesta*	NSA	NC - Coastal Plain. Closest record - Dare Co.	No data	Yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
FP		SU / WL	III			Invertebrate	Monarch (eastern population)	*Danaus plexippus plexippus*	NSA	During the spring and summer breeding season, D. p. plexippus disperses throughout the United States and southern Canada when successive generations migrate and expand north with the availability of suitable milkweeds as summer progresses.	Milkweed and other nectar producing plants. Monarchs lay their eggs only on plants in the Apocynaceae (dogbane family) in the milkweed subfamily Asclepiadoideae, genus Asclepias (L.) and related genera. The eastern range of D. p. plexippus during breeding is mainly coincident with the distribution of the most abundant and widely dispersed milkweeds. Common milkweed inhabits places that have experienced soil disturbance, such as some cultivated fields, crop fields that have been abandoned or are fallow, pastures, logged land, riparian zones, suburban and urban vacant lots and waste areas, and along trails, railroad tracks, and roadways. Monarchs in northern states primarily roost in conifers and maples, while monarchs in the south commonly roost in pecan and oak trees.	yes
			III	SR	S2	Invertebrate	Mottled duskywing	*Erynnis martialis*	NSA	Massachusetts and southern Ontario west across the Great Lake states to Minnesota; south to South Carolina, the Gulf Coast, and central Texas.	Caterpillar Hosts: Wild lilacs including New Jersey tea (Ceanothus americanus) and redroot (Ceanothus herbaceus var. pubescens) in the buckthorn family (Rhamnaceae). Adult Food: Nectar from flowers of bush houstonia, gromwell, hoary vervain, and other plants. Habitat: Open woodland, barrens, prairie hills, open brushy fields, chaparral.	No
		--		W3	SU	Invertebrate	Noctuid Moth	*Rivula stepheni*	NSA	NC - Coastal Plain. Closest record - Camden Co.	Mesic mixed pine and hardwood forests near streams. Host plant - various grasses and sedges.	Yes
		S3 / WL		SR	S2S3	Invertebrate	Northern Oak Hairstreak	*Satyrium favonius ontario*	NSA	NC - Tidewater and Coastal Plain	This species is most numerous in or near stands of evergreen oaks, such as live oaks (Quercus virginiana) or laurel oaks (Q. laurifolia) in maritime "sandhill" scrub forests. Farther inland, it is found in dry forests dominated by deciduous oak species. The foodplants are oaks; live oak is probably favored over others in NC. Nectar plants are typical for most hairstreaks, though chinquapin (Castanea pumila) has been reported as a favorite. Along the southern coast, sparkleberry (Vaccinium arboreum) is the chief nectar source.	Yes
		SH	II	W3	S2S3	Invertebrate	Precious Underwing	*Catocala pretiosa*	NSA	NC - Coastal Plain. Closest record - Dare Co.	Forests with shadbush or chokeberry. Restricted to mature swamp forests, forest edges, bog edges, coastal thickets and other habitats with thickets or very large bushes of foodplant exceeding 1.5 meters in height, usually taller. The caterpillar feeds Amelanchier arborea (Serviceberry) and Malus angusticfolia (Crabapple).	No
		S2S3		W3	S3?	Invertebrate	Relict Cane Moth	*Acrapex relicta*	NSA	NC - Coastal Plain. Closest record - Dare and Northhampton Co. North Carolina, and the Great Dismal Swamp, near the North Carolina border in southeastern Virginia.	The Cane-boring Moth is found only in patches of cane, or occasionally exotic bamboo stands. It is suspected to be a grass feeder.	Yes
		S3 / WL		SR	S3	Invertebrate	Reversed roadside-skipper	*Amblyscirtes reversa*	NSA	Isle of Wight, Surry, Chesapeake, Norfolk, Portsmouth, Suffolk, Virginia Beach. Spotty distribution from southeast Virginia south to northern Georgia; also in southern Mississippi and southern Illinois. This species has three broods from April to September	The foodplant is cane, perhaps exclusively. Found in the sandhills and coastal plain in open pine woods, pine savannas, powerlines. Swampy or wet woods near slow streams, with cane undergrowth.	yes
		S3 / WL	IV	W3	S3?	Invertebrate	Robust Baskettail	*Epitheca spinosa*	NSA	NC - Coastal Plain	Still waters of swamps and ponds/pools in or near forests; probably scarce in open water of lakes and ponds.	Yes
		S1S3	IV	W3	S2S3	Invertebrate	Silver Fork Cane Moth	*Argillophora furcilla*	NSA	NC - Coastal Plain. Closest record - Dare and Northhampton Co.	Substantial cane is present, such as in conifer, hardwood, mixed forests and woodlands, and savanna. Canes are the food plant for this species.	Yes
		S2 / WL	III	SR	S1S2	Invertebrate	Skipper, Duke's (or scarce swamp	*Euphyes dukesi*	NSA	Chesapeake, Suffolk, Virginia Beach, Chesapeake. 2 broods from June to September, BEHAVIOR: adults fly in June and in August-September	Ecotones of brackish or fresh marshes with swamps; host plants -- sedges (Carex) (NCNHP 2018). Wet, marshy areas. They are found in swamps, open marshes, and wet roadside ditches, while expansive estuarine or coastal marshes are preferred. Dukes' Skippers prefer broad-leaved sedges such as Shoreline Sedge (Carex hyalinolepis). These plants are found in the favored swamp-like habitats of Dukes' Skipper. The species nectars on pickerelweed, blue mistflower (Eupatorium coelestinum), tall verbenas, and others.	yes
				W3	S3S4	Invertebrate	Southern Pine Looper	*Caripeta aretaria*	NSA	NC - Coastal Plain. Closest record - Camden Co.	Wet-to-mesic habitats in the Coastal Plain, including Pond Pine Woodlands and other peatlands; wet pine savannas; and bottomland forests. Pond Pine appears to be the most likely host plant, and is the only species of pine occurring in some of the large expanses of peatlands where the moth has been recorded. Some use of Loblolly may also be made, since the moth has been recorded in some bottomland stands where that species is the only pine present.	Yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
		S2S4	IV			Invertebrate	Stripe-winged Baskettail (dragonfly)	*Epitheca costalis*	NSA	Fairfax, Suffolk, Virginia Beach, Charles City, Chesterfield. BEHAVIOR: flight season for the Stripe-winged Baskettail in Virginia ranges from 21 May - 2 June.	Prefers ponds, lakes, and slow streams.	yes
		S2	IV	W3	S3?: W3	Invertebrate	Treetop Emerald	*Somatochlora provocans*	NSA	NC - Coastal Plain. Closest record - Chowan Co. Strictly in the western and central Coastal Plain,	Small forested seeps and pools, perhaps very small streams	Yes
		S2	IV			Invertebrate	Two-striped Forceptail (dragonfly)	*Aphylla williamsoni*	NSA	This is the best known of the three species in the region. It regularly forages in tree tops. Males perch near the water on vegetation, occasionally making patrols along the shoreline. Females lay eggs late in the evening.	Ponds, lakes, borrow pits and sluggish streams	yes
		S1S3 / WL		W3	S3?	Invertebrate	Watson's Arugisa Moth	*Arugisa latiorella*	NSA	NC - Coastal Plain. Closest record - Dare Co.	Sedgy glades	Yes
		--		NC SR	S1?	Invertebrate	Weedpatch Ambersnail	*Catinella pugilator*	NSA	NC - Coastal Plain	Marsh ecotones, near the margins of brackish or freshwater marshes in weedy places	Yes
		S3 / WL				Mammal	Dismal Swamp short-tailed shrew	*Blarina brevicauda telmalestes*	NSA	It is known only in the dismal swamp and it does not stray far from this swampy habitat. BEHAVIOR: Home ranges varied from 280-637 square meters, and were smaller as prey density increased. They are active mostly in hours of darkness and make brief foraging trips, totalling about 94 minutes per day.	It is probably more abundant than southern short-tailed shrews (Blarina carolinensis) in hardwood forests and less abundant in other habitat types. Preference for dark, damp localities. Old logs, leaf- covered forest floors, and mossy banks provide shelter and food	yes
		S3		SR	S2S3	Mammal	Lemming, southern bog	*Synaptomys cooperi helaletes*	NSA	VA Beach, Chesapeake, Suffolk, not Currituck Co	low pocosins, early succession wetlands	yes
					S3S4; W3	Mammal	Long-tailed Weasel	*Mustela frenata*	NSA	NC - Coastal Plain. Breeding - April - May (July - August).	Forests, brushy areas. Crop fields to small wooded areas to suburban areas. They are not found in deserts or thick, dense forests. Their burrows and nests are in hollow logs, rock piles, and under barns. Near wetsites such as swamps, marshes and water courses, especially where brushy thickets reach the waterline (Whitaker and Hamilton 1998). Other haunts include most woodland habitats, sparsely wooded second-growth forests, brushy areas, stream banks, and the borders of forests and fields (Lowman 1975, Lee et al. 1982, Webster et al. 1985, Whitaker and Hamilton 1998). Nests can be located in hollow trees or stumps, downed rotting logs, underground burrows, stone walls and mole runs (Lowman 1975, Webster et al. 1985).	Yes
		S3 / WL	IV			Mammal	Marsh Rabbit	*Sylvilagus palustris*	NSA	Bath, Greensville, Isle of Wight, Powhatan, Southampton, Surry, Sussex, Chesapeake, Emporia, Franklin, Hampton, Norfolk, Portsmouth, Suffolk, Virginia Beach. BEHAVIOR: This species is primarily nocturnal being most active between 1900 and 0400 hours.	They do not live in burrows but instead build a nest which is about 36 cm across and about 20 cm deep. They are constructed from soft grasses and rabbit fur and have a floor about 2.5 cm thick. The nest is normally placed among burnt sedges approximately 9 meters from the edge of the water. Favors areas of undisturbed marsh.	yes
		S3 / WL	IV			Mammal	Mouse, cotton	*Peromyscus gossypinus*	NSA	In Virginia, the cotton mouse is found in southeastern corner in the Dismal Swamp region. BEHAVIOR: The breeding season is from March-Spetember. It is strongly nocturnal and is active all year round.	Nest in trees or under logs. It will disperse to dry sites during wet seasons. They will also nest in and under logs, in stumps and under brush piles. Nest materials include plant fibers e.g., cotton. They are most often associated with wet bottomland forest areas.	yes
		S4 / WL				Mammal	Northern river otter	*Lontra canadensis*	NSA	Range throughout Virginia and North Carolina. BEHAVIOR: They are active any hour (peak feeding dawn-midmorning, evening) and season.	Semi-aquatic or almost entirely aquatic and they are most abundant in food-rich coastal areas and the lower parts of streams and rivers. They use drift piles and logjams, and are found among tree roots. They occasionally use duck blinds and abandoned boat houses. A litter of 1-6 kits is born from March to April in natal dens (overhanging banks, tree knots and abandoned stream bank burrows).	yes
		S1? / WL	III	SC	S1	Mammal	Pungo mouse	*Peromyscus leucopus easti*	NSA	Probably occurs from the region of Cape Henry, Virginia south along the barrier beach to Oregon Inlet, North Carolina BEHAVIOR: breeding season is probably from March to November with peaks in the spring and fall.	They build nests of leaves, grass, shredded bark, and moss on the ground and in trees. They prefer nests above ground.	yes
		S3 / WL				Mammal	Shrew, Dismal Swamp southeastern	*Sorex longirostris fisheri*	NSA	As of April 1, 2016, this species has been completely delisted/completely removed from the state/DGIF regulations, which previously listed this species as State Threatened. http://vafwis.org/fwis/booklet.html?Menu=_.Status&bova=050008&version=17259	Habitat generalist. Found in habitats of Great Dismal Swamp that are not permanently flooded. Highest densities occur in areas with ground litter and moist organic soils in early to mid-successional forest, old clearcuts, and areas with thick undergrowth, particularly canebrake thickets. Low densities have been noted in mature forests, though these may be important during periods of drought or fire. Habitats used by this subspecies do not appear to be discrete units, but seem to consist of a diversity of regenerative stages of vegetative growth. Recent studies indicate use of a broad range of habitats (USFWS 1998). Nests may be placed under logs or hollow stumps.	yes
				SC	S2	Mammal	Star-nosed Mole - Coastal Plain population	*Condylura cristata pop. 1*	NSA	Currituck County, Historical	moist meadows, bogs, swamps, bottomlands	yes
				W7	S2?	Plant	American Witch Grass	*Dichanthelium columbianum*	NSA	Currituck County	thin woods and open ground, usually in sandy soil	Possible

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
				SR-T	S1S2	Plant	Creeping Spikerush	*Eleocharis fallax*	NSA	Currituck County	fresh to brackish tidal marshes	no
		S3 / WL		NC W7	S1?	Plant	American reed	*Phragmites australis subsp. americanus*	NSA	Currituck Co.	Freshwater marshes	Possible
		S1				Plant	American Wisteria	*Wisteria frutescens*	NSA	Va Beach, Chesapeake, York, James City County	Swamp forests, wet forest borders and fencerows	yes
				W7	S2?	Plant	American witchgrass	*Dichanthelium acuminatum subsp columbianum*	NSA	Currituck Co.	thin woods and open ground, usually in sandy soil	yes
		S3 / WL				Plant	Atlantic white cedar	*Chamaecyparis thyoides*	NSA	Virginia Beach, Chesapeake and surrounding cities.	Peaty non-riverine swamps and pocosins subject (at least historically) to occasional intense fires; also scattered in tidal swamp forests along Pitts Creek in n. Accomack County. Rare, Coastal Plain of far se. Virginia and the Eastern Shore; still common at a few sites in the embayed region of se. Virginia, from the Great Dismal Swamp to North Landing River. Formerly more abundant, but was heavily exploited for its rot-resistant wood.	yes
		SH		NC ST		Plant	Awl-leaf mudwort	*Limosella australis*	NSA	Currituck County	Tidal marsh, mudflat	no
		S1		SR-T	S2	Plant	Awned Mountain-mint	*Pycnanthemum setosum*	NSA	Accomack County, City of Chesapeake,and (if P. umbratile is included) Southampton County	Damp to wet flatwoods, old fields, clearings, and forest borders; usually in sandy soils	yes
		S1		S2?	S1	Plant	Baldwin's spikerush	*Eleocharis baldwinii*	NSA	Virginia Beach, Chesapeake and surrounding cities/counties.	Sandy, muddy, and peaty shores of river oxbows, sluggish streams, depression ponds, old millponds, and borrow pits; sometimes rooted on floating peat mats.	yes
		S1				Plant	Big gallberry	*Ilex coriacea*	NSA	The cities of Suffolk, Chesapeake, and Virginia Beach. frequent in and near the Great Dismal Swamp	Peaty swamps, flatwoods, and pocosins; usually associated with Chamaecyparis thyoides or Pinus serotina	yes
		S2				Plant	Big-headed rush	*Juncus megacephalus*	NSA	Rare on the outer Coastal Plain. Virginia Beach.	Interdune swales and ponds	No
		S1S2				Plant	Blood panic grass	*Dichanthelium consanguineum*	NSA	Several southeast Virginia counties.	Sandy or, occasionally, clayey woodlands, clearings, and wetland ecotones; often in moist or boggy depressions in sandy upland settings.	Yes
		S1		NC SE	S1S2	Plant	Blue Witch Grass	*Dichanthelium caerulescens*	NSA	City of Virginia Beach (Cape Henry south to False Cape and along the North Landing River) and in the City of Chesapeake (Northwest River), VA, Currituck Co. NC	Interdune swales, oligohaline tidal marshes, wet flatwoods, bogs, and boggy clearings.	yes
		S1				Plant	Bog rush	*Juncus elliottii*	NSA	VA Beach, Hampton	Open swales, seeps, and ditches.	yes
				W1	S2S3	Plant	Buckthorn Bumelia	*Sideroxylon lycioides*	NSA	Currituck County	maritime forests, bluffs or forests	no
				SR-O	S2	Plant	Carolina Grasswort	*Lilaeopsis carolinensis*	NSA	Currituck County	freshwater marshes, pools, tidal	no
		S2		W6	S4	Plant	Carolina laurel	*Kalmia carolina*	NSA	VA Beach, Chesapeake, Suffolk, not Currituck Co	Sphagnous swamps, pocosins, boggy flatwoods, clearings, depressions, mountain bogs and fens; typically in peatier and less sandy habitats than Kalmia angustifolia. At least the SE Virginia habitats were strongly influenced by frequent fires in the past, although now generally fire-suppressed. Rare (but locally common)	Possible
		S1				Plant	Carolina yellow-eyed grass	*Xyris caroliniana*	NSA	not in VA Beach or Cheasapeake, recorded at Blackwater River (?)	Mesic to dry sandhill woodlands and clearings, especially where frequently burned	yes
		S2				Plant	Coastal water-pennywort	*Hydrocotyle bonariensis*	NSA	Virginia Beach City and Northampton County	Dunes and interdune swales, disturbed sandy areas	No
		S1				Plant	Common bog buttons	*Lachnocaulon anceps*	NSA	James City Co., Surry, Rare in the Coastal Plain and inner Piedmont, mostly south of the James River.	Bogs, open seeps, boggy powerline clearings.	Possible
		S3		W1	S3	Plant	Cottongrass	*Eriophorum virginicum*	NSA	Virginia Beach, Chesapeake, Currituck County	peaty sites - bogs, fens, pocosins,	yes
		S1				Plant	Cottony golden aster	*Chrysopsis gossypina*	NSA	known only from Southampton County and Virginia Beach City.	Maritime dune grasslands and scrub, dry sandhill woodlands and clearings.	no
		S2		NC ST	S2	Plant	Cranberry	*Vaccinium macrocarpon*	NSA	Virginia Beach, Currituck Co.*	bogs, seeps, pocosins	no
		S2		NC SR-P	S1	Plant	Crowfoot sedge	*Carex crus-corvi*	NSA	Currituck Co., not in Virginia counties near study area	Coastal plain: Swamp forests	yes
		S3 / WL		NC SR-T	S1	Plant	Cutleaf Water-milfoil	*Myriophyllum pinnatum*	NSA	Virginia Beach, Cheasapeake, Currituck Co.*	ditches, pools	Possible
		S1		NC SE	S2	Plant	Eaton's Ladies'-tresses	*Spiranthes eatonii*	NSA	VA Beach (Cape Henry), Ecological Preserve in Isle of Wight County, Lee Park in the City of Petersburg	Dry to damp open pine woodlands and meadows	Possible
		S1		W1	S2S3	Plant	Elliott's Aster	*Symphyotrichum elliottii*	NSA	The Embayed Region of far se. Virginia (cities of Chesapeake and Virginia Beach)	Oligohaline tidal marshes, tidal swamps, and interdune swales	no
		S2				Plant	Elliott's goldenrod	*Solidago latissimifolia*	NSA	VA Beach, Chesapeake, York Co, New Kent Co, Hampton	Wet flatwoods and clearings, acidic swamps, seeps, ditches and canal banks	yes
		SH		W1	S2	Plant	Engelmann's arrowhead	*Sagittaria engelmanniana*	NSA	Cheasapeake (Lake Drummond in the Great Dismal Swamp)	Sphagnous and peaty shores	no
		S1S2				Plant	False Hop Sedge	*Carex lupuliformis*	NSA	York and James City Co. Suffolk	Alluvial swamps (especially seasonally flooded sloughs and swales in large bottomlands), nonriverine swamps, depression swamps and ponds.	Yes
		S1				Plant	Fibrous Bladderwort	*Utricularia striata*	NSA	York Co., VA Beach, Suffolk	Ponds, streams, and ditches	yes
		S3 / WL				Plant	Florida adder's mouth	*Malaxis spicata*	NSA	York, James City Co, Chesapeake	Hummocks and borders of seepage swamps and on mossy stream banks, often in shell-rich, calcareous soils. Infrequent to rare on the Coastal Plain north to New Kent and Middlesex counties.	yes
		S1		NC SR-T	S1?	Plant	Florida thoroughwort, Maritime thoroughwort	*Eupatorium maritimum syn E. anomalum*	NSA	Virginia Beach, coastal plains of North Carolina	Wet, low ground, flatwoods	yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
		S1				Plant	Fringed yellow-eyed grass	*Xyris fimbriata*	NSA	In or around the Great Dismal Swamp, Rare in the s. Coastal Plain, Chesapeake	Boggy and peaty clearings in wet flatwoods, pocosins, and Atlantic White-cedar swamps	yes
				NC SE	S2	Plant	Grassleaf arrowhead	*Sagittaria weatherbiana*	NSA	Virginia Beach, Chesapeake, VA, Currituck Co.*NC	Coastal Plain: fresh to slightly brackish marshes, streams, swamps, and pond margins	yes
				W7	S2?	Plant	Greater Duckweed, Duckmeal	*Spirodela polyrrhiza*	NSA	Currituck County	pools, stagnant waters, Quiet water of ditches, streams, marshes, and ponds.	no
				W7	S2?	Plant	Horned Pondweed	*Zannichellia palustris*	NSA	Currituck County	Mesohaline and polyhaline (rarely freshwater) tidal aquatic beds of the Chesapeake Bay and its tributaries.	no
		S1		W7	S2	Plant	Irisleaf yellow-eyed-grass	*Xyris iridifolia syn Xyris laxifolia var. iridifolia*	NSA	Rare in the s. Coastal Plain, south of the James River. Embayed Region along the Northwest and North Landing rivers,Chesapeake	Freshwater to oligohaline wind-tidal marshes, depression ponds, and ditches.	yes
		SH		NC SE	S1	Plant	Ivy buttercup	*Ranunculus hederaceus*	NSA	Virginia Beach, Chesapeake, Currituck Co*	Ponds, tidal shores, tidal swamps, and maritime swamps. Rare and scattered in the Coastal Plain	Yes
		S1				Plant	joint paspalum	*Paspalum distichum*	NSA	VA Beach, Chesapeake, New Kent,	Oligohaline tidal marshes, interdune swales and ponds, waterfowl and other impoundments, and disturbed tidal shores	yes
		S1		NC ST	S1	Plant	Kidney sedge	*Carex reniformis*	NSA	Had not been collected for more than four decades when, in 2013, it was discovered it in a bottomland slough along the Blackwater River in the Antioch Pines State Natural Area Preserve, Va. Not mentioned in Currituck Co.	Sloughs in alluvial swamps, sandy river shores, depression swamps, impoundment marshes, interdune swales and ponds.	yes
		S3		W1	S3?	Plant	Large Marsh Pink	*Sabatia dodecandra*	NSA	James City County, Chesapeake, VA Beach, Currituck County	tidal, brackish, and freshwater marsh	yes
		S2				Plant	Large-leaf Peatmoss	*Sphagnum macrophyllum var. macrophyllum*	NSA	York Co., Chesapeake	Seasonal ponds, seasonally flooded swamps and depressions; often submerged for parts of the year.	yes
		S1				Plant	Lax Hornpod, miterwort	*Mitreola petiolata*	NSA	York Co., Hampton, Chesapeake	Alluvial swamps, seasonally exposed river shores, peaty pond margins, boggy clearings, seeps.	Yes
				W1	S2	Plant	Leafy Pondweed	*Potamogeton foliosus*	NSA	Currituck County	lakes, streams, and ponds	no
				SR-D	S1	Plant	Little-spike Spikerush	*Eleocharis parvula*	NSA	Currituck County	brackish and fresh marshes	no
		S2		SR-T	S2	Plant	Long Beach Seedbox	*Ludwigia brevipes*	NSA	VA beach, Chesapeake, Currituck Co	Shallow water and low, wet places on the Coastal Plain, including pondshores, lakeshores, pools, marshes, swamps, blackwater rivers, interdunal swales, borrow ponds, ditches, and impoundments.	yes
		S3 / WL				Plant	Long-awned sprangletop	*Leptochloa fascicularis var. maritima syn L. fusca ssp fascicularis*	NSA	VA Beach, Chesapeake	Disturbed shores	yes
		S1				Plant	Long-leaf lobelia	*Lobelia elongata*	NSA	Rare in the Coastal Plain, in se. Virginia (Back Bay; North Landing and Northwest rivers)	Tidal marshes and swamps, primarily oligohaline	no
		S1		W7	S2?	Plant	Long-stem adder's-tongue	*Ophioglossum petiolatum*	NSA	Rare in the far se. Coastal Plain.	Interdune swales, grassy roadsides, and lawns	yes
		S2				Plant	Maidencane	*Panicum hemitomon*	NSA	Chesapeake	Depression ponds, peaty ditches, and wet clearings	yes
				NC ST	S1	Plant	Marsh straw sedge	*Carex hormathodes*	NSA	Virginia Beach, Currituck Co.*	Coastal plain: freshwater and slightly brackish tidal marshes	no
		S1				Plant	Narrow-leaf whitetop sedge	*Rhynchospora colorata*	NSA	James City and Northampton counties and Virginia Beach City, VA.	Interdune swales and ponds, waterfowl impoundments, and oligohaline marsh edges	no
		S3?		W7	S2?	Plant	Northern Coastal Violet	*Viola brittoniana*	NSA	York County and surrounding cities/counties, Virginia Beach, Chesapeake, Currituck County	moist slopes and low wet places	no
				W7	S2?	Plant	Nuttall's Elodea	*Elodea nuttallii*	NSA	Currituck County	lakes, ponds, and rivers	no
				NC SR-P	S1	Plant	Pale mannagrass	*Torreyochloa pallida var. pallida*	NSA	Currituck Co.	blackwater pools, old millponds, and small stream swamps	Possible
		S1				Plant	Pine barren sandreed	*Calamovilfa brevipilis*	NSA	York Co, Chesapeake	boggy powerline clearings in southeastern Virginia	Possible
		S2				Plant	Plukenet's flatsedge	*Cyperus plukenetii*	NSA	VA Beach, Suffolk	Sandy woodlands, clearings, and road banks in the Coastal Plain and s. Piedmont; thin soil on exposed diabase outcrops in the n. Piedmont	yes
		S1				Plant	Pondspice	*Litsea aestivalis*	NSA	York Co., Chesapeake*	Margins and hummocks of Coastal Plain depression ponds and swamps; usually inundated during normal high water.	yes
		S1				Plant	Pool Coreopsis	*Coreopsis falcata*	NSA	Northwest River in Chesapeake City	Peaty, tree-base hummocks in a diverse, open, wind-tidal woodland dominated by Taxodium distichum. Herbaceous associates include Zizania aquatica, Eleocharis fallax, Carex canescens ssp. disjuncta, Eriocaulon decangulare, and Pogonia ophioglossoides.	no
		S1				Plant	Pretty dodder	*Cuscuta indecora*	NSA	York Co., VA Beach, Chesapeake	Salt scrub and marshes, weedy clearings and roadsides, and disturbed wetlands in the Coastsal Plain; reported to parasitize Iva frutescens and plants of the Asteraceae and Fabaceae, especially Lespedeza spp. ; disjunct to a Shenandoah Valley sinkhole pond in Augusta County, where parasitic on Stachys hyssopifolia, Helenium virginicum, and other forbs. Rare throughout	yes
		S2				Plant	Purple bladderwort	*Utricularia purpurea*	NSA	VA Beach, Chesapeake	Ponds, sluggish streams, and seepage pools	yes
FP		S1		NC ST	S1	Plant	Raven's Seedbox	*Ludwigia ravenii*	NSA	not in Currituck Co in NC., Rare, s. Coastal Plain; known only from Suffolk City.	Boggy clearings and ditches in wet flatwoods (probably former savannas).	yes

Federal Status	VA Status*	VA Rank	VA Tier	NC Status	NC Rank	Species Type	Common Name	*Scientific Name*	NSA	Occurrence	Habitat Association	Possible Habitat
		SH				Plant	Redroot	*Lachnanthes caroliniana*	NSA	known only from Lake Drummond in the Great Dismal Swamp (s. Coastal Plain) and a sinkhole pond in the Shenandoah Valley (Ridge and Valley province)	Peaty shores of natural lakes and ponds	no
		S2		W7	S2?	Plant	Rough Hedge-nettle	*Stachys aspera*	NSA	VA Beach, Chesapeake (Hampton)	Freshwater and oligohaline tidal marshes, tidal swamps, depression swamps and ponds, and wet clearings; prefers open or partly open habitats	yes
		S1		W7	S2?	Plant	Rough vervain	*Verbena scabra*	NSA	York, James City Co., VA Beach, Currituck County	Oligohaline tidal marshes, impoundment edges, ditches, wet clearings, shell middens, eroding coastal river bluffs, and river shores	yes
		S1		W7	S2?	Plant	Rough vervain	*Verbena scabra*	NSA	Va Beach	Oligohaline tidal marshes, impoundment edges, ditches, wet clearings, shell middens, eroding coastal river bluffs, and river shores	Possible
		S1		W7	S2?	Plant	Rough vervain	*Verbena scabra*	NSA	Va Beach	Oligohaline tidal marshes, impoundment edges, ditches, wet clearings, shell middens, eroding coastal river bluffs, and river shores	no
				W1	S2?	Plant	Sago Pondweed	*Stuckenia pectinata*	NSA	Currituck County	Brackish and alkaline waters	no
		S3		W7	S1S2	Plant	Saltmarsh Sandspurrey	*Spergularia salina*	NSA	York, James City Counties, NN, Hampton, Chesapeake, VA Beach, Currituck County	salt marshes and tidal flats	yes
				SE	S!	Plant	Salt-meadow Grass	*Diplachne maritima*	NSA	Currituck County	fresh to brackish tidal marshes	no
				W1	S2	Plant	Saltwater False-willow	*Baccharis angustifolia*	NSA	Currituck County	brackish marshes, shrubby marsh edges	no
				NC ST	S2	Plant	Sand heather	*Hudsonia tomentosa*	NSA	Currituck Co	Dune grasslands, scrub, and woodlands; usually on distinctly xeric secondary dunes and ancient high dunes well back from the beach, often in blowouts with little other vegetation; rarely on inland sandhill woodlands	no
				SR-P	S1	Plant	Sand Spikerush	*Eleocharis montevidensis*	NSA	Currituck County	Maritime brackish and fresh marshes	no
		S1S2				Plant	Sawgrass	*Cladium jamaicense*	NSA	along the lower North Landing and Northwest rivers in far se. Virginia; also known from a site on the Eastern Shore (Accomack County) near Back Bay and Chesapeak.	Oligohaline tidal marshes; rarely in waterfowl impoundments. Rare, outer Coastal Plain, but locally common in wind-tidal marshes	no
		S3 / WL				Plant	Silky camellia	*Stewartia malacodendron*	NSA	Virginia Beach, Chesapeake, north to New Kent and Accomack counties (not in York Co.), found at Pocaty Creek in 2002 by Nat Heritage	Mesic to dry, mixed hardwood forests, usually under oaks and beech; especially characteristic of river bluffs and upland islands in swamps. Wooded banks & hillsides, Acid, humus-rich, well-drained soils. prefers deep shade during the heat of the day, but thrives on early morning sun.	yes
				W7	S1?	Plant	Simmonds' Aster	*Symphyotrichum simmondsii*	NSA	Currituck County, not in Virginia	wet ditches	yes
		S2				Plant	Slender Marsh Pink	*Sabatia campanulata*	NSA	York Co, VA Beach, Chesapeake	Bogs, seeps, fens, depression ponds, and wet power-line clearings.	yes
		S1		W7	S1?	Plant	Slender sand sedge	*Cyperus odoratus var. engelmannii*	NSA	VA Beach	Interdune pond and impoundment shores	yes
				W1	S3	Plant	Southern twayblade	*Listera australis*	NSA	Currituck Co.	moist hardwood forest, swamps, wet woods with acidic soils	yes
		S1S2				Plant	Spanish moss	*Tillandsia usneoides*	NSA	VA Beach, Chesapeake, York Co (!) - locally common at a few sites in Virginia Beach	Alluvial, tidal, and maritime swamp forests, wet flatwoods, maritime upland forests, and on Baldcypresses in Lake Drummond	yes
		S2				Plant	Ten-angled pipewort	*Eriocaulon decangulare var. decangulare*	NSA	Chesapeake	Bogs, boggy sphagnous clearings, sea-level fens, mafic fens and seeps; a number of somewhat anomalous populations occur in low-statured freshwater to oligohaline wind-tidal marshes	no
				SC-H	SH	Plant	Toothed flatsedge	*Cyperus dentatus*	NSA	Currituck County, Historical	marshes	no
		S1S2		W6	S3	Plant	Tuberous grass pink	*Calopogon tuberosus*	NSA	Virginia Beach, Chesapeake	Bogs, fens, and seeps on both basic and acidic substrates in the mountains; pocosin openings and boggy powerline clearings in se. Virginia. Rare in mountains, s. Coastal Plain, and outer s. Piedmont.	Possible
		S1		NC SE	S1	Plant	Twisted leaf goldenrod	*Solidago tortifolia*	NSA	Chesapeake, Virginia Beach,	Dry, open oak and pine forests, clearings, and roadsides. Rare; known historically from Chesapeake and Virginia Beach cities in far se. Virginia and Northampton County on the Eastern Shore; known to be extant at only two sites.	yes
				W7	S2	Plant	Upland Red Bay	*Persea borbonia*	NSA	Currituck County	sandy upland soils in maritime forests	no
		S2		NC SE		Plant	Virginia Least Trillium	*Trillium pusillum var. virginianum*	NSA	York Co, James City, Hampton, Norfolk, VA Beach, Chesapeake, not in Currituck Co.	Most frequent on hummocks in braided seepage along small streams in southeastern Virginia, where the canopy oftens includes Liriodendron, Magnolia virginiana, and Acer rubrum; also in low mesic forests, wet flatwoods, bottomland forests, alluvial swamp hummocks, and non-riverine swamp "islands" of this region.	yes
		S1		NC SE	S1	Plant	Viviparous Spikerush	*Eleocharis vivipara*	NSA	Virginia Beach, Nat Heritage documented at Oceana Ponds 2001. Not mentioned in Currituck Co.	Sandy or peaty interdune ponds and borrow pit ponds; usually submerged	yes
		S2		NC SE	S2	Plant	Walter's paspalum	*Paspalum dissectum*	NSA	VA beach, Chesapeake, not in Currituck Co	Seasonally exposed sandy or gravelly river shores and bars, interdune swales and ponds, impoundment edges, depressions and ruts in bottomland or upland clearings	yes
		S2		NC SR-P	S2	Plant	White beaksedge	*Rhynchospora alba*	NSA	VA Beach, Currituck Co.	fens, bogs, pocosin openings, limesink ponds	Possible
		S2				Plant	White-top fleabane	*Erigeron vernus*	NSA	Virginian SE Coastal Plain and Eastern Shore.	Sea-level fens, interdune swales, seasonally wet maritime forests, boggy clearings, and ditches	Possible

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		S1				Plant	Wild olive	*Cartrema american syn. Osmanthus americanus var. americanus*	NSA	Virginia Beach, Chesapeake	Rich woods; swamps with rich, moist, well-drained soil.	yes
		S1		SR-P	S2	Plant	Winged seedbox	*Ludwigia alata*	NSA	Known only from wind-tidal marshes of the Embayed Region of se. Virginia (Back Bay, North Landing River, Northwest River)-Chesapeake and Virginia Beach; frequent in these limited habitats. Currituck Co in NC.	A broad spectrum of wetland habitats, but mostly near-coastal types, including wet to ponded dune swales, brackish marshes, fresh tidal marshes (including "wind tide marshes" in Virginia), wet pockets in maritime forests, pond cypress depressons, shores of freshwater lakes, margins of spring-fed rivers, margins of blackwater rivers, and wet hammock woodlands on oolite. Ludwigia alata also occurs in roadside ditches and borrow pits.	yes
		S1		SR-P	S2	Plant	Winged Seedbox	*Ludwigia alata*	NSA	Embayed Region of se. Virginia (Back Bay, North Landing River, Northwest River)	Freshwater to oligohaline tidal marshes. Rare, Coastal Plain; wind-tidal marshes	no

City/County	City/County	Common Name/Natural Community	Scientific Name	NCV Code	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Occurrence	Comments
Currituck		Estuarine Fringe Pine Forest (Pond Pine Subtype)	Pinus serotina / Morella cerifera / Osmunda regalis var. spectabilis Woodland (CEGL003669)	CEGL003669	G2?	S2	None	None	No	
Currituck		Maritime Shrub (Stunted Tree Subtype)	Quercus virginiana - (Ilex vomitoria) Shrubland (CEGL003833)	CEGL003833	G3	S2	None	None	No	
Currituck		Stable Dune Barren (Beach Heather Subtype)	Hudsonia tomentosa / Panicum amarum var. amarulum Dwarf-shrubland (CEGL003950)	CEGL003950	G2G3	S1	None	None	No	
Currituck		Dune Grass (Northern Subtype)	Ammophila breviligulata - Panicum amarum var. Amarum Herbaceous Vegetation (CEGL004043)	CEGL004043	G2	S1	None	None	No	
Currituck		Maritime Wet Grassland (Southern Hairgrass Subtype)	Muhlenbergia filipes - Spartina patens - Eustachys petraea Herbaceous Vegetation (CEGL004051)	CEGL004051	G2	S2	None	None	No	
Currituck		Maritime Swamp Forest (Typic Subtype)	Acer rubrum - Nyssa biflora - (Liquidambar styraciflua, Fraxinus sp.) Maritime Swamp Forest (CEGL004082)	CEGL004082	G2	S2	None	None	No	
Currituck		Maritime Dry Grassland (Typic Subtype)	Spartina patens - Schoenoplectus pungens - Solidago sempervirens Herbaceous Vegetation (CEGL004097)	CEGL004097	G2G3	S2	None	None	No	
Currituck		Maritime Wet Grassland (Switchgrass Subtype)	(Morella cerifera) - Panicum virgatum - Spartina patens Herbaceous Vegetation (CEGL004129)	CEGL004129	G1	S1?	None	None	No	
Currituck		Tidal Freshwater Marsh (Threesquare Subtype)	Schoenoplectus pungens - (Osmunda regalis var. Spectabilis) Herbaceous Vegetation (CEGL004189)	CEGL004189	G2G3	S2S3	None	None	No	
Currituck		Tidal Freshwater Marsh (Cattail Subtype)	Typha angustifolia - Hibiscus moscheutos Herbaceous Vegetation (CEGL004201)	CEGL004201	G4G5	S3	None	None	No	
Currituck		Nonriverine Swamp Forest (Cypress-Gum Subtype)	Taxodium distichum - Nyssa biflora / Berchemia scandens - Toxicodendron radicans / Woodwardia areolata Forest (CEGL004429)	CEGL004229	G2G3	S2	None	None	Possible	
	Chesapeake	Non-Riverine Swamp Forest (Tupelo - Bald Cypress Type)	Nyssa biflora - Taxodium distichum - Acer rubrum / (Persea palustris) / Clethra alnifolia / Woodwardia virginica Forest (CEGL004229)	CEGL004429	G2G3	S1S2	None	None	Yes	mapped at NSAHR NWA
	Chesapeake	Wind-Tidal Oligohaline Marsh (Creeping Spikerush - Bull-Tongue Arrowhead Type)	Eleocharis fallax - Sagittaria lancifolia - Hibiscus moscheutos - (Schoenoplectus americanus, Eleocharis rostellata) Tidal Herbaceous Vegetation	CEGL004628	G1G2	S1	None	None	No	
Currituck		Tidal Freshwater Marsh (Oligohaline Low Marsh Subtype)	Eleocharis fallax - Eleocharis rostellata - Schoenoplectus americanus - Sagittaria lancifolia Herbaceous Vegetation (CEGL004628)	CEGL004628	G1	S1	None	None	No	
Currituck		Maritime Shrub Swamp (Red Bay Subtype)	Persea palustris / Morella cerifera Maritime Forest (CEGL004635)	CEGL004635	G1	S1	None	None	No	
	Chesapeake	Wind-Tidal Tupelo - Bald Cypress Swamp	Nyssa biflora - (Taxodium distichum, Pinus taeda) / Morella cerifera / Osmunda spectabilis Tidal Forest	CEGL004651	G2?	S2	None	None	No	
	Chesapeake	Pond Pine Woodland / Pocosin	Pinus serotina / Smilax laurifolia - Ilex glabra / Woodwardia virginica Woodland	CEGL004652	G2?	S1	None	None	No	

City/County	City/County	Common Name/Natural Community	Scientific Name	NCV Code	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Occurrence	Comments
	Chesapeake	Oligohaline Tidal Shrub Swamp	Morella cerifera - Rosa palustris / Osmunda spectabilis - Thelypteris palustris Tidal Shrubland	CEGL004656	G4	S3	None	None	No	
	Chesapeake	Wind-Tidal Oligohaline Marsh (Big Cordgrass Type)	Spartina cynosuroides - Schoenoplectus americanus - Sagittaria lancifolia Tidal Herbaceous Vegetation	CEGL004656	G2G3	S2	None	None	No	
	Chesapeake	Wind-Tidal Oligohaline Marsh (Black Needlerush Type)	Juncus roemerianus - Eleocharis fallax Tidal Herbaceous Vegetation	CEGL004660	G2G3	S2S3	None	None	No	
Currituck		Tidal Freshwater Marsh (Needlerush Subtype)	Juncus roemerianus - Pontederia cordata Herbaceous Vegetation (CEGL004660)	CEGL004660	G2G3	S2	None	None	No	
Currituck		Freshwater Marsh Pool	Ceratophyllum demersum - Utricularia macrorhiza - Nymphaea odorata Herbaceous Vegetation (CEGL004661)	CEGL004661	G3?	S3?	None	None	No	
Currituck		Estuarine Beach Forest	Acer rubrum / Sambucus canadensis / Ampelopsis arborea - Sicyos angulatus Forest (CEGL004698)	CEGL004698	G2	S2?	None	None	No	
Currituck		Estuarine Fringe Pine Forest (Loblolly Pine Subtype)	Pinus taeda / Morella cerifera / Osmunda regalis var. spectabilis Forest (CEGL006137)	CEGL006137	G3	S3	None	None	No	
	Chesapeake	Peatland Atlantic White-Cedar Forest	Chamaecyparis thyoides / Persea palustris / Lyonia lucida - Ilex coriacea / Osmundastrum cinnamomeum Forest	CEGL006146	G2	S1	None	None	No	
Currituck		Peatland Atlantic White Cedar Forest	Chamaecyparis thyoides / Persea palustris / Lyonia lucida - Ilex coriacea Forest (CEGL006146)	CEGL006146	G2	S1	None	None	No	
Currituck		Tidal Freshwater Marsh (Shoreline Lawn Subtype)	Eriocaulon parkeri - Polygonum punctatum Herbaceous Vegetation (CEGL006352)	CEGL006352	G2	S2	None	None	No	
Currituck		Maritime Evergreen Forest (Mid Atlantic Subtype)	Quercus virginiana - Quercus hemisphaerica - Pinus taeda / Persea palustris - Ilex vomitoria Forest (CEGL007027)	CEGL007027	G2	S2	None	None	No	
Currituck		Marsh Hammock	Quercus virginiana - Quercus hemisphaerica - Pinus taeda / Persea palustris - Ilex vomitoria Forest (CEGL007027)	CEGL007027	G3?	S2	None	None	No	
Currituck		Bay Forest	Gordonia lasianthus - Magnolia virginiana - Persea palustris / Sphagnum spp. Forest (CEGL007044).	CEGL007044	G4	S3	None	None	No	
	Chesapeake	Southern Coastal Plain Mesic Mixed Hardwood Forest	Fagus grandifolia - Quercus (alba, nigra, michauxii) / Symplocos tinctoria - (Stewartia malacodendron) Forest (CEGL007211)	CEGL007211	G3	S2S3	None	None	Yes	mapped at NSAHR NWA
Currituck		Mesic Mixed Hardwood Forest (Coastal Plain Subtype)	Fagus grandifolia - Quercus (alba, nigra) / Symplocos tinctoria – (Stewartia malacodendron) Forest (CEGL007211).	CEGL007211	G3	S3	None	None	Yes	mapped at NSAHR NWA
Currituck		Dry-Mesic Oak--Hickory Forest (Coastal Plain Subtype)	Quercus falcata - Quercus stellata - Carya alba / Vaccinium spp. Coastal Plain Forest (CEGL007246)	CEGL007246	G3G4	S3	None	None	No	
Currituck		Calcareous Coastal Fringe Forest (Northern Subtype)	Celtis laevigata - Tilia americana var . caroliniana / Aesculus pavia Forest (CEGL007282)	CEGL007282	G1	S1	None	None	No	
	Chesapeake	Bald Cypress - Mixed Tupelo Intermediate Swamp	Taxodium distichum - Nyssa (biflora, aquatica) / Itea virginica / Saururus cernuus Forest (CEGL007432)	CEGL007432	G3G4	S3S4	None	None	No	

City/County	City/County	Common Name/Natural Community	Scientific Name	NCV Code	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Occurrence	Comments
Currituck		Nonriverine Wet Hardwood Forest (Oak-Gum Slough Subtype)	Quercus laurifolia - Nyssa biflora / Clethra alnifolia - Leucothoe axillaris Forest (CEGL007447)	CEGL007447	G2G3	S1	None	None	No	
	Chesapeake	Non-Riverine Wet Hardwood Forest (Southern Coastal Plain Type)	Quercus (michauxii, pagoda, laurifolia) / Carpinus caroliniana / (Leucothoe axillaris) - Arundinaria tecta Forest (CEGL007449)	CEGL007449	G2	S1	None	None	Yes	Mapped at NSAHR NWA in 2013
Currituck		Nonriverine Wet Hardwood Forest (Oak Flat Subtype)	Quercus michauxii - Quercus pagoda / Clethra alnifolia - Leucothoe axillaris Wet Flatwoods Forest (CEGL007449)	CEGL007449	G2	S1	None	None	Yes	Mapped at NSAHR NWA in 2013
Currituck		Nonriverine Swamp Forest (Mixed Subtype)	Pinus taeda - Chamaecyparis thyoides - Acer rubrum - Nyssa biflora / Lyonia lucida - Clethra alnifolia Forest (CEGL007558)	CEGL007558	G3	S3	None	None	No	
	Chesapeake	Wind-Tidal Bald Cypress Woodland	Taxodium distichum / Zizania aquatica - Carex canescens Tidal Woodland	CEGL007741	G1Q	SU	None	None	No	

USFWS ESA Staus
FE=Federal Endangered
FT=Federal Threatened
FP=Federal Proposed
FC=Federal Candidate

Virginia Status Status
SE=State Endangered
ST=State Threatened
CC=Collection Concern

From Roble 2016 Natural Heritage Resources of Virginia
Virginia state rank definitions are as follows:
S1 = Critically Imperiled - At very high risk of extirpation from the state due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
S2 = Imperiled - At high risk of extirpation from the state due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.
S3 = Vulnerable - At moderate risk of extirpation from the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.
S4 = Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5 = Secure – Common, widespread and abundant.
SH = Possibly Extirpated - Known only from historical occurrences but still some hope of rediscovery.
SU = Unrankable - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
S_? = Inexact Numeric Rank - Denotes inexact numeric rank (e.g., S3?).
S_B = Breeding status of an animal (primarily used for birds) in Virginia; these species typically inhabit Virginia only during the breeding season.
S_B/S_N = Breeding and nonbreeding status of an animal (primarily used for birds) in Virginia, when they differ.
WL = Watch List - Decidedly uncommon in Virginia, but not scarce enough to merit inclusion on the Rare Vascular Plant List.

Virginia WAP Tiers:
Tier I - Critical Conservation Need
Tier II - Very High Conservation Need
Tier III - High Conservation Need
Tier IV - Moderate Conservation Need

North Carolina Status
E=State Endangered
T=State Threatened
SR=NC Significantly rare
SC=Any species of wild animal native or once-native to North Carolina which is determined by the NCWRC to require monitoring but which may be taken under regulations adopted under the provisions of the Article. (G.S.113-25]
S_?=Uncertain, denotes inexact or uncertain numeric rank
SR-T=The species is rare throughout its range
SR-D=The species is disjunct to North Carolina from a main range in a different part of the country or world.
SR-P=The species is at the periphery of its range in North Carolina
SR-O=The range of the species is sporadic or cannot be described by the other Significantly Rare categories
SR-H=Any species or higher taxon of plant that occurred in North Carolina at one time, but for which all known populations are currently considered to be either historical or extirpated." "(NCAC 02 NCAC 48F .0401).

NC Watch Categories
W1 Rare but Relatively Secure
W2 Rare to uncommon in North Carolina, but are not necessarily considered to be declining or otherwise in trouble
W3 Poorly Known in NC
W4 Known to occur in North Carolina which current data suggest are not native to North Carolina
W5 Declined sharply in North Carolina, but which do not appear yet to warrant site-specific monitoring
W6 Rare in one region of North Carolina, while uncommon to abundant in another
W7 Plants with inadequate information about their distribution and rarity in North Carolina

NC Ranks
S1=Critically imperiled in North Carolina due to extreme rarity or some factor(s) making it especially vulnerable to extirpation (local extinction) from the state.
S2=Imperiled in North Carolina due to rarity or some factor(s) making it very vulnerable to extirpation from the state.
S3=Vulnerable to extinction in North Carolina either because rare or uncommon, or found only in a restricted range (even if abundant at some locations), or due to other factors making it vulnerable to extirpation
S4=Apparently secure and widespread in North Carolina
S5=Secure, common, widespread, and abundant
SH=Occurred in North Carolina historically
SU=Currently cannot be assigned a rank in North Carolina due to lack of information
S_N=Rank of non-breeding population
S_B=Rank of breeding population
S_?=Indicates an inexact or uncertain numeric rank

References
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Note: NSA (N) signifies birds that are rare breeders in other regions of Virginia or North Carolina and may migrate or over-winter in this region, but do not breed here.

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Enclosure 2. Fauna of NSAHR HQ, NSAHR LRA, and NSAHR PA

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List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region.

Common Name	Scientific Name	Status*	Tier**
Turtle, Kemp's ridley sea	*Lepidochelys kempii*	FESE	Ia
Sturgeon, Atlantic	*Acipenser oxyrinchus*	FESE	Ib
Turtle, leatherback sea	*Dermochelys coriacea*	FESE	Ic
Turtle, hawksbill sea	*Eretmochelys imbricata*	FESE	
Turtle, loggerhead sea	*Caretta caretta*	FTST	Ia
Knot, red	*Calidris canutus rufa*	FTST	Ia
Bat, northern long-eared	*Myotis septentrionalis*	FTST	Ia
Turtle, green sea	*Chelonia mydas*	FTST	Ib
Plover, piping	*Charadrius melodus*	FTST	IIa
Plover, Wilson's	*Charadrius wilsonia*	SE	Ia
Rail, eastern black	*Laterallus jamaicensis jamaicensis*	FPSE	Ia
Bat, Rafinesque's eastern big-eared	*Corynorhinus rafinesquii macrotis*	SE	Ia
Bat, tri-colored	*Perimyotis subflavus*	SE	Ia
Rattlesnake, canebrake	*Crotalus horridus*	SE	IIa
Falcon, peregrine	*Falco peregrinus*	ST	Ia
Shrike, loggerhead	*Lanius ludovicianus*	ST	Ia
Tern, gull-billed	*Gelochelidon nilotica*	ST	Ia
Shrike, migrant loggerhead	*Lanius ludovicianus migrans*	ST	
Terrapin, northern diamond-backed	*Malaclemys terrapin terrapin*	CC	IIa
Turtle, spotted	*Clemmys guttata*	CC	IIIa
Ibis, glossy	*Plegadis falcinellus*		Ia
Toad, oak	*Anaxyrus quercicus*		IIa
Duck, American black	*Anas rubripes*		IIa
Egret, snowy	*Egretta thula*		IIa
Heron, little blue	*Egretta caerulea caerulea*		IIa
Night-heron, yellow-crowned	*Nyctanassa violacea violacea*		IIa

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Skimmer, black	*Rynchops niger*		IIa
Tern, common	*Sterna hirundo*		IIa
Warbler, cerulean	*Setophaga cerulea*		IIa
Woodcock, American	*Scolopax minor*		IIa
Rail, king	*Rallus elegans*		IIb
Warbler, Swainson's	*Limnothlypis swainsonii*		IIc
Eel, American	*Anguilla rostrata*		IIIa
Frog, carpenter	*Lithobates virgatipes*		IIIa
Siren, eastern lesser	*Siren intermedia intermedia*		IIIa
Turtle, woodland box	*Terrapene carolina carolina*		IIIa
Bittern, least	*Ixobrychus exilis exilis*		IIIa
Bobwhite, northern	*Colinus virginianus*		IIIa
Brant	*Branta bernicla brota*		IIIa
Cuckoo, yellow-billed	*Coccyzus americanus*		IIIa
Harrier, northern	*Circus hudsonius*		IIIa
Night-heron, black-crowned	*Nycticorax nycticorax hoactii*		IIIa
Owl, barn	*Tyto alba pratincola*		IIIa
Sparrow, Nelson's	*Ammospiza nelsoni*		IIIa
Sparrow, saltmarsh	*Ammodramus caudacutus*		IIIa
Tern, Forster's	*Sterna forsteri*		IIIa
Tern, least	*Sternula antillarum*		IIIa
Warbler, Kentucky	*Geothlypis formosa*		IIIa
Whip-poor-will, Eastern	*Antrostomus vociferus*		IIIa
Willet	*Catoptrophorus semipalmatus semipalmatus*		IIIa
Butterfly, monarch	*Danaus plexippus*		IIIa
Kingfisher, belted	*Megaceryle alcyon*		IIIb
Dolphin, bottlenose	*Tursiops truncatus*		IIIb
Skipper, Duke's (or scarce swamp)	*Euphyes dukesi*		IIIc
Herring, alewife	*Alosa pseudoharengus*		IVa
Herring, blueback	*Alosa aestivalis*		IVa
Shad, American	*Alosa sapidissima*		IVa
Frog, little grass	*Pseudacris ocularis*		IVa
Salamander, eastern mud	*Pseudotriton montanus montanus*		IVa
Salamander, many-lined	*Stereochilus marginatus*		IVa
Siren, greater	*Siren lacertina*		IVa
Lizard, eastern slender glass	*Ophisaurus attenuatus longicaudus*		IVa
Mudsnake, eastern	*Farancia abacura abacura*		IVa

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Ribbonsnake, common	*Thamnophis saurita saurita*		IVa
Scarletsnake, northern	*Cemophora coccinea copei*		IVa
Snake, common rainbow	*Farancia erytrogramma erytrogramma*		IVa
Catbird, gray	*Dumetella carolinensis*		IVa
Chat, yellow-breasted	*Icteria virens virens*		IVa
Dowitcher, short-billed	*Limnodromus griseus*		IVa
Dunlin	*Calidris alpina hudsonia*		IVa
Godwit, marbled	*Limosa fedoa*		IVa
Gull, laughing	*Leucophaeus atricilla*		IVa
Kingbird, eastern	*Tyrannus tyrannus*		IVa
Loon, red-throated	*Gavia stellata*		IVa
Meadowlark, eastern	*Sturnella magna*		IVa
Pintail, northern	*Anas acuta*		IVa
Plover, black-bellied	*Pluvialis squatarola*		IVa
Rail, clapper	*Rallus crepitans*		IVa
Rail, Virginia	*Rallus limicola*		IVa
Sanderling	*Calidris alba*		IVa
Scaup, greater	*Aythya marila*		IVa
Sparrow, field	*Spizella pusilla*		IVa
Sparrow, grasshopper	*Ammodramus savannarum pratensis*		IVa
Sparrow, seaside	*Ammodramus maritimus*		IVa
Tern, royal	*Sterna maxima maximus*		IVa
Thrasher, brown	*Toxostoma rufum*		IVa
Towhee, eastern	*Pipilo erythrophthalmus*		IVa
Warbler, black-and-white	*Mniotilta varia*		IVa
Whimbrel	*Numenius phaeopus*		IVa
Wren, marsh	*Cistothorus palustris*		IVa
Bat, eastern red	*Lasiurus borealis*		IVa
Bat, hoary	*Lasiurus cinereus*		IVa
Bat, silver-haired	*Lasionycteris noctivagans*		IVa
Mouse, cotton	*Peromyscus gossypinus gossypinus*		IVa
Myotis, southeastern	*Myotis austroriparius*		IVa
Rabbit, marsh	*Sylvilagus palustris palustris*		IVa
Slider, yellow-bellied	*Trachemys scripta scripta*		IVb
Turtle, snapping	*Chelydra serpentina*		IVb
Blackbird, rusty	*Euphagus carolinus*		IVb
Flicker, northern	*Colaptes auratus*		IVb
Heron, green	*Butorides virescens*		IVb

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Swift, chimney	*Chaetura pelagica*		IVb
Thrush, wood	*Hylocichla mustelina*		IVb
Warbler, Canada	*Cardellina canadensis*		IVb
Wood-Pewee, Eastern	*Contopus virens*		IVb
Spadefoot, eastern	*Scaphiopus holbrookii*		IVc
Snake, eastern hog-nosed	*Heterodon platirhinos*		IVc
Sandpiper, purple	*Calidris maritima*		IVc
Swallow, northern rough-winged	*Stelgidopteryx serripennis*		IVc
Butterfly, King's hairstreak	*Satyrium kingi*		IVc
Anchovy, bay	*Anchoa mitchilli*		
Bass, largemouth	*Micropterus salmoides*		
Bass, striped	*Morone saxatilis*		
Bluegill	*Lepomis macrochirus*		
Bullhead, brown	*Ameiurus nebulosus*		
Bullhead, yellow	*Ameiurus natalis*		
Carp, common	*Cyprinus carpio*		
Catfish, channel	*Ictalurus punctatus*		
Catfish, white	*Ameiurus catus*		
Crappie, black	*Pomoxis nigromaculatus*		
Croaker, Atlantic	*Micropogonias undulatus*		
Dace, rosyside	*Clinostomus funduloides*		
Hogchoker	*Trinectes maculatus*		
Killifish, banded	*Fundulus diaphanus*		
Lamprey, sea	*Petromyzon marinus*		
Menhaden, Atlantic	*Brevoortia tyrannus*		
Minnow, eastern silvery	*Hybognathus regius*		
Minnow, sheepshead	*Cyprinodon variegatus*		
Mosquitofish, eastern	*Gambusia holbrooki*		
Mummichog	*Fundulus heteroclitus*		
Perch, white	*Morone americana*		
Perch, yellow	*Perca flavescens*		
Pickerel, chain	*Esox niger*		
Pumpkinseed	*Lepomis gibbosus*		
Shad, gizzard	*Dorosoma cepedianum*		
Shiner, golden	*Notemigonus crysoleucas*		
Silverside, Atlantic	*Menidia menidia*		
Spot	*Leiostomus xanthurus*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Sunfish, redear	*Lepomis microlophus*		
Walleye	*Sander vitreus vitreus*		
Warmouth	*Lepomis gulosus*		
Weakfish	*Cynoscion regalis*		
Amphiuma, two-toed	*Amphiuma means*		
Bullfrog, American	*Lithobates catesbeianus*		
Frog, Brimley's chorus	*Pseudacris brimleyi*		
Frog, Coastal Plains leopard	*Lithobates sphenocephalus utricularius*		
Frog, green	*Lithobates clamitans*		
Frog, southern cricket	*Acris gryllus*		
Newt, red-spotted	*Notophthalmus viridescens viridescens*		
Peeper, spring	*Pseudacris crucifer*		
Salamander, Atlantic Coast Slimy	*Plethodon chlorobryonis*		
Salamander, eastern red-backed	*Plethodon cinereus*		
Salamander, four-toed	*Hemidactylium scutatum*		
Salamander, marbled	*Ambystoma opacum*		
Salamander, northern dusky	*Desmognathus fuscus*		
Salamander, southern dusky	*Desmognathus auriculatus*		
Salamander, southern two-lined	*Eurycea cirrigera*		
Salamander, three-lined	*Eurycea guttolineata*		
Toad, eastern narrow-mouthed	*Gastrophryne carolinensis*		
Toad, Fowler's	*Anaxyrus fowleri*		
Toad, southern	*Anaxyrus terrestris*		
Treefrog, Cope's gray	*Hyla chrysoscelis*		
Treefrog, green	*Hyla cinerea*		
Treefrog, pine woods	*Hyla femoralis*		
Treefrog, squirrel	*Hyla squirella*		
Brownsnake, Dekay's	*Storeria dekayi*		
Cooter, northern red-bellied	*Pseudemys rubriventris*		
Copperhead, eastern	*Agkistrodon contortrix*		
Cottonmouth, northern	*Agkistrodon piscivorus*		
Earthsnake, eastern smooth	*Virginia valeriae valeriae*		
Earthsnake, rough	*Haldea striatula*		
Gartersnake, eastern	*Thamnophis sirtalis sirtalis*		
Gecko, Mediterranean	*Hemidactylus turcicus*		
Greensnake, northern rough	*Opheodrys aestivus aestivus*		
Kingsnake, eastern	*Lampropeltis getula*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Lizard, eastern fence	*Sceloporus undulatus*		
Milksnake, eastern	*Lampropeltis triangulum*		
Racer, northern black	*Coluber constrictor constrictor*		
Racerunner, eastern six-lined	*Aspidoscelis sexlineata sexlineata*		
Ratsnake, eastern	*Pantherophis alleghaniensis*		
Skink, broad-headed	*Plestiodon laticeps*		
Skink, common five-lined	*Plestiodon fasciatus*		
Skink, little brown	*Scincella lateralis*		
Skink, southeastern five-lined	*Plestiodon inexpectatus*		
Slider, red-eared	*Trachemys scripta elegans*		
Snake, northern red-bellied	*Storeria occipitomaculata occipitomaculata*		
Snake, northern ring-necked	*Diadophis punctatus edwardsii*		
Snake, southern ring-necked	*Diadophis punctatus punctatus*		
Turtle, eastern musk	*Sternotherus odoratus*		
Turtle, eastern painted	*Chrysemys picta picta*		
Turtle, southeastern mud	*Kinosternon subrubrum subrubrum*		
Turtle, striped mud	*Kinosternon baurii*		
Watersnake, brown	*Nerodia taxispilota*		
Watersnake, northern	*Nerodia sipedon sipedon*		
Watersnake, plain-bellied	*Nerodia erythrogaster*		
Wormsnake, eastern	*Carphophis amoenus amoenus*		
Avocet, American	*Recurvirostra americana*		
Bittern, American	*Botaurus lentiginosus*		
Blackbird, red-winged	*Agelaius phoeniceus*		
Bluebird, eastern	*Sialia sialis*		
Bufflehead	*Bucephala albeola*		
Bunting, indigo	*Passerina cyanea*		
Bunting, Lazuli	*Passerina amoena*		
Canvasback	*Aythya valisineria*		
Cardinal, northern	*Cardinalis cardinalis*		
Chickadee, Carolina	*Poecile carolinensis*		
Chuck-will's-widow	*Antrostomus carolinensis*		
Coot, American	*Fulica americana*		
Cormorant, double-crested	*Phalacrocorax auritus*		
Cormorant, great	*Phalacrocorax carbo*		
Cowbird, brown-headed	*Molothrus ater*		
Creeper, brown	*Certhia americana*		
Crossbill, white-winged	*Loxia leucoptera*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Crow, American	*Corvus brachyrhynchos*		
Crow, fish	*Corvus ossifragus*		
Dickcissel	*Spiza americana*		
Dove, mourning	*Zenaida macroura carolinensis*		
Dowitcher, long-billed	*Limnodromus scolopaceus*		
Duck, Harlequin	*Histrionicus histrionicus*		
Duck, long-tailed	*Clangula hyemalis*		
Duck, ruddy	*Oxyura jamaicensis*		
Duck, wood	*Aix sponsa*		
Eagle, bald	*Haliaeetus leucocephalus*		
Egret, cattle	*Bubulcus ibis*		
Egret, great	*Ardea alba egretta*		
Egret, reddish	*Egretta rufescens rufescens*		
Eider, common	*Somateria mollissima*		
Finch, house	*Haemorhous mexicanus*		
Finch, purple	*Haemorhous purpureus*		
Flycatcher, Acadian	*Empidonax virescens*		
Flycatcher, great crested	*Myiarchus crinitus*		
Flycatcher, willow	*Empidonax traillii*		
Gadwall	*Mareca strepera*		
Gnatcatcher, blue-gray	*Polioptila caerulea*		
Godwit, Hudsonian	*Limosa haemastica*		
Goldeneye, common	*Bucephala clangula americana*		
Goldfinch, American	*Spinus tristis*		
Goose, Canada	*Branta canadensis*		
Goose, lesser snow	*Chen caerulescens caerulescens*		
Goose, snow	*Chen caerulescens*		
Grackle, boat-tailed	*Quiscalus major*		
Grackle, common	*Quiscalus quiscula*		
Grebe, horned	*Podiceps auritus*		
Grebe, pied-billed	*Podilymbus podiceps*		
Grebe, red-necked	*Podiceps grisegena*		
Grosbeak, black-headed	*Pheucticus melanocephalus*		
Grosbeak, blue	*Passerina caerulea*		
Grosbeak, evening	*Coccothraustes vespertinus*		
Grosbeak, rose-breasted	*Pheucticus ludovicianus*		
Gull, great black-backed	*Larus marinus*		
Gull, herring	*Larus argentatus*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Gull, ring-billed	*Larus delawarensis*		
Hawk, Cooper's	*Accipiter cooperii*		
Hawk, red-shouldered	*Buteo lineatus lineatus*		
Hawk, red-tailed	*Buteo jamaicensis*		
Hawk, rough-legged	*Buteo lagopus johannis*		
Hawk, sharp-shinned	*Accipiter striatus velox*		
Heron, great blue	*Ardea herodias herodias*		
Heron, tricolored	*Egretta tricolor*		
Hummingbird, ruby-throated	*Archilochus colubris*		
Ibis, white	*Eudocimus albus*		
Jay, blue	*Cyanocitta cristata*		
Junco, dark-eyed	*Junco hyemalis*		
Kestrel, American	*Falco sparverius sparverius*		
Killdeer	*Charadrius vociferus*		
Kinglet, golden-crowned	*Regulus satrapa*		
Kinglet, ruby-crowned	*Regulus calendula*		
Lark, horned	*Eremophila alpestris*		
Longspur, Lapland	*Calcarius lapponicus*		
Loon, common	*Gavia immer*		
Mallard	*Anas platyrhynchos*		
Martin, purple	*Progne subis*		
Merganser, common	*Mergus merganser americanus*		
Merganser, red-breasted	*Mergus serrator serrator*		
Mockingbird, northern	*Mimus polyglottos*		
Moorhen, common	*Gallinula chloropus cachinnans*		
Nighthawk, common	*Chordeiles minor*		
Nuthatch, brown-headed	*Sitta pusilla*		
Nuthatch, red-breasted	*Sitta canadensis*		
Nuthatch, white-breasted	*Sitta carolinensis*		
Oriole, Baltimore	*Icterus galbula*		
Oriole, orchard	*Icterus spurius*		
Osprey	*Pandion haliaetus carolinensis*		
Ovenbird	*Seiurus aurocapilla*		
Owl, barred	*Strix varia*		
Owl, great horned	*Bubo virginianus*		
Owl, short-eared	*Asio flammeus*		
Owl, snowy	*Bubo scandiacus*		
Parula, northern	*Setophaga americana*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Pelican, brown	*Pelecanus occidentalis carolinensis*		
Phoebe, eastern	*Sayornis phoebe*		
Pigeon, rock	*Columba livia*		
Pipit, American	*Anthus rubescens*		
Redhead	*Aythya americana*		
Redstart, American	*Setophaga ruticilla*		
Robin, American	*Turdus migratorius*		
Sandpiper, least	*Calidris minutilla*		
Sandpiper, spotted	*Actitis macularia*		
Sandpiper, upland	*Bartramia longicauda*		
Sandpiper, western	*Calidris mauri*		
Sapsucker, yellow-bellied	*Sphyrapicus varius*		
Scaup, lesser	*Aythya affinis*		
Scoter, black	*Melanitta americana*		
Scoter, surf	*Melanitta perspicillata*		
Screech-owl, eastern	*Megascops asio*		
Shoveler, northern	*Anas clypeata*		
Siskin, pine	*Spinus pinus*		
Snipe, Wilson's	*Gallinago delicata*		
Sora	*Porzana carolina*		
Sparrow, black-throated	*Amphispiza bilineata*		
Sparrow, chipping	*Spizella passerina*		
Sparrow, fox	*Passerella iliaca*		
Sparrow, house	*Passer domesticus*		
Sparrow, savannah	*Passerculus sandwichensis*		
Sparrow, song	*Melospiza melodia*		
Sparrow, swamp	*Melospiza georgiana*		
Sparrow, vesper	*Pooecetes gramineus*		
Sparrow, white-crowned	*Zonotrichia leucophrys*		
Sparrow, white-throated	*Zonotrichia albicollis*		
Starling, European	*Sturnus vulgaris*		
Stilt, black-necked	*Himantopus mexicanus*		
Swallow, barn	*Hirundo rustica*		
Swan, mute	*Cygnus olor*		
Swan, tundra	*Cygnus columbianus columbianus*		
Tanager, scarlet	*Piranga olivacea*		
Tanager, summer	*Piranga rubra*		
Tanager, western	*Piranga ludoviciana*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Teal, blue-winged	*Spatula discors*		
Teal, green-winged	*Anas crecca carolinensis*		
Tern, Caspian	*Hydroprogne caspia*		
Tern, sandwich	*Sterna sandvicensis acuflavidus*		
Thrush, hermit	*Catharus guttatus*		
Titmouse, tufted	*Baeolophus bicolor*		
Turnstone, ruddy	*Arenaria interpres morinella*		
Veery	*Catharus fuscescens*		
Vireo, blue-headed	*Vireo solitarius*		
Vireo, red-eyed	*Vireo olivaceus*		
Vireo, white-eyed	*Vireo griseus*		
Vireo, yellow-throated	*Vireo flavifrons*		
Vulture, black	*Coragyps atratus*		
Vulture, turkey	*Cathartes aura*		
Warbler, bay-breasted	*Setophaga castanea*		
Warbler, black-throated blue	*Setophaga caerulescens*		
Warbler, black-throated green	*Setophaga virens*		
Warbler, blackpoll	*Setophaga striata*		
Warbler, blue-winged	*Vermivora cyanoptera*		
Warbler, chestnut-sided	*Setophaga pensylvanica*		
Warbler, hooded	*Setophaga citrina*		
Warbler, magnolia	*Setophaga magnolia*		
Warbler, Nashville	*Leiothlypis ruficapilla*		
Warbler, palm	*Setophaga palmarum*		
Warbler, pine	*Setophaga pinus*		
Warbler, prairie	*Setophaga discolor*		
Warbler, prothonotary	*Protonotaria citrea*		
Warbler, worm-eating	*Helmitheros vermivorus*		
Warbler, yellow	*Setophaga petechia*		
Warbler, yellow-rumped	*Setophaga coronata*		
Waterthrush, Louisiana	*Parkesia motacilla*		
Waterthrush, northern	*Parkesia noveboracensis*		
Waxwing, cedar	*Bombycilla cedrorum*		
Wigeon, American	*Mareca americana*		
Wigeon, Eurasian	*Mareca penelope*		
Woodpecker, downy	*Dryobates pubescens*		
Woodpecker, hairy	*Dryobates villosus*		
Woodpecker, pileated	*Dryocopus pileatus*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Woodpecker, red-bellied	*Melanerpes carolinus*		
Woodpecker, red-headed	*Melanerpes erythrocephalus*		
Wren, Carolina	*Thryothorus ludovicianus*		
Wren, house	*Troglodytes aedon*		
Wren, sedge	*Cistothorus platensis*		
Wren, winter	*Troglodytes troglodytes*		
Yellowlegs, lesser	*Tringa flavipes*		
Yellowthroat, common	*Geothlypis trichas*		
Bat, big brown	*Eptesicus fuscus*		
Bat, evening	*Nycticeius humeralis*		
Bat, northern yellow	*Lasiurus intermedius floridanus*		
Beaver, American	*Castor canadensis*		
Chipmunk, Fisher's eastern	*Tamias striatus fisheri*		
Cottontail, eastern	*Sylvilagus floridanus mallurus*		
Coyote	*Canis latrans*		
Deer, white-tailed	*Odocoileus virginianus*		
Fox, common gray	*Urocyon cinereoargenteus cinereoargenteus*		
Fox, red	*Vulpes vulpes fulva*		
Lemming, southern bog	*Synaptomys cooperi helaletes*		
Mink, common	*Neovison vison mink*		
Mole, eastern	*Scalopus aquaticus aquaticus*		
Mouse, common white-footed	*Peromyscus leucopus leucopus*		
Mouse, eastern harvest	*Reithrodontomys humulis humulis*		
Mouse, house	*Mus musculus musculus*		
Mouse, Lewis' golden	*Ochrotomys nuttalli nuttalli*		
Mouse, meadow jumping	*Zapus hudsonius americanus*		
Muskrat, large-toothed	*Ondatra zibethicus macrodon*		
Nutria	*Myocastor coypus*		
Opossum, Virginia	*Didelphis virginiana virginiana*		
Otter, northern river	*Lontra canadensis lataxina*		
Raccoon	*Procyon lotor lotor*		
Rat, black	*Rattus rattus rattus*		
Rat, hispid cotton	*Sigmodon hispidus virginianus*		
Rat, marsh rice	*Oryzomys palustris palustris*		
Rat, Norway	*Rattus norvegicus norvegicus*		
Shrew, American pygmy	*Sorex hoyi*		
Shrew, least	*Cryptotis parva*		
Shrew, southeastern	*Sorex longirostris longirostris*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Shrew, southern short-tailed	*Blarina carolinensis*		
Skunk, striped	*Mephitis mephitis nigra*		
Skunk, striped	*Mephitis mephitis mephitis*		
Squirrel, eastern gray	*Sciurus carolinensis carolinensis*		
Squirrel, southern flying	*Glaucomys volans volans*		
Vole, dark meadow	*Microtus pennsylvanicus nigrans*		
Vole, pine	*Microtus pinetorum scalopsoides*		
Weasel, long-tailed	*Mustela frenata noveboracensis*		
Mussel, eastern elliptio	*Elliptio complanata*		
Crab, flatback mud	*Eurypanopeus depressus*		
Crayfish, Digger	*Fallicambarus fodiens*		
Crayfish, no common name	*Cambarus acuminatus*		
Crayfish, White River	*Procambarus acutus*		
Shrimp, Big-clawed snapping	*Alpheus Heterochaelis*		
SHRIMP, EELGRASS	*Hippolyte Pleuracentha*		
Armyworm	*Pseudaletia unipuncta*		
Borer, European corn	*Ostrinia nubilatis*		
Butterfly, Aaron's skipper	*Poanes aaroni*		
Butterfly, American lady	*Vanessa virginiensis*		
Butterfly, banded hairstreak	*Satyrium calanus*		
Butterfly, black swallowtail	*Papilio polyxenes asterius*		
Butterfly, Brazilian skipper	*Calpodes ethlius*		
Butterfly, broad-winged skipper	*Poanes viator*		
Butterfly, brown elfin	*Callophrys augustinus*		
Butterfly, cabbage white	*Pieris rapae*		
Butterfly, Carolina road-skipper	*Amblyscirtes carolina*		
Butterfly, clouded skipper	*Lerema accius*		
Butterfly, clouded sulphur	*Colias philodice*		
Butterfly, cloudless sulphur	*Phoebis sennae eubule*		
Butterfly, common buckeye	*Junonia coenia*		
Butterfly, common checkered-skipper	*Pyrgus communis*		
Butterfly, common sootywing	*Pholisora catullus*		
Butterfly, common wood-nymph	*Cercyonis pegala*		
Butterfly, confused cloudywing	*Thorybes confusis*		
Butterfly, crossline skipper	*Polites origenes*		
Butterfly, Delaware skipper	*Anatrytone logan*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Butterfly, Dion skipper	*Euphyes dion*		
Butterfly, Dun skipper	*Euphyes vestris*		
Butterfly, eastern comma	*Polygonia comma*		
Butterfly, eastern tailed-blue	*Everes comyntas*		
Butterfly, eastern tiger swallowtail	*Papilio glaucus*		
Butterfly, fiery skipper	*Hylephila phyleus*		
Butterfly, gemmed satyr	*Cyllopsis gemma*		
Butterfly, gray hairstreak	*Strymon melinus*		
Butterfly, great purple hairstreak	*Atlides halesus*		
Butterfly, gulf fritillary	*Agraulis vanillae nigrior*		
Butterfly, Hayhurst's scallopwing	*Staphylus hayhurstii*		
Butterfly, hoary edge	*Achalarus lyciades*		
Butterfly, Horace's duskywing	*Erynnis horatius*		
Butterfly, Juvenal's duskywing	*Erynnis juvenalis*		
Butterfly, lace-winged road-skipper	*Amblyscirtes aesculapius*		
Butterfly, least skipper	*Ancyloxypha numitor*		
Butterfly, little glassywing	*Pompeius verna*		
Butterfly, long-tailed skipper	*Urbanus proteus*		
Butterfly, northern broken dash	*Wallengrenia egeremet*		
Butterfly, northern cloudywing	*Thorybes pylades*		
Butterfly, Ocola skipper	*Panoquina ocola*		
Butterfly, orange sulphur	*Colias eurytheme*		
Butterfly, painted lady	*Vanessa cardui*		
Butterfly, Palamedes swallowtail	*Papilio palamedes*		
Butterfly, pipevine swallowtail	*Battus philenor*		
Butterfly, question mark	*Polygonia interrogationis*		
Butterfly, red admiral	*Vanessa atalanta*		
Butterfly, red-banded hairstreak	*Calycopis cecrops*		
Butterfly, red-spotted purple	*Limenitis arthemis astyanax*		
Butterfly, reversed road-skipper	*Amblyscirtes reversa*		
Butterfly, sachem	*Atalopedes campestris*		
Butterfly, salt marsh skipper	*Panoquina panoquin*		
Butterfly, silver-spotted skipper	*Epargyreus clarus*		

Table 2-8. List of Species and Virginia State Status that are Known to Occur within the NSAHR HQ Complex, NSAHR LRA, and NSAHR PA Region, Cont.

Common Name	Scientific Name	Status*	Tier**
Butterfly, sleepy duskywing	*Erynnis brizo*		
Butterfly, sleepy orange	*Eurema nicippe*		
Butterfly, southern broken dash	*Wallengrenia otho*		
Butterfly, southern cloudywing	*Thorybes bathyllus*		
Butterfly, spicebush swallowtail	*Papilio troilus*		
Butterfly, spring azure	*Celastrina ladon*		
Butterfly, swarthy skipper	*Nastra lherminier*		
Butterfly, variegated fritillary	*Euptoieta claudia*		
Butterfly, viceroy	*Limenitis archippus*		
Butterfly, white M hairstreak	*Parrhasius m-album*		
Butterfly, Yehl skipper	*Poanes yehl*		
Butterfly, Zabulon skipper	*Poanes zabulon*		
Butterfly, Zarucco duskywing	*Erynnis zarucco*		
Deerfly	*Chrysops vittatus vittatus*		
Earworm, corn	*Heliathis zea*		
Moth, codling	*Cydia pomonella*		
Moth, gypsy	*Lymantria dispar*		
Moth, pinkstriped oakworm	*Anisota virginiensis*		
Tick, American dog	*Dermacentor variabilis*		
Tick, brown dog	*Rhipicephalus sanguineus*		
Tick, lone star	*Amblyomma americanum*		
Tick, rabbit	*Haemaphysalis leporispalustris*		
Tick, winter	*Dermacentor albipictus*		

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern.

**I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need Virginia Wildlife Action Plan Conservation Opportunity Ranking: a - On the ground management strategies/actions exist and can be feasibly implemented.; b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.; c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

Source: VaFWIS Search Report 2020.

Enclosure 3. Animal Species of Greatest Conservation Need for the Virginia Mid-Atlantic Coastal Plain

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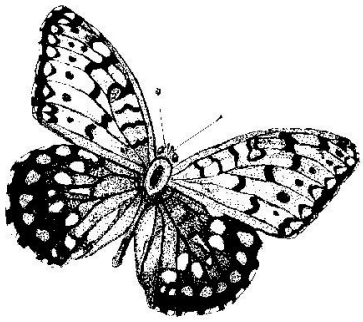
COMMONWEALTH of VIRGINIA

Natural Heritage Resources of Virginia: Rare Animals

Compiled by:
Steven M. Roble, Zoologist



Virginia Department of Conservation and Recreation
Division of Natural Heritage, Richmond, Virginia
Natural Heritage Technical Report 16-07. February 2016

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

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NATURAL HERITAGE RESOURCES OF VIRGINIA:

RARE ANIMALS

FEBRUARY 2016

VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION
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Cover illustrations (left to right) by Megan Rollins

Indiana Myotis
Red-cockaded Woodpecker
Regal Fritillary

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NATURAL HERITAGE RESOURCES
OF VIRGINIA: RARE ANIMALS

FEBRUARY 2016

INTRODUCTION

The Virginia Department of Conservation and Recreation's Division of Natural Heritage (DCR-DNH) was established in 1986 to protect Virginia's biological diversity. DCR-DNH is the state's first comprehensive program for conservation of our natural heritage, and includes an intensive statewide biological inventory, field surveys, electronic and manual database management, environmental review capabilities, and natural area protection and stewardship. Through its actions the Division identifies Natural Heritage Resources that are in need of conservation attention while creating an efficient means of evaluating the impacts of balanced economic growth. Natural Heritage Resources are defined in the Virginia Natural Area Preserves Act of 1989 (Section 10.1-209 through 217, Code of Virginia), as the habitat of rare, threatened, and endangered plant and animal species; exemplary natural communities, habitats, and ecosystems; and other natural features of the Commonwealth.

To achieve this protection, DCR-DNH maintains lists of the most significant elements of our natural diversity. These lists focus the Division's inventory on the Natural Heritage Resources most likely to be lost without conservation action in the near future. Most importantly, these lists are useful not only for DCR-DNH, but can be used by other agencies, organizations, and individuals to assist in the determination of actions in protection and development decision-making. In formulating these lists, the Division uses information from previous studies, museum records, observations and opinions of experts, DCR-DNH staff scientists, and field inventories.

The first list included in this report is the Rare Animal List. This list contains information on the legal and biological status of Virginia's rarest known native animals, including vertebrates, insects, and selected other invertebrate groups, **793** in total (189 vertebrates, 604 invertebrates). This list includes those species that are believed to be sufficiently rare or threatened to merit an inventory of their status and locations. Certain marine species that are listed as federally endangered or threatened are only included in the appendices. Only those species that use discrete habitat patches or can directly benefit from habitat protection are included in the main taxonomic lists.

The second list included in this report is the Animal Watchlist. This list contains information on the legal and biological status of **347** additional taxa (74 vertebrates, 273 invertebrates) that are decidedly uncommon in Virginia but not scarce enough to merit inclusion on the Rare Animal List. Species on this list are monitored to determine general population trends, and if a particular species is found to be rare or threatened, it is placed on the Rare Animal List. Some species included on the Animal Watchlist were formerly on the Rare Animal List but have been determined to be more common than previously believed. Other species on the Watchlist are declining and may warrant placement on the Rare Animal List in the future if their populations continue to decline.

The third list included in this report is the Animal Review List (Taxa of Uncertain Status). Many of these species lack numerical ranks, indicating that they are poorly known from a distributional and/or taxonomic standpoint. Although some of these species may prove to be conservation targets, more field and museum data are needed to assess their degree of rarity in Virginia and/or taxonomic status. There are **273** species (5 vertebrates, 268 invertebrates) in this category.

Natural Heritage Resource lists are necessarily dynamic, with updates occurring as new data become available. Such revisions assure the most current knowledge of the status of Virginia's animals. Animals are added to the list when it is determined that they have become rare or threatened to such an extent that their continued existence in the Commonwealth is in jeopardy. Animals are deleted from the list when additional field surveys or other new data indicate they are more common than previously believed and do not warrant priority conservation efforts.

All animals that are officially protected by federal or state endangered species acts are included in this list (except as noted above). Federally listed species are protected by the Endangered Species Act of 1973, as amended. The U.S. Department of the Interior's Fish and Wildlife Service administers the Act, listing and protecting federally endangered and threatened species. The Virginia Department of Game and Inland Fisheries has the regulatory responsibility for the listing and protection of the state's endangered and threatened animals (excluding the Class Insecta) under the Virginia Endangered Species Act (Section 29.1-564 through 570, Code of Virginia). The Office of Plant Protection within the Virginia Department of Agriculture and Consumer Services has regulatory

responsibility for the listing and protection of the state's insects (and plants) under the Virginia Endangered Plant and Insect Act (Section 3.1-1020 through 1030, Code of Virginia). DCR-DNH is a primary source of recommendations to each of the regulatory agencies for species that are in need of listing as endangered or threatened.

The Virginia Department of Conservation and Recreation, the U.S. Fish and Wildlife Service, the Virginia Department of Game and Inland Fisheries, and the Virginia Department of Agriculture and Consumer Services work cooperatively to insure the continued survival of Virginia's diverse fauna and other elements of natural diversity. The Division of Natural Heritage also works closely with many other state and federal agencies, local governments, conservation organizations, and many other organizations and individuals to seek adequate protection of Virginia's natural heritage.

LIST FORMAT

The lists are sorted by broad taxonomic groups and then ordered alphabetically by scientific name within each group. The format of each list consists of six fields: scientific name, common name, global rank, state rank, federal status, and state status. These fields are also used in the lists appearing in Appendices 1-3. To aid in the interpretation of the lists, a brief explanation of each field and a summary of abbreviations follow.

Column 1. Scientific name:

Nomenclature of animals is not contained in any single source. The most recent taxonomic sources are examined by the staff zoologist and, when necessary, direct consultations with experts are used to maintain the most scientifically accepted names for all animal groups. Divergences from these opinions are rare and generally occur only while an ongoing taxonomic study is being conducted. Contact the staff zoologist if you have questions or comments regarding the scientific names used herein.

Column 2. Common name:

A common name is provided for the convenience of the user. Standard common names have been developed and universally adopted for only a few animal groups; therefore, the user is cautioned to use scientific names whenever possible. The common names for most vertebrates and a few selected aquatic invertebrate groups (e.g., mussels) are recognized as stable. Most invertebrate species lack common names and it may not be practical to provide such names. They are usually indicated in the list as "a caddisfly", "a millipede", etc. The primary sources of common names applied to species in selected groups included in this list can be found on page 7. Many other common names that appear in the list, especially those of invertebrates, are not widely used or universally accepted.

Column 3. Global rank:

Global ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, and NatureServe (a non-profit conservation organization) to designate the rangewide rarity of a species or subspecies. This system was originally developed by The Nature Conservancy and is widely used by other agencies (e.g., U.S. Fish and Wildlife Service, U.S. Forest Service) and organizations as the best available scientific and objective assessment of an animal's rarity and the level of threat to its existence. The ranks are assigned after considering a suite of factors including the number of occurrences (populations), number of individuals, and severity of threats to the species and its habitats. Global ranks found in the Rare Animal List are explained below:

G1 Extremely rare and critically imperiled with 5 or fewer occurrences or very few remaining individuals; or because of some factor(s) making it especially vulnerable to extinction.

G2 Very rare and imperiled with 6 to 20 occurrences or few remaining individuals; or because of some factor(s) making it vulnerable to extinction.

G3 Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range; or vulnerable to extinction because of other factors. Usually fewer than 100 occurrences are documented.

G4 Common and apparently secure globally, although it may be rare in parts of its range, especially at the periphery.

G5 Very common and demonstrably secure globally, although it may be rare in parts of its range, especially at the periphery.

GH Formerly part of the world's fauna with some expectation that it may be rediscovered; generally applies to species that have not been verified for an extended period (usually >15 years) and for which some inventory has been attempted recently.

GX Believed to be extinct throughout its range with virtually no likelihood of rediscovery.

GU Possibly rare, but status uncertain and more data needed.

G? Unranked, or, if following a numerical ranking, rank uncertain (e.g., G3?).

G_G_ The rank is uncertain, but considered to be within the indicated range (e.g., G2G4) of ranks (also, T_T_).

G_Q Taxon has a questionable taxonomic assignment (e.g., G3Q) and may prove to be invalid upon further study.

G_T_ Signifies the rank of a subspecies (e.g., G5T1 would apply to a subspecies if the species is demonstrably secure globally (G5) but the subspecies warrants a rank of T1, critically imperiled.)

GNR A global conservation status rank has not been assigned to the species.

Column 4. State rank:

State ranks are assigned in a manner similar to that described for global ranks, with values that generally range from S1-S5, but consider only factors within the political boundaries of Virginia. For example, an animal that is endemic to Virginia (found nowhere else in the world) will have the same global and state ranks, whereas a species that may be common in the northeastern United States but only known from a few occurrences in Virginia will have global and state ranks that differ. State ranks found in the Rare Animal List are explained below:

S1 Extremely rare and critically imperiled with 5 or fewer occurrences or very few remaining individuals in Virginia; or because of some factor(s) making it especially vulnerable to extirpation in Virginia.

S2 Very rare and imperiled with 6 to 20 occurrences or few remaining individuals in Virginia; or because of some factor(s) making it vulnerable to extirpation in Virginia.

S3 Rare to uncommon in Virginia with between 20 and 100 occurrences; may have fewer occurrences if found to be common or abundant at some of these locations; may be somewhat vulnerable to extirpation in Virginia.

S4 Common and apparently secure in Virginia, although it may be rare in parts of its range.

SH Formerly part of Virginia's fauna with some expectation that it may be rediscovered; generally applies to species that have not been verified in the state for an extended period (usually >15 years) and for which some inventory has been attempted recently.

SX Believed to be extirpated from Virginia with virtually no likelihood of rediscovery.

SU Possibly rare, but status uncertain and more data needed.

S_? Rank uncertain. For example the rank S2? denotes a species that may range from S1 to S3.

S_S_ Rank is uncertain, but considered to be within the indicated range of ranks (e.g., S2S4).

S_B Breeding status of an animal (primarily used for birds) in Virginia; these species typically inhabit Virginia only during the breeding season.

S_B/S_N Breeding and nonbreeding status of an animal (primarily used for birds) in Virginia, when they differ.

SNA A conservation status rank is not applicable because the species is not a suitable target for conservation activities in Virginia (includes accidental species, transients, exotics, etc.).

SNR A state conservation status rank has not been assigned to the species.

Column 5. Federal status:

Federal status is determined by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. This status is used for all animals listed as endangered or threatened by the U.S. government and receiving protection under the federal Endangered Species Act. The list also notes those species that have been formally proposed for listing or are currently candidates under consideration for listing. The federal status formerly known as "Category 2, candidate species" was abolished on February 28, 1996; species formerly designated as "Category 1, candidate species" are now referred to simply as "candidate species."

LE Listed Endangered. A species threatened with extinction throughout all or a significant portion of its range.

LT Listed Threatened. A species likely to become endangered in the foreseeable future.

LE/PT Currently listed as endangered but proposed for downlisting to threatened.

LT/SA Listed as Threatened due to Similarity of Appearance. The species so closely resembles an endangered or threatened species or population that enforcement personnel of the U.S. Fish and Wildlife Service cannot readily distinguish between the taxa (e.g., the northern population of the bog turtle is federally listed as endangered, but turtles from the southern population, which includes Virginia, are not readily distinguishable from them).

PE Proposed Endangered. A species proposed for listing as endangered.

PT Proposed Threatened. A species proposed for listing as threatened.

C Candidate. There is enough available information to propose the species for listing, but listing is "precluded by other pending proposals of higher priority". (Formerly Candidate, Category 1)

Column 6. State status:

State status is determined by the Virginia Department of Game and Inland Fisheries (all animals except insects) and the Virginia Department of Agriculture and Consumer Services (insects only). The informal category of "Special Concern" species that was previously maintained by the Virginia Department of Game and Inland Fisheries was abolished by that agency on January 1, 2011.

LE Listed Endangered; defined as a species that is in danger of extinction throughout all or a significant portion of its range.

LT Listed Threatened; defined as a species that is likely to become endangered within the foreseeable future.

LT/PDL Listed as Threatened but proposed for delisting (removal from the state list of Endangered and Threatened wildlife). However, at the present time, the species is still listed as Threatened pending further action and is thus protected under Virginia's Endangered Species Act.

PE Proposed Endangered. A species proposed for listing as endangered.

PT Proposed Threatened. A species proposed for listing as threatened.

The following table summarizes the ranks and legal status of the rarest animals tracked by the Virginia Department of Conservation and Recreation, Division of Natural Heritage (pages 10-30 of this list).

Rank[a]	Fish	Amphibians	Reptiles	Birds[b]	Mammals	Invertebrates
GH	0	0	0	0	1	5
G1	7	1	1	0	0	170
G2	10	3	0	2	6	118
G3	15	4	4	6	9	117
SX	3	0	0	0	1	5
SH	2	0	1	6	0	54
S1	30	4	8	38	11	323
S2	36	15	5	23	6	217
Totals	71	19	14	67	18	604
Legal Status[c]						
FE	4	1	1	2	5	31
FT	4	0	2	2	1	2
PFE	0	0	0	0	0	1
SE	8	2	4	5	11	50
PSE	0	0	0	0	2	0
ST	14	2	3	7	0	14
PST	0	0	0	1	1	0

[a] Rounded ranks (e.g., G1G2 is combined with G1, S2S3 with S2, G2G4 is treated as G3, S1S3 is treated as S2, etc.); also T ranks are treated as equivalent to G ranks for the purposes of this table.

[b] Breeding ranks of birds were used as the S ranks for the purposes of this table (except for Red Knot).

[c] FE = Federally Endangered; FT = Federally Threatened; PFE = Proposed Federally Endangered; SE = State Endangered; PSE = Proposed State Endangered; ST = State Threatened; PST = Proposed State Threatened.

Changes in legal status since the March 2013 DCR rare animal list

New Listings:

Fluted Kidneyshell and Slabside Pearlymussel – listed as endangered by the U.S. Fish and Wildlife Service in September 2013.

Thomas' cave beetle – listed as endangered by the Virginia Department of Agriculture and Consumer Services in December 2013.

Red Knot – listed as threatened by the U.S. Fish and Wildlife Service in January 2015.

Northern Long-eared Myotis (bat) – listed as threatened by the U.S. Fish and Wildlife Service in May 2015.

Delistings:

Virginia Northern Flying Squirrel – delisted by the U.S. Fish and Wildlife Service in March 2013.

Delmarva Fox Squirrel – delisted by the U.S. Fish and Wildlife Service in December 2015.

PRIMARY SOURCES OF COMMON NAMES

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American Ornithologists' Union. 1998. Check-list of North American Birds. Seventh Edition. American Ornithologists' Union, Washington, D.C. 829 pp. [as modified by subsequent supplements and corrections published in *The Auk*].

Mammals
Baker, R.J., L.C. Bradley, R.D. Bradley, J.W. Dragoo, M.D. Engstrom, R.S. Hoffmann, C.A. Jones, F. Reid, D.W. Rice, and C. Jones. 2003. Revised Checklist of North American Mammals North of Mexico, 2003. Texas Tech University Museum, Occasional Paper Number 229. 23 pp.

Gastropoda and Bivalvia
Turgeon, D.D., J.F. Quinn, Jr., A.E. Bogan, E.V. Coan, F.G. Hochberg, W.G. Lyons, P.M. Mikkelsen, R.J. Neves, C.F.E. Roper, G. Rosenberg, B. Roth, A. Scheltema, M.J. Sweeney, F.G. Thompson, M. Vecchione, and J.D. Williams. 1998. Common and Scientific Names of Aquatic Invertebrates from the United States and Canada: Mollusks. 2nd Edition. American Fisheries Society, Special Publication 26, Bethesda, Maryland. 526 pp.

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Odonata
Paulson, D.R. and S.W. Dunkle. 1999 (updated 2012). A Checklist of North American Odonata. Slater Museum of Natural History, University of Puget Sound Occasional Paper 56. 86 pp.

Plecoptera
Stark, B.P., K.W. Stewart, S.W. Szczytko, and R.W. Baumann. 1998. Common names of stoneflies (Plecoptera) from the United States and Canada. Ohio Biological Survey Notes 1: 1-18.

Coleoptera
Pearson, D.L. 2004. A list of suggested common English names for species of tiger beetles occurring in Canada and the U.S. Cicindela 36(1-2): 31-40.

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Covell, C.V., Jr. 2005. A Field Guide to Moths of Eastern North America. Virginia Museum of Natural History Special Publication Number 12. Martinsville, VA. 496 pp.

Glassberg, J. 1999. Butterflies Through Binoculars – The East: A Field Guide to the Butterflies of Eastern North America. Oxford University Press, New York, NY. 242 pp.

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PART ONE:

RARE ANIMAL LIST

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VA DEPARTMENT OF CONSERVATION & RECREATION
DIVISION OF NATURAL HERITAGE

VIRGINIA RARE ANIMAL LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
VERTEBRATES					
FISH					
Acipenser brevirostrum	Shortnose sturgeon	G3	SHB/S1N	LE	LE
Acipenser oxyrinchus	Atlantic sturgeon	G3	S2	LE	LE
= *Acipenser oxyrhynchus*					
Ameiurus brunneus	Snail bullhead	G4	S2		
Ammocrypta clara	Western sand darter	G3	S1		LT
= *Etheostoma clarum*					
Aplodinotus grunniens	Freshwater drum	G5	S2		
Chrosomus cumberlandensis	Blackside dace	G2	S1	LT	LT
= *Phoxinus cumberlandensis*					
Chrosomus tennesseensis	Tennessee dace	G3	S1		LE
= *Phoxinus tennesseensis*					
Chrosomus sp. 1	Clinch dace	G1	S1		
Cyprinella labrosa	Thicklip chub	G4	SH		
= *Hybopsis labrosa*					
Cyprinella whipplei	Steelcolor shiner	G5	S1		LT
= *Notropis whipplei*					
Enneacanthus chaetodon	Blackbanded sunfish	G3G4	S1		LE
Erimonax monachus	Spotfin chub (= turquoise shiner)	G2	S1	LT	LT
= *Cyprinella monacha,*					
= *Hybopsis monacha*					
Erimystax cahni	Slender chub	G1	S1	LT	LT
= *Hybopsis cahni*					
Erimyzon sucetta	Lake chubsucker	G5	S2		
Etheostoma acuticeps	Sharphead darter	G3	S1		LE
Etheostoma brevispinum	Carolina fantail darter	G4	S1		
Etheostoma caeruleum	Rainbow darter	G5	S2		
Etheostoma camurum	Bluebreast darter	G4	S2		
Etheostoma chlorobranchium	Greenfin darter	G4	S1		LT
Etheostoma cinereum	Ashy darter	G2G3	S1		
Etheostoma collis	Carolina darter	G3	S2		LT
Etheostoma denoncourti	Golden darter	G2	S1		LT
= *Etheostoma tippecanoe* (in part)					
Etheostoma jessiae	Blueside darter	G4	S1		
= *Etheostoma stigmaeum jessiae*					
Etheostoma meadiae	Bluespar darter	G4	S2		
= *Etheostoma stigmaeum meadiae*					
Etheostoma osburni	Candy darter	G3	S1		
Etheostoma percnurum	Duskytail darter	G1	S1	LE	LE
Etheostoma swannanoa	Swannanoa darter	G4	S2		
Etheostoma variatum	Variegate darter	G5	S1		LE
Etheostoma vulneratum	Wounded darter	G3	S2S3		
Fundulus rathbuni	Speckled killifish	G4	S2		
Hybopsis hypsinotus	Highback chub	G4	S2		
= *Notropis hypsinotus*					
Ichthyomyzon bdellium	Ohio lamprey	G3G4	S2		
Ichthyomyzon greeleyi	Mountain brook lamprey	G4	S2		
Labidesthes sicculus	Brook silverside	G5	S2		
Lythrurus lirus	Mountain shiner	G4	S2S3		
= *Notropis lirus*					

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VIRGINIA RARE ANIMAL LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
FISH (continued)					
Moxostoma carinatum	River redhorse	G4	S2S3		
Moxostoma sp. 4	Brassy jumprock	G4	S1S2		
Notropis alborus	Whitemouth shiner	G4	S1		LT
Notropis ariommus	Popeye shiner	G3	S2S3		
Notropis atherinoides	Emerald shiner	G5	S1S2		LT
Notropis bifrenatus	Bridle shiner	G3	S2		
Notropis semperasper	Roughhead shiner	G2G3	S2S3		
Notropis spectrunculus	Mirror shiner	G4	S2		
Notropis stramineus	Sand shiner	G5	S2		
Noturus eleutherus	Mountain madtom	G4	S2S3		
Noturus flavipinnis	Yellowfin madtom	G1	S1	LT	LT
Noturus flavus	Stonecat	G5	S2		
Noturus gilberti	Orangefin madtom	G2	S2		LT
Percina aurantiaca	Tangerine darter	G4	S2S3		
Percina bimaculata	Chesapeake logperch	G1G2	SX		
Percina burtoni	Blotchside logperch	G2G3	S1		
Percina copelandi	Channel darter	G4	S2		
Percina crassa	Piedmont darter	G4	S1		
Percina evides	Gilt darter	G4	S2		
Percina maculata	Blackside darter	G5	SX		
Percina rex	Roanoke logperch	G1G2	S1S2	LE	LE
Percina sciera	Dusky darter	G5	S1S2		
Percina williamsi = *Percina macrocephala* (in part)	Sickle darter	G2	S1S2		LT
Percopsis omiscomaycus	Trout-perch	G5	SX		
Phenacobius crassilabrum	Fatlips minnow	G3G4	S2		
Phenacobius mirabilis	Suckermouth minnow	G5	S1S2		
Phenacobius teretulus	Kanawha minnow	G3G4	S2S3		
Pimephales vigilax	Bullhead minnow	G5	S1		
Polyodon spathula	Paddlefish	G4	S1		LT
Sander canadensis = *Stizostedion canadense*	Sauger	G5	S2S3		
Thoburnia hamiltoni = *Moxostoma hamiltoni*	Rustyside sucker	G3	S2		
Uranidea baileyi = *Cottus baileyi*	Black sculpin	G4Q	S2		
Uranidea cognata = *Cottus cognatus*	Slimy sculpin	G5	S2		
Uranidea sp. 1 = *Cottus* sp. 1	Bluestone sculpin	G2	S2		
Uranidea sp. 4 = *Cottus* sp. 4	Clinch sculpin	G1G2	S1S2		
Uranidea sp. 5 = *Cottus* sp. 5	Holston sculpin	G2	S2		

VA DEPARTMENT OF CONSERVATION & RECREATION
DIVISION OF NATURAL HERITAGE

VIRGINIA RARE ANIMAL LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
AMPHIBIANS					
Ambystoma mabeei	Mabee's salamander	G4	S1S2		LT
Ambystoma talpoideum	Mole salamander	G5	S2		
Ambystoma tigrinum	Tiger salamander	G5	S1		LE
Anaxyrus quercicus = *Bufo quercicus*	Oak toad	G5	S2		
Cryptobranchus alleganiensis	Hellbender	G3G4	S2		
Desmognathus marmoratus = *Leurognathus marmoratus*	Shovel-nosed salamander	G4	S2		
Desmognathus organi	Northern Pygmy salamander	G3	S2		
Eurycea wilderae	Blue Ridge two-lined salamander	G5	S2		
Hyla gratiosa	Barking treefrog	G5	S2		LT
Necturus maculosus	Mudpuppy	G5	S2		
Necturus punctatus	Dwarf waterdog	G5	S2S3		
Plethodon hubrichti	Peaks of Otter salamander	G2	S2		
Plethodon punctatus	Cow Knob salamander	G3	S2		
Plethodon shenandoah	Shenandoah salamander	G1	S1	LE	LE
Plethodon sherando	Big Levels salamander	G2	S2		
Plethodon ventralis	Southern zigzag salamander	G4	S1		
Plethodon virginia	Shenandoah Mountain salamander	G2G3	S2		
Plethodon welleri	Weller's salamander	G3	S2		
Siren intermedia	Lesser siren	G5	S2S3		
REPTILES					
Apalone spinifera = *Trionyx spiniferus*	Spiny softshell	G5	S2		
Caretta caretta	Loggerhead (sea turtle)	G3	S1B/S1N	LT	LT
Crotalus horridus [Coastal Plain population]	Canebrake rattlesnake	G4	S1		LE
Deirochelys reticularia	Chicken turtle	G5	S1		LE
Glyptemys insculpta = *Clemmys insculpta*	Wood turtle	G3	S2		LT
Glyptemys muhlenbergii = *Clemmys muhlenbergii*	Bog turtle	G3	S2	LT/SA	LE
Lampropeltis nigra = *Lampropeltis getula nigra*	Eastern black kingsnake	G5	S2		
Lepidochelys kempii	Kemp's ridley (sea turtle)	G1	S1N	LE	LE
Ophisaurus ventralis	Eastern glass lizard	G5	S1		LT
Pituophis melanoleucus	Pine snake	G4	SH		
Regina rigida	Glossy crayfish snake	G5	S1		
Sternotherus minor	Loggerhead musk turtle	G5	S2		
Trachemys scripta troostii	Cumberland slider	G5T4	S1		
Virginia valeriae pulchra	Mountain earthsnake	G5T3T4	S1S2		

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VIRGINIA RARE ANIMAL LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
BIRDS					
Actitis macularius	Spotted Sandpiper	G5	S1B		
Aegolius acadicus	Northern Saw-whet Owl	G5	S1B/S2N		
Ammodramus caudacutus	Saltmarsh Sparrow	G4	S2B/S3N		
Ammodramus henslowii	Henslow's Sparrow	G4	S1B		LT
Anas discors	Blue-winged Teal	G5	S1B/S2N		
Anas strepera	Gadwall	G5	S2B/S4N		
Aquila chrysaetos	Golden Eagle	G5	SHB/S1N		
Ardea alba = *Casmerodius albus*	Great Egret	G5	S2S3B/S3N		
Asio flammeus	Short-eared Owl	G5	S1B/S2N		
Asio otus	Long-eared Owl	G5	S1		
Bartramia longicauda	Upland Sandpiper	G5	SHB		LT/PDL
Botaurus lentiginosus	American Bittern	G4	S1B/S2N		
Calidris canutus rufa	Red Knot	G4T2	S2N	LT	PT
Catharus guttatus	Hermit Thrush	G5	S1B/S5N		
Catharus ustulatus	Swainson's Thrush	G5	S1B		
Charadrius melodus	Piping Plover	G3	S2B/S1N	LT	LT
Charadrius wilsonia	Wilson's Plover	G5	S1B		LE
Chondestes grammacus	Lark Sparrow	G5	SHB		
Circus cyaneus	Northern Harrier	G5	S1S2B/S3N		
Cistothorus platensis	Sedge Wren	G5	S1B/S1S2N		
Contopus cooperi = *Nuttallornis borealis*	Olive-sided Flycatcher	G4	SHB		
Dolichonyx oryzivorus	Bobolink	G5	S1B		
Egretta caerulea	Little Blue Heron	G5	S2B/S3N		
Egretta thula	Snowy Egret	G5	S2B/S3N		
Egretta tricolor	Tricolored Heron	G5	S2B/S3N		
Empidonax alnorum	Alder Flycatcher	G5	S1S2B		
Empidonax flaviventris	Yellow-bellied Flycatcher	G5	S1B		
Eudocimus albus	White Ibis	G5	S1B		
Falco peregrinus	Peregrine Falcon	G4	S1B/S2N		LT
Fulica americana	American Coot	G5	S1B/S5N		
Gallinula galeata = *Gallinula chloropus* (in part)	Common Gallinule	G5	S1B/S1N		
Gelochelidon nilotica = *Sterna nilotica*	Gull-billed Tern	G5	S2B		LT
Geothlypis philadelphia = *Oporornis philadelphia*	Mourning Warbler	G5	S1B		
Haemorhous purpureus = *Carpodacus purpureus*	Purple Finch	G5	S1B/S5N		
Himantopus mexicanus	Black-necked Stilt	G5	S1B		
Hydroprogne caspia = *Sterna caspia*	Caspian Tern	G5	S1B/S2N		
Lanius ludovicianus	Loggerhead Shrike	G4	S1B/S2N		LT
Laterallus jamaicensis	Black Rail	G3G4	S1B/S1N		LE
Limnothlypis swainsonii	Swainson's Warbler	G4	S2B		
Loxia curvirostra	Red Crossbill	G5	S1		

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BIRDS (continued)					
Melospiza georgiana georgiana	Swamp Sparrow	G5T5	S1B/S4S5N		
Melospiza georgiana nigrescens	Coastal Plain Swamp Sparrow	G5T3	S1B		
Mergus merganser	Common Merganser	G5	S1B/S4N		
Nyctanassa violacea = *Nycticorax violaceus*	Yellow-crowned Night-heron	G5	S2S3B/S3N		
Oreothlypis ruficapilla = *Vermivora ruficapilla*	Nashville Warbler	G5	S1B		
Parkesia noveboracensis = *Seiurus noveboracensis*	Northern Waterthrush	G5	S1B		
Pelecanus occidentalis	Brown Pelican	G4	S2B/S3N		
Peucaea aestivalis = *Aimophila aestivalis*	Bachman's Sparrow	G3	S1B		LT
Picoides borealis	Red-cockaded Woodpecker	G3	S1	LE	LE
Plegadis falcinellus	Glossy Ibis	G5	S2B/S1N		
Podilymbus podiceps	Pied-billed Grebe	G5	S1S2B/S4N		
Porzana carolina	Sora	G5	S1B/S2N		
Rallus elegans	King Rail	G4	S2B/S3N		
Rallus limicola	Virginia Rail	G5	S2B/S3N		
Regulus satrapa	Golden-crowned Kinglet	G5	S2B/S5N		
Rynchops niger	Black Skimmer	G5	S2B/S1N		
Setophaga fusca = *Dendroica fusca*	Blackburnian Warbler	G5	S2S3B		
Setophaga magnolia = *Dendroica magnolia*	Magnolia Warbler	G5	S2B		
Setophaga virens waynei = *Dendroica virens waynei*	Wayne's Black-throated Green Warbler	G5T3	S1B?		
Sitta canadensis	Red-breasted Nuthatch	G5	S2B/S4N		
Sphyrapicus varius	Yellow-bellied Sapsucker	G5	S1B/S4N		
Sterna dougallii	Roseate Tern	G4	SHB	LE	LE
Sternula antillarum = *Sterna antillarum*	Least Tern	G4	S2B		
Thalasseus maximus = *Sterna maxima*	Royal Tern	G5	S2B		
Thalasseus sandvicensis = *Sterna sandvicensis*	Sandwich Tern	G5	S1B		
Thryomanes bewickii altus	Appalachian Bewick's Wren	G5T2Q	SHB		LE
Troglodytes hiemalis = *Troglodytes troglodytes* (in part)	Winter Wren	G5	S2B/S4N		

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MAMMALS					
Corynorhinus rafinesquii macrotis = *Plecotus rafinesquii macrotis*	Eastern big-eared bat	G3G4T3	S2		LE
Corynorhinus townsendii virginianus = *Plecotus townsendii virginianus*	Virginia big-eared bat	G3G4T2	S1	LE	LE
Erethizon dorsatum	North American porcupine	G5	S1		
Glaucomys sabrinus coloratus	Carolina northern flying squirrel	G5T2	S1	LE	LE
Glaucomys sabrinus fuscus	Virginia northern flying squirrel	G5T2	S1		LE
Lepus americanus	Snowshoe hare	G5	S1		LE
Martes pennanti	Fisher	G5	S1		
Microtus chrotorrhinus carolinensis	Southern rock vole	G4T3	S1		LE
Myotis austroriparius	Southeastern myotis (bat)	G3G4	S2		
Myotis grisescens	Gray myotis (bat)	G3	S1	LE	LE
Myotis leibii	Eastern small-footed myotis (bat)	G1G3	S2		
Myotis lucifugus	Little Brown Bat	G3	S1S3		PE
Myotis septentrionalis	Northern long-eared myotis (bat)	G2G3	S1S3	LT	PT
Myotis sodalis	Indiana bat (= social myotis)	G2	S1	LE	LE
Perimyotis subflavus = *Pipistrellus subflavus*	Tricolored Bat (= Eastern Pipistrelle)	G3	S1S3		PE
Puma concolor couguar = *Felis concolor couguar*	Eastern cougar (= mountain lion, puma)	G5THQ	SX	LE	LE
Sciurus niger cinereus	Delmarva fox squirrel	G5T3	S1		LE
Sorex palustris punctulatus	Southern water shrew	G5T3	S1S2		LE

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INVERTEBRATES					
TURBELLARIA (FLATWORMS)					
Geocentrophora cavernicola	A cave planarian	G1G2	S1		
Procotyla typhlops	A groundwater planarian	G1G2	S1S2		
Sphalloplana chandleri	Chandler's planarian	G1G2	S1		
Sphalloplana consimilis	Powell Valley planarian	G2G3	S1		
Sphalloplana holsingeri	Holsinger's groundwater planarian	G1G2	SH		
Sphalloplana hypogea	A groundwater planarian	G1G2	S1S2		
Sphalloplana subtilis	Bigger's groundwater planarian	G1G2	SH		
Sphalloplana virginiana	Rockbridge County cave planarian	G1	S1		
GASTROPODA (SNAILS)					
Anguispira jessica	Mountain disc	G3G4	S1		
= Anguispira alternata jessica					
Elimia arachnoidea	Spider Elimia	G2G3	S2		LE
= Goniobasis arachnoidea					
Fontigens bottimeri	Appalachian springsnail	G2G3	S2S3		LE
Fontigens morrisoni	Virginia springsnail	G2	S2		LE
Fontigens tartarea	Organ cavesnail	G2	S1S2		
Fumonelix wheatleyi clingmanicus	Clingman covert	G4T2T3	S1S2		
= Mesodon clingmanicus					
Glyphyalinia raderi	Maryland glyph	G2	S1S2		
Helicodiscus diadema	Shaggy coil	G1	S1		LE
Helicodiscus lirellus	Rubble coil	G1	S1		LE
Helicodiscus multidens	Twilight coil	G3	S2		
Helicodiscus triodus	Talus coil	G2	S1S2		
Holsingeria unthanksensis	Thankless ghostsnail (= Unthanks Cave snail)	G2	S2		LE
Io fluvialis	Spiny riversnail	G2	S2		LT
Mesodon andrewsae	Balsam globe	G3	S1		
Millerelix plicata	Cumberland liptooth	G4	S1S3		
= Polygyra plicata					
Pallifera hemphilli	Black mantleslug	G4	S1		
Paravitrea blarina	Shrew supercoil	G3	S1		
Paravitrea dentilla	Comb supercoil	G1	S1		
Paravitrea hera	Spirit supercoil	G1	S1		LE
Paravitrea mira	Funnel supercoil	G2	S2		
Paravitrea septadens	Brown supercoil	G1	S1		LT
Paravitrea seradens	Barred supercoil	G3	S1S3		
Paravitrea subtilis	Slender supercoil	G2	S1S2		
Pleurocera gradata	Bottle hornsnail	G1G2	SH/SU		
Polygyriscus virginianus	Virginia coil (=Virginia fringed mountain snail)	G1	S1	LE	LE
Somatogyrus virginicus	Panhandle pebblesnail	G2G3	S2		
Stagnicola neopalustris	Piedmont pondsnail	GHQ	SH		
Stenotrema altispira	Highland slitmouth	G3	S1		
Triodopsis picea	Spruce Knob threetooth	G3	S1		
Ventridens coelaxis	Bidentate dome	G3	S2		

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BIVALVIA (MUSSELS & CLAMS)					
Mussels					
Alasmidonta heterodon	Dwarf wedgemussel	G1G2	S1	LE	LE
Alasmidonta marginata	Elktoe	G4	S1S2		
Alasmidonta varicosa	Brook floater	G3	S1		LE
Alasmidonta viridis	Slippershell mussel	G4G5	S1		LE
= *Alasmidonta minor*					
Cumberlandia monodonta	Spectaclecase	G3	S1	LE	LE
Cyprogenia stegaria	Fanshell	G1Q	S1	LE	LE
= *Cyprogenia irrorata*					
Dromus dromas	Dromedary pearlymussel	G1	S1	LE	LE
Elliptio crassidens	Elephantear	G5	S1		LE
Elliptio lanceolata	Yellow lance	G2G3	S2S3		
Elliptio roanokensis	Roanoke slabshell	G3	S2		
Epioblasma brevidens	Cumberland combshell	G1	S1	LE	LE
Epioblasma capsaeformis	Oyster mussel	G1	S1	LE	LE
Epioblasma florentina aureola	Golden riffleshell	G1T1	S1	LE*	LE*
= *Epioblasma florentina walkeri* (in part)					
Epioblasma torulosa gubernaculum	Green-blossom pearlymussel	G2TX	SX	LE	LE
Epioblasma triquetra	Snuffbox	G3	S1	LE	LE
Fusconaia cor	Shiny pigtoe	G1	S1	LE	LE
= *Fusconaia edgariana*					
Fusconaia cuneolus	Fine-rayed pigtoe	G1	S1	LE	LE
Fusconaia masoni	Atlantic pigtoe	G2	S2		LT
= *Lexingtonia subplana* (Virginia pigtoe)					
Hemistena lata	Cracking pearlymussel	G1	S1	LE	LE
= *Lastena lata*					
Lampsilis abrupta	Pink mucket	G2	SX	LE	LE
= *Lampsilis orbiculata*					
Lampsilis cariosa	Yellow lampmussel	G3G4	S2		
Lampsilis radiata	Eastern lampmussel	G5	S2S3		
Lasmigona holstonia	Tennessee heelsplitter	G3	S1		LE
Lasmigona subviridis	Green floater	G3	S2		LT
Lemiox rimosus	Birdwing pearlymussel	G1	S1	LE	LE
= *Conradilla caelata*					
Leptodea fragilis	Fragile papershell	G5	S1		LT
Ligumia recta	Black sandshell	G5	S2		LT
= *Ligumia recta latissima*					
Pegias fabula	Little-winged pearlymussel	G1	S1	LE	LE
Plethobasus cyphyus	Sheepnose	G3	S1	LE	LE
Pleurobema collina	James spinymussel	G1	S1	LE	LE
Pleurobema cordatum	Ohio pigtoe	G4	S1		LE
Pleurobema oviforme	Tennessee clubshell	G2G3	S2S3		
= *Pleurobema maculatum*					
Pleurobema plenum	Rough pigtoe	G1	SH	LE	LE
Pleurobema rubrum	Pyramid pigtoe	G2G3	SH		LE
= *Pleurobema pyramidatum*					
Pleuronaia barnesiana	Tennessee pigtoe	G2G3	S2		
= *Fusconaia barnesiana*					
Pleuronaia dolabelloides	Slabside pearlymussel	G2	S2	LE	LE
= *Lexingtonia dolabelloides*					
Ptychobranchus subtentum	Fluted Kidneyshell	G2	S2	LE	LE

*Virginia populations are listed as federally and state endangered under the name Tan Riffleshell (*Epioblasma florentina walkeri*)

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Mussels (continued)					
Quadrula cylindrica strigillata	Rough rabbits foot	G3G4T2	S2	LE	LE
Quadrula intermedia	Cumberland monkeyface	G1	S1	LE	LE
Quadrula pustulosa	Pimple back	G5	S2		LT
Quadrula sparsa	Appalachian monkeyface	G1	S1	LE	LE
Quadrula verrucosa	Pistolgrip	G4G5	S2		LT
= *Tritogonia verrucosa*					
Toxolasma lividum	Purple liliput	G3Q	SH		LE
= *Carunculina lividus, Carunculina glans*					
Truncilla truncata	Deertoe	G5	S1		LE
Villosa fabalis	Rayed bean	G2	SX	LE	LE
Villosa perpurpurea	Purple bean	G1	S1	LE	LE
Villosa trabalis	Cumberland bean	G1	SX	LE	LE
ANNELIDA (SEGMENTED WORMS)					
Spelaedrilus multiporus	A cave lumbriculid worm	G1	S1		
Stylodrilus beattiei	A cave lumbriculid worm	G2G3	S1		
ARACHNIDA (SPIDERS, PSEUDOSCORPIONS & RELATIVES)					
Spiders					
Anahita punctulata	Southeastern wandering spider	G4	S2		
Anthrobia coylei	Coyle's cave spider	G2?	S1		
Anthrobia monmouthia	Mammoth Cave spider	G5	S2		
= *Anthrobia mammouthia*					
Bathyphantes weyeri	A cave spider	G4	S1		
Hypochilus thorelli	Thorell's lampshade-web spider	G4	S1		
Islandiana muma	A cave spider	G1G2	S1		
Microhexura montivaga	Spruce-fir moss spider	G1	S1	LE	LE
Nesticus mimus	A cave spider	G2	S1		
Nesticus paynei	A cave spider	G3G4	S1		
Mites					
Traegaardhia paralleloseta	A cave mite	G1	S1		
= *Foveacheles paralleloseta*					
Pseudoscorpions					
Apochthonius coecus	A cave pseudoscorpion	G1G2	S1		
Apochthonius holsingeri	A cave pseudoscorpion	G1G2	S1		
Chitrella superba	A cave pseudoscorpion	G1	S1		
Chitrella sp. 1	A cave pseudoscorpion	G1	S1		
Kleptochthonius anophthalmus	A cave pseudoscorpion	G1	S1		
Kleptochthonius binoculatus	A cave pseudoscorpion	G1G2	S1S2		
Kleptochthonius gertschi	Gertsch's cave pseudoscorpion	G1	S1		
Kleptochthonius lutzi	Lutz's cave pseudoscorpion	G1	S1		
Kleptochthonius proximosetus	A cave pseudoscorpion	G1	S1		
Kleptochthonius regulus	A cave pseudoscorpion	G1G2	S1		
Kleptochthonius similis	A cave pseudoscorpion	G1	S1		
Kleptochthonius sp. 1	A cave pseudoscorpion	G1	S1		
= *Kleptochthonius* sp. B					
Lissocreagris valentinei	Valentine's cave pseudoscorpion	G1	S1		
= *Microcreagris valentinei*					
Mundochthonius holsingeri	A cave pseudoscorpion	G1	S1		

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Scorpions					
Vaejovis carolinianus	Carolina scorpion	G5	S1		
CRUSTACEA (AMPHIPODS, ISOPODS & DECAPODS)					
Amphipods					
Bactrurus angulus	Cumberland Gap cave amphipod	G1	S1		
Crangonyx baculispina	Lancaster County amphipod	G1?	S1?		
Crangonyx fontinalis	Bland County amphipod	G1?	S1?		
Crangonyx montanus	A freshwater amphipod	G2	S2		
Stygobromus baroodyi	Rockbridge County cave amphipod	G2G3	S1S2		
Stygobromus biggersi	Bigger's cave amphipod	G2G4	S1S2		
Stygobromus conradi	Burnsville Cove cave amphipod	G2G3	S1S2		
Stygobromus cumberlandus	Cumberland cave amphipod	G3G4	S1S2		
Stygobromus ephemerus	Ephemeral cave amphipod	G1G2	S1		
Stygobromus fergusoni	Montgomery County cave amphipod	G2G3	S1		
Stygobromus finleyi	Finley's cave amphipod	G3G4	S1		
Stygobromus foliatus	A groundwater amphipod	G2	S2		
Stygobromus hoffmani	Alleghany County cave amphipod	G2	S2		
Stygobromus hubbardi	Hupp's Hill cave amphipod	G1	S1		
Stygobromus interitus	New Castle Murder Hole amphipod	G1G2	SH		
Stygobromus leensis	Lee County cave amphipod	G1G2	S1S2		
Stygobromus mausi	Round Hill cave amphipod	G1	S1		
Stygobromus morrisoni	Morrison's cave amphipod	G2G3	S1S2		
Stygobromus mundus	Bath County cave amphipod	G2G3	S1S2		
Stygobromus obrutus	Pittsylvania well amphipod	G1G2	SH		
Stygobromus phreaticus	Northern Virginia well amphipod	G1	S1		
Stygobromus pizzinii	Pizzini's amphipod	G3G4	S1S2		
Stygobromus pseudospinosus	Luray Caverns amphipod	G1	S1		
Stygobromus sextarius	Capital area groundwater amphipod	G1	S1		
Stygobromus stegerorum	Madison Cave amphipod	G1	S1		LT
Stygobromus sp. 7	Sherando spinosoid amphipod	G2	S2		
Stygobromus sp. 8	A groundwater amphipod	G2G3	S2S3		
Stygobromus sp. 16	Helsley's Cave amphipod	G1	S1		
Stygobromus sp. 17	Massanutten spring amphipod	G2	S2		
Stygobromus sp. 18	Big Levels spring amphipod	G1?	S1?		
Stygobromus sp. 23	Shenandoah Mountain spring amphipod	G1?	S1?		
Isopods					
Amerigoniscus henroti	Powell Valley terrestrial cave isopod	G1G2	S1S2		
Antrolana lira	Madison Cave isopod	G2G4	S2	LT	LT
Caecidotea attenuata	Dismal Swamp isopod	G1G3	S1S3		
Caecidotea bowmani	Natural Bridge cave isopod	G1G2	S1S2		
Caecidotea cumberlandensis	Cumberland Gap cave isopod	G1G2	S1		
Caecidotea henroti	Henrot's cave isopod	G2	S2		
Caecidotea incurva	Incurved cave isopod	G2G4	S2		
Caecidotea mausi	Maus' cave isopod	G2	S2		
Caecidotea phreatica	Phreatic isopod	G2G3	S1S3		
Ligidium elrodii leensis	Lee County terrestrial cave isopod	G4G5T1T2	S1S2		
Ligidium elrodii scottensis	Scott County terrestrial cave isopod	G4G5T1T2	S1S2		
Lirceus culveri	Rye Cove isopod	G1	S1		
Lirceus usdagalun	Lee County cave isopod	G2G3	S1	LE	LE
Miktoniscus racovitzai	Racovitza's terrestrial cave isopod	G3G4	S2		

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Decapods					
Cambarus callainus = *Cambarus veteranus* (in part)	Big Sandy Crayfish	G2	S1S2	PE	LE*
Cambarus hatfieldi	Tug Valley crayfish	G3	S1		
Cambarus jezerinaci	Spiny scale crayfish	G3	S2		
Cambarus monongalensis	Blue crawfish	G5	S1?		
Macrobrachium ohione	Ohio river shrimp	G4	S1		
Orconectes erichsonianus	Reticulate crayfish	G5	S2		
Orconectes virginiensis	Chowanoke crayfish	G3	S2S3		
DIPLOPODA (MILLIPEDES)					
Appalachioria falcifera = *Brachoria falcifera*	Big Cedar Creek millipede	G1	S1		
Appalachioria separanda hamata = *Brachoria separanda hamata*	A millipede	G3T2	S2		
Appalachioria separanda versicolor = *Brachoria separanda versicolor*	A millipede	G3T2	S2		
Appalachioria turneri = *Brachoria turneri*	Turner’s millipede	G1	S1		
Boraria infesta	A millipede	G4	S2		
Brachoria sp. 1	Powell Mountain millipede sp 1	G1?	S1?		
Brachoria sp. 2	Powell Mountain millipede sp 2	G1?	S1?		
Brachoria cedra	cedar glade mimic millipede	G2G3	S2S3		
Brachoria dentata	Pennington Gap mimic millipede	G2G3	S2S3		
Brachoria hoffmani	Hoffman’s mimic millipede	G2G3	S2S3		
Brachoria insolita	High Knob mimic millipede	G1	S1		
Brachoria laminata	Harman mimic millipede	G1	S1		
Brachoria mendota	Mendota mimic millipede	G2G3	S2S3		
Brachoria sheari	Shear’s mimic millipede	G1	S1		
Brachoria virginia	Virginia mimic millipede	G1	S1		
Cherokia georgiana latassa	A millipede	G4T?	S1		
Cleidogona hoffmani	Hoffman's cleidogonid millipede	G3	S2S3		
Cleidogona lachesis	A millipede	G2	S1		
Cleidogona medialis	Blowing Rock millipede	G3G4	S2		
Conotyla aeto	Aeto millipede	G1	S1		
Conotyla celeno	Celeno millipede	G1	S1		
Conotyla venetia	Venetia millipede	G2	S2		
Desmonus earlei	Earle’s millipede	G5	S1		
Dixioria brooksi	Brooks millipede	G1	S1		
Dixioria fowleri	Fowler’s millipede	G2	S2		
Dixioria pela coronata = *Dixioria coronata*	A millipede	G2T2	S2		
Nannaria shenandoa	Shenandoah Mountain xystodesmid millipede	G1	S1		
Nannaria simplex	A millipede	G1	S1		
Nannaria sp. 1	Roaring Branch Nannaria millipede	G1?	S1?		
Pseudotremia armesi	Arme’s rough-backed millipede	G2	S2		
Pseudotremia cavernarum	Ellett Valley Pseudotremia millipede	G2G3	S1		LT
Pseudotremia cerberus	Cerberus cave millipede	G1	S1		
Pseudotremia contorta	Twisted-gonopod cave millipede	G1	S1		
Pseudotremia culveri	Culver’s cave millipede	G1	S1		
Pseudotremia deprehendor	A cave millipede	G2G3	S1S3		
Pseudotremia fergusoni	Ferguson’s cave millipede	G1	S1		

*Listed as state endangered under the name *Cambarus veteranus*.

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Millipedes (continued)					
Pseudotremia inexpectata	Devault's cave millipede	G1	S1		
Pseudotremia fremens	Roaring Branch rough-backed millipede	G1?	S1?		
Pseudotremia hubbardi	Hubbard's cave millipede	G1G2	S1S2		
Pseudotremia jaculohamatum	Harpoon cave millipede	G1	S1		
Pseudotremia johnholsingeri	Holsinger's cave millipede	G1	S1		
Pseudotremia loomisi	Lommis' rough-backed millipede	G1	S1		
Pseudotremia momus	A millipede	G2	S2		
Pseudotremia orndorffi	Orndorff's cave millipede	G2	S2		
Pseudotremia peponocranium	Pumpkin-headed cave millipede	G1	S1		
Pseudotremia piscator	Fisher Cave millipede	G1	S1		
Pseudotremia princeps	South Branch Valley cave millipede	G1	S1		
Pseudotremia ryensis	Rye Cove cave millipede	G1	S1		
Pseudotremia salifodina	Jones' Saltpetre Cave millipede	G1	S1		
Pseudotremia sublevis	A millipede	G2G3	S2S3		
Pseudotremia tuberculata	A millipede	G2G3	S2		
Pseudotremia valga	A millipede	G1G2	S1S2		
Rhysodesmus restans	Relictual Appalachian millipede	G1G2	S1		
Sigmoria whiteheadi	Laurel Creek xystodesmid millipede	G1	S1		LT
Trichopetalum lunatum	A millipede	G5	S2		
Zygonopus weyeriensis = *Trichopetalum weyeriensis*	Grand Caverns blind cave millipede	G3G4	S2		
Zygonopus whitei = *Trichopetalum whitei*	Luray Caverns blind cave millipede	G3G4	S2		
CHILOPODA (CENTIPEDES)					
Escaryus cryptorobius	Montane centipede	G2	S2		
Escaryus orestes	Whitetop Mountain centipede	G1G2	S1S2		
Nampabius turbator	A cave centipede	G1G2	S1		
INSECTS					
COLLEMBOLA (SPRINGTAILS)					
Oncopodura hubbardi	A cave springtail	G1G2	S1S2		
Paleonura petebellingeri	A cave springtail	G1	S1		
Pseudosinella bona	A cave springtail	G2	S2		
Pseudosinella erehwon	A cave springtail	G2	S2		
Pseudosinella extra	A cave springtail	G1G2	S1		
Pseudosinella flatua	A cave springtail	G1G2	S1S2		
Pseudosinella gisini virginia	A cave springtail	G3G4T2	S2		
Pseudosinella hirsuta	A cave springtail	G5	S1		
Pseudosinella testa	Shelled Cave springtail	G2G3	S1		
Pseudosinella vespera	A cave springtail	G2	S1S2		
Pygmarrhopalites caedus	A cave springtail	G1G2	S1S2		
Pygmarrhopalites commorus	A cave springtail	G2G3	S2S3		
Pygmarrhopalites lacuna	A cave springtail	G1G2	S1S2		
Pygmarrhopalites obtusus	A cave springtail	G1	S1		
Pygmarrhopalites sacer	A cave springtail	G2	S2		
Pygmarrhopalites sextus	A cave springtail	G1	S1		
Pygmarrhopalites silvus	A cave springtail	G1G2	S1S2		
Speleonura kenchristianseni	A cave springtail	G1	S1		
Typhlogastrura valentini	A cave springtail	G1	S1		

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DIPLURA (DIPLURANS)					
Litocampa fieldingae	Fielding's cave dipluran	G2G3	S1S3		
Litocampa pucketti	Puckett's cave dipluran	G1G2	S1S2		
Litocampa sp. 1	A cave dipluran (Salamander Cave)	G1	S1		
Litocampa sp. 2	A cave dipluran (Ward Cove)	G1	S1		
Litocampa sp. 3	A cave dipluran (Pulaski/Wythe)	G2	S2		
Litocampa sp. 4	A cave dipluran (Rye Cove)	G2	S1S2		
EPHEMEROPTERA (MAYFLIES)					
Baetisca rubescens	A mayfly	G3G4	S1		
Barbaetis benfieldi	Benfield's bearded small minnow mayfly	G2G4	S1		
Habrophlebiodes celeteria	A mayfly	G2G4	S2		
Homoeoneuria cahabensis	Cahaba sand-filtering mayfly	G2G3	SU		
Isonychia hoffmani	Hoffman's Isonychia mayfly	G1G3	S1		
Isonychia serrata	A mayfly	G4	S1S3		
Iswaeon rubrolaterale = *Heterocloeon rubrolaterale*, = *Plauditus rubrolateralis*	A mayfly	G2	SU		
Leptophlebia johnsoni	Johnson's pronggill mayfly	G4	S1		
Neoephemera compressa	A mayfly	G1S3	S1?		
Pseudiron centralis	White sand-river mayfly	G5	S1		
Siphloplecton costalense	Spieth's great speckled olive mayfly	G2G4	SH		
Tsalia berneri = *Ephemerella berneri*	Berner's Ephemerella mayfly	G4	S2		
ODONATA (DAMSELFLIES & DRAGONFLIES)					
Damselflies					
Calopteryx aequabilis	River jewelwing	G5	SH		
Calopteryx amata	Superb jewelwing	G4	S1		
Enallagma annexum = *Enallagma cyathigerum* (in part)	Northern bluet	G5	S1		
Enallagma carunculatum	Tule bluet	G5	SH		
Enallagma ebrium	Marsh bluet	G5	S1		
Enallagma pallidum	Pale bluet	G4	S1S2		
Lestes disjunctus	Northern spreadwing	G5	S2		
Nehalennia gracilis	Sphagnum sprite	G5	S2		
Nehalennia irene	Sedge sprite	G5	S1S2		
Dragonflies					
Aeshna canadensis	Canada darner	G5	S1		
Aeshna constricta	Lance-tipped darner	G5	SH		
Aeshna tuberculifera	Black-tipped darner	G4	S2S3		
Aeshna verticalis	Green-striped darner	G5	S1		
Aphylla williamsoni	Two-striped forceptail	G5	S2		
Arigomphus furcifer	Lilypad clubtail	G5	SH		
Celithemis martha	Martha's pennant	G4	S2		
Celithemis ornata	Faded pennant	G5	SH		
Cordulegaster diastatops	Delta-spotted spiketail	G5	S1		
Coryphaeschna ingens	Regal darner	G5	S1		

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Dragonflies (continued)					
Epitheca canis	Beaverpond baskettail	G5	S1		
= Tetragoneuria canis					
Epitheca semiaquea	Mantled baskettail	G5	S1		
= Tetragoneuria semiaquea					
Gomphus adelphus	Moustached clubtail	G4	S1		
= Gomphus brevis					
Gomphus apomyius	Banner clubtail	G3G4	SH		
Gomphus borealis	Beaverpond clubtail	G4	SH		
Gomphus consanguis	Cherokee clubtail	G3	S2		
Gomphus descriptus	Harpoon clubtail	G4	S1		
Gomphus fraternus	Midland clubtail	G5	S2		
Gomphus parvidens	Piedmont clubtail	G4	S1		
Gomphus septima	Septima's clubtail	G2	S1		
Gomphus ventricosus	Skillet clubtail	G3	S1		
Gomphus viridifrons	Green-faced clubtail	G3G4	S2		
Ladona exusta	White corporal skimmer	G4	SH		
= Libellula exusta					
Ladona julia	Chalk-fronted corporal skimmer	G5	S2S3		
= Libellula julia					
Lanthus parvulus	Northern pygmy clubtail	G4	S2		
Leucorrhinia frigida	Frosted whiteface	G5	SH		
Leucorrhinia hudsonica	Hudsonian whiteface	G5	S1		
Leucorrhinia proxima	Red-waisted whiteface	G5	SH		
Macrodiplax balteata	Marl pennant	G5	S1		
Macromia alleghaniensis	Allegheny river cruiser	G4	S2		
Macromia margarita	Mountain river cruiser	G3	SH		
Nannothemis bella	Elfin skimmer	G4	S1		
Neurocordulia virginiensis	Cinnamon shadowdragon	G4	S2		
Neurocordulia yamaskanensis	Stygian shadowdragon	G5	S2		
Ophiogomphus aspersus	Brook snaketail	G4	S2		
Ophiogomphus carolus	Riffle snaketail	G5	S1		
Ophiogomphus howei	Pygmy snaketail	G3	S1S2		
Ophiogomphus incurvatus alleghaniensis	Allegheny snaketail	G3T2T3	S1		
= Ophiogomphus alleghaniensis					
Ophiogomphus incurvatus incurvatus	Appalachian snaketail	G3T2T3	S2		
Ophiogomphus mainensis	Maine snaketail	G4	S1		
Ophiogomphus susbehcha	St. Croix snaketail	G2	S1S2		
Rhionaeschna mutata	Spatterdock darner	G4	S2		
= Aeshna mutata					
Somatochlora elongata	Ski-tipped emerald	G5	S1S2		
Somatochlora filosa	Fine-lined emerald	G5	S2		
Somatochlora georgiana	Coppery emerald	G3G4	SH		
Somatochlora provocans	Treetop emerald	G4	S2		
Somatochlora williamsoni	Williamson's emerald	G5	SH		
Stylogomphus sigmastylus	Interior least clubtail	G5	S1		
Stylurus amnicola	Riverine clubtail	G4	S1		
Stylurus laurae	Laura's clubtail	G4	S2		
Stylurus notatus	Elusive clubtail	G3	SH		
Stylurus scudderi	Zebra clubtail	G4	S1S2		
Sympetrum obtrusum	White-faced meadowhawk	G5	S2		

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PLECOPTERA (STONEFLIES)					
Acroneuria flinti	Manassas stonefly	GH	SH		
Acroneuria kirchneri	Strawberry stonefly	G3G4	S1S3		
Acroneuria kosztarabi	Virginia stonefly	G1G2	S1S2		
Acroneuria yuchi	Ornate stonefly	G1G3	S1S3		
Allocapnia fumosa	Smokies snowfly	G2	S1S2		
Allocapnia illinoensis	Illinois snowfly	G3	S1S3		
Allocapnia simmonsi	Spatulate snowfly	G3	S1S2		
Allocapnia stannardi	Blue Ridge snowfly	G3	S1S3		
Alloperla stipitata	Blue Ridge sallfly	G2G3	S1S3		
Cultus decisus isolatus	Southern springfly	G4T2	S1S2		
Diploperla kanawholensis	Kanawhole springfly	G3	S1S3		
Diploperla morgani	Virginia springfly	G3	S2		
Isoperla major	Big stripetail stonefly	G1	S1		
Leuctra mitchellensis	Mitchell needlefly	G3	S1S2		
Leuctra monticola	Montane needlefly	G1Q	S1		
Megaleuctra flinti	Shenandoah needlefly	G2	S2		
Megaleuctra williamsae	Smokies needlefly	G2	S1S2		
Perlesta cranshawi	A stonefly	G1	S1?		
Perlesta durfeei	A stonefly	G1G3	S1S3		
Perlesta frisoni	Blue Ridge stonefly	G3	S1S2		
Prostoia hallasi	Swamp forestfly	G3	S1S3		
Remenus kirchneri	Blue Ridge springfly	G2	S2		
Strophopteryx limata	Newfound willowfly	G3	S1S2		
Sweltsa holstonensis	Holston sallfly	G1	S1		
Sweltsa palearata	Shenandoah sallfly	G2G3	S1S3		
Sweltsa voshelli	Virginia sallfly	G3	S2		
Taeniopteryx nelsoni	Cryptic willowfly	G1	S1		
Tallaperla lobata	Lobed roachfly	G2	S1S2		
Yugus arinus	Highlands springfly	G3	S1S3		
Yugus kondratieffi	A stonefly	G2G3	S1S3		
ORTHOPTERA (GRASSHOPPERS, KATYDIDS, CRICKETS & RELATIVES)					
Appalachia hebardi	Appalachian grasshopper	GH	SH		
HEMIPTERA (TRUE BUGS, CICADAS, LEAFHOPPERS & RELATIVES)					
Bothynotus johnstoni	A mirid bug	G3	S1S3		
Chelinidea vittiger	Opuntia squash bug	G3G5	S1		
Chlorochroa dismalia	Dismal Swamp green stink bug	G1G3	S1S3		
Ctenotrachelus shermani	Combneck assassin bug	G3	S1S3		
Gnathobleda litigiosa	An assassin bug	G5	S1		
Limnoporus dissortis	A water strider	G5	S1		
Melanaethus cavicollis	A burrower bug	G4	S1S3		
Phytocoris hoffmani	Spruce plant bug	GNR	S1S3		
Ploiaria carolina	Carolina thread-legged bug	G4?	S1S3		
Ploiaria hirticornis	An assassin bug	G3?	S1S3		
Pnirontis brimleyi	Brimley's assassin bug	G2	S1S3		
Puto kosztarabi	Buffalo Mountain mealybug	G1	S1		LE
Pycnoderiella virginiana	Seashore plant bug	GU	SU		
Ramphocorixa acuminata	Acuminate water boatman	G4	S1		
Sigara depressa	Virginia Piedmont water boatman	G1G2	S1S2		LE
Stenocoris tipuloides	Neotropical rice bug	G5	S1S3		

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COLEOPTERA (BEETLES)					
Arianops jeanneli	A cave pselaphid beetle	G1	S1		
Atheta annexa	A rove beetle	G4	S2		
Atheta troglophila	A rove beetle	G2	S1		
Cicindela abdominalis	Eastern pine barrens tiger beetle	G3G4	S1		
Cicindela ancocisconensis	Appalachian tiger beetle	G3	S2		
Cicindela dorsalis dorsalis = *Habroscelimorpha dorsalis dorsalis*	Northeastern beach tiger beetle	G3G4T2	S2	LT	LT
Cicindela formosa generosa	Big sand tiger beetle	G5T5	SH		
Cicindela gratiosa = *Ellipsoptera gratiosa*	Whitish tiger beetle	G3G4	S1		
Cicindela lepida = *Ellipsoptera lepida*	Ghost tiger beetle	G3G4	S1		
Cicindela limbalis	Common claybank tiger beetle	G5	S1		
Cicindela patruela	Northern barrens tiger beetle	G3	S2		
Cicindela trifasciata	S-banded tiger beetle	G5	S1		
Copris howdeni	Howden's Copris scarab beetle	G3?	S1		
Dryobius sexnotatus	Six-banded longhorn beetle	GNR	S2?		
Hemipeplus microphthalmus	A flat bark beetle	G4?	S1		
Hydraena maureenae	Maureen's shale stream beetle	G2?	S2?		
Lordithon niger	Black Lordithon rove beetle	GU	SH		
Nicrophorus americanus	American burying beetle	G2G3	SH	LE	
Nicrophorus carolinus	Carolina burying beetle	G4?	S1S3		
Pseudanophthalmus avernus	Avernus cave beetle	G1	S1		
Pseudanophthalmus cordicollis	Little Kennedy Cave beetle	G1	S1		
Pseudanophthalmus deceptivus	Deceptive cave beetle	G1	S1		
Pseudanophthalmus delicatus	Delicate cave beetle	G3G4	S2		
Pseudanophthalmus egberti	New River Valley cave beetle	G1G2	S1		
Pseudanophthalmus gracilis	Clover Hollow cave beetle	G1G2	S1S2		
Pseudanophthalmus hirsutus	Cumberland Gap cave beetle	G1G2	S1		
Pseudanophthalmus hoffmani	Hoffman's cave beetle	G2G3	S1S2		
Pseudanophthalmus holsingeri	Holsinger's cave beetle	G1	S1		LE
Pseudanophthalmus hortulanus	Burkes Garden cave beetle	G1	S1		
Pseudanophthalmus hubbardi	Hubbard's cave beetle	G1	S1		
Pseudanophthalmus hubrichti	Hubricht's cave beetle	G1	S1		
Pseudanophthalmus intersectus	Crossroads Cave beetle	G1G2	S1		
Pseudanophthalmus limicola	Maddens Cave beetle	G1G2	S1		
Pseudanophthalmus longiceps	Long-headed cave beetle	G1G2	S1		
Pseudanophthalmus nelsoni	Nelson's cave beetle	G1G2	S1		
Pseudanophthalmus parvicollis	Hupp's Hill cave beetle	G1	S1		
Pseudanophthalmus petrunkevitchi	Petrunkevitch's cave beetle	G1G2	S1		
Pseudanophthalmus pontis	Natural Bridge cave beetle	G1	S1		
Pseudanophthalmus potomaca	South Branch Valley cave beetle	G3G4	S2		
Pseudanophthalmus praetermissus	Overlooked cave beetle	G1	S1		
Pseudanophthalmus punctatus	Spotted cave beetle	G2G3	S1		
Pseudanophthalmus pusio	Ellett Valley cave beetle	G2G3	S1S2		
Pseudanophthalmus quadratus	Straley's Cave beetle	G1	S1		
Pseudanophthalmus rotundatus	Rotund cave beetle	G2	S1		
Pseudanophthalmus sanctipauli	Saint Paul cave beetle	G1G2	S1		
Pseudanophthalmus seclusus	Rye Cove cave beetle	G2G3	S2		
Pseudanophthalmus sericus	Silken cave beetle	G1	S1		
Pseudanophthalmus thomasi	Thomas' cave beetle	G1G2	S1		LE
Pseudanophthalmus vicarius	Vicariant cave beetle	G2G3	S1S2		
Pseudanophthalmus virginicus	Maiden Spring cave beetle	G1	SH		

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Beetles (continued)					
Pseudanophthalmus sp. 4	Greears cave beetle	G1	S1		
Pseudanophthalmus sp. 5	Rhea Valley cave beetle	G1	S1		
Pseudanophthalmus sp. 6	Wytheville cave beetle	G1	S1		
Pseudanophthalmus sp. 7	Dublin cave beetle	G1	S1		
Pseudanophthalmus sp. 8	Burnsville Cove cave beetle	G1	S1		
Pseudanophthalmus sp. 9	Banner Cave beetle	G1	S1		
Pseudanophthalmus sp. 10	Indian Cave beetle	G1	S1		
Pseudanophthalmus sp. 11	Showalters Cave beetle	G1	S1		
Pseudanophthalmus sp. 12	Catawba Cave beetle	G1	S1		
Pseudanophthalmus sp. 13	McMullens Cave beetle	G1	S1		
Pseudanophthalmus sp. 14	Karl's Pit cave beetle	G1	S1		
Pseudanophthalmus sp. 42	Elk Garden cave beetle	G1	S1		
Pseudanophthalmus sp. 43	Rosedale cave beetle	G1	S1		
Sphaeroderus schaumii = *Sphaeroderus nitidicollis schaumii*	Schaum's false snail-eating beetle	G4	S2		
Stenelmis gammoni	Gammon's riffle beetle	G1G3	S1		
MECOPTERA (SCORPIONFLIES)					
Brachypanorpa jeffersoni	Jefferson's short-nosed scorpionfly	G2	S1S2		
TRICHOPTERA (CADDISFLIES)					
Agraylea costello	A microcaddisfly	G3	S1S2		
Agraylea multipunctata	A microcaddisfly	G5	SH		
Anabolia apora	A limnephilid caddisfly	G1G3	S1S3		
Arctopsyche irrorata	A hydropsychid caddisfly	G4	S1		
Brachycentrus incanus	A brachycentrid caddisfly	G5	SH		
Ceraclea ruthae	A leptocerid caddisfly	G4	S1		
Ceratopsyche etnieri	Buffalo Springs caddisfly	G2	S1S2		
Ceratopsyche macleodi	A hydropsychid caddisfly	G3G4	S1S2		
Cernotina calcea	A polycentropodid caddisfly	G5	S1		
Cernotina pallida	A polycentropodid caddisfly	G3G4	SH		
Cernotina truncona	A polycentropodid caddisfly	G4	S1		
Cheumatopsyche speciosa	A hydropsychid caddisfly	G5	SH		
Cheumatopsyche etrona	A hydropsychid caddisfly	G4G5	S1		
Cheumatopsyche virginica	A hydropsychid caddisfly	G5	S1		
Glossosoma lividum	A glossosomatid caddisfly	G5	S1S2		
Goerita semata	A caddisfly	G3	S1		
Hydropsyche bassi	A hydropsychid caddisfly	G2	S2		
Hydroptila anisoforficata	A microcaddisfly	G1G2	SU		
Hydroptila coweetensis	A microcaddisfly	G1G2	SU		
Lepidostoma mitchelli	A lepidostomatid caddisfly	G3	S1		
Lepidostoma modestum	A lepidostomatid caddisfly	G3G4	S2		
Nemotaulius hostilis	A limnephilid caddisfly	G5	S1		
Neophylax acutus	A uenoid caddisfly	G2G3	S1S3		
Neophylax atlanta	A uenoid caddisfly	G2G4	SH		
Neophylax etnieri	A uenoid caddisfly	G3	S1S3		
Neophylax toshioi	A uenoid caddisfly	G1G2	S1S2		
Oligostomis pardalis	A phryganeid caddisfly	G5	S1S2		
Polycentropus rickeri	A polycentropodid caddisfly	G3G4	SH		
Potamyia flava	A hydropsychid caddisfly	G5	SH		
Psilotreta rossi	An odontocerid caddisfly	G3	S2		

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Caddisflies (continued)					
Rhyacophila appalachia	Appalachian rhyacophilid caddisfly	G3	S2		
Rhyacophila kondratieffi	A rhyacophilid caddisfly	G2G3	S2S3		
Rhyacophila mainensis	A rhyacophilid caddisfly	G5	S1S2		
Rhyacophila mycta	A rhyacophilid caddisfly	G3	S1S2		
Rhyacophila teddyi	A rhyacophilid caddisfly	G2G3	S2		
Rhyacophila simmonsi	A rhyacophilid caddisfly	G1G3	S1S3		
Rhyacophila tricornuta	A rhyacophilid caddisfly	G1G3	S1S3		
Wormaldia mohri	A philopotamid caddisfly	G2G3	S1		
Wormaldia thyria	A philopotamid caddisfly	G3	S2		
LEPIDOPTERA (BUTTERFLIES, SKIPPERS & MOTHS)					
Butterflies					
Anaea andria	Goatweed leafwing	G4G5	S1		
Boloria selene	Silver-bordered fritillary	G5	S2		
Calephelis virginiensis	Little metalmark	G4	SH		
Callophrys hesseli = *Mitoura hesseli*	Hessel's hairstreak	G3G4	S1		
Callophrys irus = *Incisalia irus, Deciduphagus irus*	Frosted elfin	G3	S2?		
Callophyrs polios = *Incisalia polios, Deciduphagus polios*	Hoary elfin	G5	S1S3		
Chlosyne harrisii	Harris's checkerspot	G4	S1		
Colias interior	Pink-edged sulphur	G5	S1S2		
Erora laeta	Early hairstreak	GU	S2		
Euchloe olympia	Olympia marble	G4G5	S2		
Lycaena hyllus	Bronze copper	G5	S1		
Neonympha helicta = *Neonympha areolatus septentrionalis*	Helicta satyr	G3G4	S2		
Neonympha mitchellii	Mitchell's satyr	G2	S1	LE	LE
Phyciodes batesii batesii	Tawny crescent	G4T1	SX		
Phyciodes cocyta = *Phyciodes pascoensis, Phyciodes selenis*	Northern crescent	G5	S1S3		
Polygonia faunus smythi	Smyth's green comma	G5T3	S1S3		
Satyrium kingi	King's hairstreak	G3G4	S2		
Speyeria atlantis	Atlantis fritillary	G5	S2		
Speyeria idalia	Regal fritillary	G3	S1		
Skippers					
Amblyscirtes alternata	Dusky roadside skipper	G2G3	SH		
Atrytone arogos arogos	Arogos skipper	G3T1T2	SH		
Erynnis lucilius	Columbine duskywing	G4	S1S3		
Erynnis martialis	Mottled duskywing	G3	S1S3		
Erynnis persius persius	Persius duskywing	G5T1T3	S1		
Euphyes bimacula	Two-spotted skipper	G4	S2		
Euphyes conspicua	Black dash	G4	SH		
Euphyes dukesi	Dukes' skipper	G3	S2		
Euphyes pilatka	Palatka skipper (= sawgrass skipper)	G3G4	S1		
Hesperia attalus slossonae	Seminole skipper (= dotted skipper)	G3G4T3	SH		
Megathymus yuccae	Yucca giant skipper	G5	SH		
Problema bulenta	Rare skipper	G2G3	S1S2		
Pyrgus centaureae wyandot = *Pyrgus wyandot*	Appalachian grizzled skipper	G5T1T2	S1		LT

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VIRGINIA RARE ANIMAL LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Moths					
Acherdoa ferraria	Chocolate moth	G5	S2		
Acrapex relicta	Cane-boring moth	G4	S2S3		
Acronicta albarufa	Barrens dagger moth	G3G4	S1S3		
Acronicta brumosa	A dagger moth	G4?	S1S2		
Acronicta dolli	Doll's dagger moth	G3G4	S1S3		
= Merolonche dolli					
Amolita roseola	Roseate grass moth	G5	S1		
Anaplectoides brunneomedia	Brown-lined dart moth	G4	S2		
Apamea smythi	Smyth's Apamea moth	GH	SH		
Aplectoides condita	A noctuid moth	G4	S1S3		
Apodrepanulatrix liberaria	New Jersey tea inchworm moth	G3	S2		
Arctia caja	Great Tiger Moth	G5	S1		
Argillophora furcilla	A cane moth	G3G4	S1S3		
Argyrostrotis deleta	A noctuid moth	G4G5	S1S3		
Argyrostrotis sylvarum	Woodland chocolate moth	G4	S1S3		
Brachionycha borealis	Boreal fan moth	G4	S1S3		
Callosamia securifera	Sweetbay silkmoth	G4	S1S2		
Catocala consors	Consort underwing	G4	SH		
Catocala dulciola	Sweet underwing	G3	S1S3		
Catocala herodias gerhardi	Pine barrens underwing	G3T3	S2S3		
Catocala marmorata	Marbled underwing	G3G4	S2		
Catocala messalina	Messalina underwing	G4?	SH		
Catocala pretiosa pretiosa	Precious underwing	G4T2	SH		
Catocala relicta	White underwing	G5	S2		
Catocala ulalume	Ulalume underwing	G4	S1S3		
Cerma cora	Owl-eyed Bird Dropping Moth	G3G4	S1S3		
Coptotriche perplexa	Chestnut leaf-mining moth	GHQ	SH		
= Tischeria perplexa					
Crambidia cephalica	Yellow-headed lichen moth	G5	S1S2		
Ctenucha virginica	Virginia Ctenucha moth	G5	S2		
Cycnia inopinatus	Unexpected Cycnia moth	G4	S1S3		
Cymatophora approximaria	Giant gray moth	G4G5	S1S3		
Dargida rubripennis	Pink-streak moth	G3G4	S2		
= Faronta rubripennis					
Dichagyris grotei	A noctuid moth	G4	S1S3		
= Loxagrotis apicalis, Richia grotei					
Drasteria graphica	Graphic moth	G4	S1S3		
Eilema bicolor	Bicolored moth	G5	S1		
Erastria coloraria	Broad-lined Erastria moth	G3G4	S2?		
Euchlaena milnei	Milne's Euchlaena moth	G2G4	S2		
Eulithis propulsata	Currant Eulithis moth	GNR	S1S3		
Euxoa fumalis	A dart moth	GNR	S1S3		
Euxoa immixta	Mixed dart moth	G4	S1S3		
Exyra ridingsii	Green pitcher plant moth	G2G4	SH		
Franclemontia interrogans	A cane moth	G3G4	S1S3		
Gondysia telma	Telma darkwing moth	GNR	S1S2		
= Neadysgonia telma					
Graphiphora augur	Double Dart Moth	G5	S1		
Hadena ectypa	Catchfly moth	G3G4	S2		
Heterocampa astarte	A prominent moth	G4G5	S1S2		
Hyppa contrasta	Summer Hyppa moth	G3G4	S1S3		
Idaea tacturata	A geometrid moth	G4	S1S2		
Leucania calidior	A cane moth	G2G4	S2		

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VIRGINIA RARE ANIMAL LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Moths (continued)					
Lithophane adipel	A pinion moth	G4	S1S3		
= Lithophane lepida adipel					
Lithophane georgii	Large grey pinion moth	G5	S1S2		
Lithophane lemmeri	Lemmer's pinion moth	G3G4	S1S3		
Loscopia roblei	A cane moth	G3G4	S1S2		
Lytrosis permagnaria	A geometrid moth	G3G4	S2		
Macaria distribuaria	A geometrid moth	G4	S1S2		
= Semiothisa distribuaria					
Meropleon cosmion	A noctuid moth	G4	S2S3		
Meropleon titan	A noctuid moth	G2G4	S1S3		
Metria amella	A noctuid moth	G5	S1S2		
Nemoria tuscarora	Tuscarora emerald	GU	S1S3		
Odontosia elegans	Elegant prominent	G5	S1S3		
Oligia bridghamii	Bridgham's brocade moth	G4	S1		
Oxycilla mitographa	A noctuid moth	G4	SH		
Paectes abrostolella	A noctuid moth	G4	S1S2		
Papaipema araliae	Aralia shoot borer moth	G3G4	S2S3		
Papaipema astuta	Yellow stoneroot borer moth	G2G4	S1S3		
Papaipema duovata	Seaside goldenrod borer moth	G4	S2S3		
Papaipema duplicata	Dark stoneroot borer moth	G2G4	S2		
Papaipema necopina	Sunflower borer moth	G4?	S1S3		
Papaipema stenocelis	Chain fern borer moth	G4	S1S3		
Papaipema sp. 3	Southeastern cane borer moth	G4	S2S3		
Platypolia anceps	A noctuid moth	GNR	S1S2		
Polia purpurissata	Purple arches moth	GNR	SH		
Properigea costa	A noctuid moth	G4	S2		
Protodeltote sp. 1	A noctuid moth	G1G3	S1S2		
Psectrotarsia hebardi	Hebard's noctuid moth	GU	SH		
= Erythroecia hebardi					
Ptichodis bistrigata	Southern Ptichodis moth	G3	S1S3		
Pygarctia abdominalis	Yellow-edged Pygarctia moth	G3	S1S2		
Pyrrhia aurantiago	Aureolaria seed borer moth	G3G4	S1S3		
= Rhodoecia aurantiago					
Rheumaptera hastata	Spear-marked black moth	G5	S2		
Schinia siren	A flower moth	GNR	S1S2		
= Schinia inclara					
Schizura apicalis	Plain Schizura moth	G3G4	S1S3		
Speranza exonerata	Barrens Speranza moth	G3G4	S1S3		
Speranza ribearia	Currant spanworm moth	G4	S2S3		
= Itame ribearia					
Sphinx franckii	Franck's sphinx	G4	S2S3		
Sympistis perscripta	Scribbled sallow moth	G4	S1S3		
= Lepipolys perscripta					
Synanthedon castaneae	Chestnut clearwing moth	G3G5	SH		
Syngrapha alias	Hooked silver Y moth	G5	S1S2		
Syngrapha rectangula	Salt-and-pepper looper moth	G5	S2		
Tricholita notata	Marked Tricholita moth	G5	SH		
Xanthorhoe iduata	A geometrid moth	G4	S1S3		
Zale curema	A noctuid moth	G4	S1S3		
Zale lunifera	Pine barrens Zale moth	G3G4	S2		

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VIRGINIA RARE ANIMAL LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
DIPTERA (TRUE FLIES)					
Basilia boardmani	Southeastern myotis bat fly	G3	S1S2		
Fletcherimyia fletcheri	Pitcher plant fly	G5	S1S2		
Metriocnemus knabi	Pitcher plant midge	G5	S2		
Spelobia tenebrarum	A cave fly	G5	S1		
Wyeomyia smithii =*Wyeomyia haynei*	Pitcher plant mosquito	G5	S2		
HYMENOPTERA (BEES, WASPS, ANTS, & RELATIVES)					
Bombus affinis	Rusty-patched bumble bee	G1	S1		
ANIMAL ASSEMBLAGES					
Landbird Migratory Concentration Area		G3	S1		
Shorebird Migratory Concentration Area		G3	S2		
Colonial Wading Bird Colony		G5	S2		
Bird Nesting Colony		G5	SNR		
Freshwater Mussel Concentration Site		G3	SNR		
Monarch Butterfly Migratory Roost Site		GU	S1		

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PART TWO:

ANIMAL WATCHLIST

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NATURAL HERITAGE ANIMAL WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
VERTEBRATES					
FISH					
Ambloplites cavifrons	Roanoke bass	G3	S3		
Chologaster cornuta	Swampfish	G5	S3		
Enneacanthus obesus	Banded sunfish	G5	S3		
Erimystax dissimilis = *Hybopsis dissimilis*	Streamline chub	G4	S3		
Erimystax insignis = *Hybopsis insignis*	Blotched chub	G4	S3		
Etheostoma kanawhae	Kanawha darter	G4	S3		
Etheostoma simoterum	Snubnose darter	G3G4	S3		
Etheostoma tennesseense	Tennessee darter	G5	S3		
Etheostoma zonale	Banded darter	G5	S3		
Fundulus catenatus	Northern studfish	G5	S3		
Fundulus lineolatus	Lined topminnow	G5	S3		
Lampetra aepyptera	Least brook lamprey	G5	S3		
Lampetra appendix	American brook lamprey	G4	S3		
Margariscus margarita = *Semotilus margarita*	Pearl dace	G4	S3		
Moxostoma ariommum = *Scartomyzon ariommus*	Bigeye jumprock	G4	S3		
Moxostoma duquesnei	Black redhorse	G5	S3		
Notropis chalybaeus	Ironcolor shiner	G4	S3		
Notropis chiliticus	Redlip shiner	G4	S3		
Notropis sp. 4	Sawfin shiner	G4	S3		
Percina caprodes	Logperch	G5	S3		
Percina gymnocephala	Appalachia darter	G4	S3		
Percina oxyrhynchus	Sharpnose darter	G4	S3		
Phenacobius uranops	Stargazing minnow	G4	S3		
Uranidea kanawhae = *Cottus kanawhae*	Kanawha sculpin	G4	S3		
AMPHIBIANS					
Aneides aeneus	Green salamander	G3G4	S3		
Desmognathus orestes	Blue Ridge dusky salamander	G4	S3		
Lithobates virgatipes = *Rana virgatipes*	Carpenter frog	G4	S3		
Plethodon kentucki	Cumberland Plateau salamander	G4	S3		
Plethodon montanus	Northern Gray-cheeked salamander	G4	S3		
Plethodon yonahlossee	Yonahlossee salamander	G4	S3		
Pseudacris nigrita	Southern chorus frog	G5	S3		
Pseudacris ocularis = *Limnaoedus ocularis*	Little grass frog	G5	S3		
Siren lacertina	Greater siren	G5	S3		
Stereochilus marginatus	Many-lined salamander	G5	S3		
REPTILES					
Farancia erytrogramma	Rainbow snake	G4	S3		
Graptemys geographica	Northern map turtle	G5	S3		
Malaclemys terrapin	Diamond-backed terrapin	G4	S3		
Opheodrys vernalis = *Liochlorophis vernalis*	Smooth greensnake	G5	S3		
Plestiodon anthracinus = *Eumeces anthracinus*	Coal skink	G5	S3		
Tantilla coronata	Southeastern crowned snake	G5	S3		

NATURAL HERITAGE ANIMAL WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
BIRDS					
Accipiter cooperii	Cooper's Hawk	G5	S3B/S3N		
Ardea herodias	Great Blue Heron	G5	S3B/S5N		
Cardellina canadensis = *Wilsonia canadensis*	Canada Warbler	G5	S3S4B		
Certhia americana	Brown Creeper	G5	S3B/S5N		
Empidonax minimus	Least Flycatcher	G5	S3S4B		
Haematopus palliatus	American Oystercatcher	G5	S3B/S3N		
Haliaeetus leucocephalus	Bald Eagle	G5	S3S4B/S3S4N		
Ictinia mississippiensis	Mississippi Kite	G5	S2B		
Ixobrychus exilis	Least Bittern	G5	S3B/S3N		
Nycticorax nycticorax	Black-crowned Night-heron	G5	S3B/S4N		
Passerculus sandwichensis	Savannah Sparrow	G5	S3S4B/S4N		
Petrochelidon pyrrhonota	Cliff Swallow	G5	S3S4B		
Riparia riparia	Bank Swallow	G5	S3B		
Setophaga cerulea = *Dendroica cerulea*	Cerulean Warbler	G4	S3S4B		
Spiza americana	Dickcissel	G5	S2S3B		
Sterna forsteri	Forster's Tern	G5	S3B/S3N		
Sterna hirundo	Common Tern	G5	S3B		
Tyto alba	Barn Owl	G5	S3B/S3N		
Vermivora chrysoptera	Golden-winged Warbler	G4	S3B		
Vermivora cyanoptera = *Vermivora pinus*	Blue-winged Warbler	G5	S3B		
MAMMALS					
Blarina brevicauda telmalestes	Dismal Swamp short-tailed shrew	G5T3	S3		
Lasionycteris noctivagans	Silver-haired bat	G5	SUB/S4N		
Lasiurus cinereus	Hoary bat	G5	SUB/S3N		
Lontra canadensis = *Lutra canadensis*	Northern river otter	G5	S4		
Mustela nivalis	Least weasel	G5	S3		
Neotoma magister	Allegheny (or Appalachian) woodrat	G3G4	S3		
Peromyscus gossypinus	Cotton mouse	G5	S3		
Sciurus niger niger	Southeastern fox squirrel	G5T5	S3		
Sorex dispar	Long-tailed or rock shrew	G4	S3		
Sorex longirostris fisheri	Dismal Swamp southeastern shrew	G5T4	S3		LT/PDL
Spilogale putorius	Eastern spotted skunk	G4	S3S4		
Sylvilagus obscurus = *Sylvilagus transitionalis* ?	Appalachian cottontail (New England cottontail)	G4	S4?		
Sylvilagus palustris	Marsh rabbit	G5	S3		
Synaptomys cooperi helaletes	Dismal Swamp bog lemming	G5T3	S3		

NATURAL HERITAGE ANIMAL WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
INVERTEBRATES					
GASTROPODA (SNAILS)					
Elimia catenaria	Gravel Elimia	G4	S3		
= Pleurocera catenaria					
Fontigens orolibas	Blue Ridge springsnail	G3	S3		
Glyphyalinia picea	Rust glyph	G3	S1S3		
Glyphyalinia virginica	Depressed glyph	G3	S3		
Hendersonia occulta	Cherrystone Drop	G4	S3		
Leptoxis praerosa	Onyx rocksnail	G5	S3		
= Anculosa subglobosa					
Megapallifera wetherbyi	Blotchy mantleslug	G2G3	S1S3		
Mesodon elevatus	Proud globe	G5	S2?		
Mesomphix rugeli	Wrinkled button	G4	S3		
Patera panselenus	Virginia bladetooth	G3	S2?		
= Mesodon panselenus					
Philomycus virginicus	Virginia mantleslug	G3	S3		
Promenetus exacuous	Sharp Sprite	G5	S3		
Triodopsis burchi	Pittsylvania three-tooth	G3	S3		
Triodopsis fraudulenta	Baffled three-tooth	G4	S3		
Triodopsis tennesseensis	Budded three-tooth	G4	S3		
Ventridens arcellus	Golden dome	G4	S3		
Ventridens lasmodon	Hollow dome	G4	S3		
Ventridens pilsbryi	Yellow dome	G4	S3		
BIVALVIA (MUSSELS & CLAMS)					
Alasmidonta undulata	Triangle floater	G4	S3S4		
Anodonta implicata	Alewife floater	G5	S3?		
Fusconaia subrotunda	Longsolid	G3	S3		
Leptodea ochracea	Tidewater mucket	G3G4	S3		
= Ligumia ochracea					
Ligumia nasuta	Eastern pondmussel	G4	S3		
Medionidus conradicus	Cumberland moccasinshell	G3G4	S3S4		
Strophitus undulatus	Creeper	G5	S3S4		
Villosa constricta	Notched rainbow	G3	S3		
Villosa vanuxemensis	Mountain creekshell	G4	S3S4		
ARACHNIDA (SPIDERS, PSEUDOSCORPIONS & RELATIVES)					
Spiders					
Antrodiaetus robustus	Robust trapdoor spider	G3?	S2?		
Hypochilus gertschi	Gertsch's lampshade-web spider	G3	S3		
Hypochilus pococki	Pocock's lampshade-web spider	G4G5	S2S3		
Nesticus holsingeri	Holsinger's cave spider	G3G4	S3		
Nesticus tennesseensis	A cave spider	G3G4	S3S4		
Sphodros atlanticus	Atlantic purse-web spider	G4	S3		
Sphodros coylei	Coyle's purse-web spider	G4?	S3		
Sphodros niger	Black purse-web spider	G4G5	S3		
Pseudoscorpions					
Chitrella cavicola	A cave pseudoscorpion	G3	S3		

NATURAL HERITAGE ANIMAL WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
CRUSTACEA (AMPHIPODS, ISOPODS & DECAPODS)					
Amphipods					
Crangonyx antennatus	Appalachian Valley cave amphipod	G5	S3		
Gammarus pseudolimnaeus	Northern spring amphipod	G5	S3		
Stygobromus araeus	Tidewater interstitial amphipod	G3	S3		
Stygobromus abditus	James Cave amphipod	G3	S3		
Stygobromus estesi	Craig County cave amphipod	G4	S3		
Stygobromus gracilipes	Shenandoah Valley cave amphipod	G3G4	S3		
Stygobromus indentatus	Tidewater amphipod	G3	S3		
Stygobromus spinosus	Blue Ridge spring amphipod	G3	S3		
Isopods					
Caecidotea holsingeri	Greenbrier Valley cave isopod	G5	S3		
Caecidotea pricei	Price's cave isopod	G5	S3		
Caecidotea recurvata	Southwestern Virginia cave isopod	G5	S3		
Caecidotea richardsonae	Tennessee Valley cave isopod	G5	S3		
Caecidotea vandeli	Vandel's cave isopod	G3G4	S3		
Decapods					
Cambarus angularis	Angled crayfish	G3	S3		
Cambarus chasmodactylus	New River crayfish	G4	S3		
Cambarus diogenes	Devil crawfish	G5	S3		
Cambarus longirostris	Longnose crayfish	G5Q	S3		
Cambarus sciotensis	Teays River crayfish	G5	S3		
Fallicambarus fodiens = *Fallicambarus uhleri*	Digger crayfish	G5	S3		
Orconectes cristavarius	Spiny stream crayfish	G5	S3		
Orconectes forceps	Surgeon crayfish	G5	S3		
Orconectes obscurus	Allegheny crayfish	G5	S3		
DIPLOPODA (MILLIPEDES)					
Abacion tesselatum	A millipede	G5	S3		
Andrognathus corticarius	A millipede	G5	S3		
Apheloria montana	A millipede	G5	S3		
Apheloria tigana	A millipede	G5	S3		
Brachycybe lecontii	A millipede	G5	S3		
Buotus carolinus	A millipede	G3	S3		
Cambala hubrichti	A millipede	G5	S3		
Cambala minor	A millipede	G5	S3		
Conotyla melinda	Melinda millipede	G3	S3		
Gyalostethus monticolens	A millipede	G4	S3		
Nannaria ericacea	McGraw Gap xystodesmid millipede	G3	S3		
Nannaria morrisoni	A millipede	G3	S3		
Nannaria wilsoni	A millipede	G3	S3		
Rudiloria kleinpeteri	A millipede	G3	S3		
Rudiloria trimaculata tortua	A millipede	G5T2	S2?		
Semionellus placidus	A millipede	G3	S3		
Zygonopus packardi = *Trichopetalum packardi*	Packard's blind cave millipede	G4	S3		

NATURAL HERITAGE ANIMAL WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
INSECTS					
COLLEMBOLA (SPRINGTAILS)					
Pseudosinella granda	A cave springtail	G3	S3		
Pygmarrhopalites carolynae	A cave springtail	G4	S3		
Pygmarrhopalites clarus	A cave springtail	G4	S3		
Pygmarrhopalites marshalli	A cave springtail	G3	S3		
Pygmarrhopalites pavo	A cave springtail	G3?	S3		
Schaefferia hubbardi	A cave springtail	G3	S3		
Sinella barri	Barr's cave springtail	G5	S3		
DIPLURA (DIPLURANS)					
Litocampa cookei	Cooke's cave dipluran	G5	S3		
ODONATA (DAMSELFLIES & DRAGONFLIES)					
Damselflies					
Argia bipunctulata	Seepage dancer	G4	S3		
Calopteryx angustipennis	Appalachian jewelwing	G4	S3		
Enallagma daeckii	Attenuated bluet	G4	S3		
Enallagma doubledayi	Atlantic bluet	G5	S3		
Enallagma dubium	Burgundy bluet	G5	S3		
Enallagma hageni	Hagen's bluet	G5	S3		
Enallagma weewa	Blackwater bluet	G5	S3		
Ischnura prognata	Furtive forktail	G4	S3		
Lestes forcipatus	Sweetflag spreadwing	G5	S3		
Nehalennia integricollis	Southern sprite	G5	S3		
Telebasis byersi	Duckweed firetail	G5	S3		
Dragonflies					
Anax longipes	Comet darner	G5	S3		
Cordulegaster erronea	Tiger spiketail	G4	S3		
Cordulia shurtleffii	American emerald	G5	S3		
Epitheca spinosa = *Tetragoneuria spinosa*	Robust baskettail	G4	S3		
Gomphaeschna antilope	Taper-tailed darner	G4	S3		
Gomphus abbreviatus	Spine-crowned clubtail	G4	S3		
Gomphus dilatatus	Blackwater clubtail	G5	S3		
Gomphus quadricolor	Rapids clubtail	G3G4	S3		
Gomphus rogersi	Sable clubtail	G4	S3		
Helocordulia selysii	Selys' sundragon	G4	S3		
Leucorrhinia intacta	Dot-tailed whiteface	G5	S3		
Libellula flavida	Yellow-sided skimmer	G5	S3		
ORTHOPTERA (GRASSHOPPERS, KATYDIDS, CRICKETS & RELATIVES)					
Scudderia septentrionalis	Northern bush katydid	G3?	S3		
COLEOPTERA (BEETLES)					
Cicindela dorsalis media = *Habroscelimorpha dorsalis media*	White tiger beetle	G3G4T3T4	S3		
Cicindela purpurea	Purple tiger beetle	G5	S3		
Cicindela splendida	Splendid tiger beetle	G5	S3		

NATURAL HERITAGE ANIMAL WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Beetles (continued)					
Megacephala carolina = *Tetracha carolina*	Carolina big-headed tiger beetle	G5	S3		
Nicrophorus defodiens	A burying beetle	G4	S3		
Phloeoxena signata	A ground beetle	G3?	S3		
TRICHOPTERA (CADDISFLIES)					
Adicrophleps hitchcocki	A brachycentrid caddisfly	G4G5	S1S3		
Agapetus tomus	A glossosomatid caddisfly	G5	S1S3		
Agarodes libalis	Spring-loving psiloneuran caddisfly	G3	S1S3		
Ceraclea neffi	A leptocerid caddisfly	G5	S1S3		
Ceraclea punctata	A leptocerid caddisfly	G5	S1S3		
Ceraclea spongillovorax	A leptocerid caddisfly	G3G4	S1S3		
Ceraclea uvalo	A leptocerid caddisfly	G2G4	S1S3		
Cheumatopsyche parentum	A hydropsychid caddisfly	G3	S3		
Chimarra augusta	A philopotamid caddisfly	G3G4	S3		
Culoptila cantha	A glossosomatid caddisfly	G5	S1S3		
Heteroplectron americanum	A caddisfly	G5	S2		
Homoplectra monticola	A hydropsychid caddisfly	G2G3	S2S3		
Hydropsyche brunneipennis	A hydropsychid caddisfly	G3G4	S1S3		
Hydropsyche catawba	A hydropsychid caddisfly	G3	S3		
Hydropsyche frisoni	A hydropsychid caddisfly	G5	S1S3		
Hydropsyche hoffmani	A hydropsychid caddisfly	G3G4	S3		
Hydropsyche opthalmica	A hydropsychid caddisfly	G3	S3		
Hydropsyche potomacensis	A hydropsychid caddisfly	G2G3	S2S3		
Hydropsyche rotosa	A hydropsychid caddisfly	G2G3	S2S3		
Ironoquia lyrata	A limnephilid caddisfly	G5	S1S3		
Lepidostoma bryanti	A lepidostomatid caddisfly	G5	S1S3		
Lepidostoma carrolli	A lepidostomatid caddisfly	G5	S1S3		
Lepidostoma ontario	A lepidostomatid caddisfly	G5	S1S3		
Lepidostoma serratum	A lepidostomatid caddisfly	G4	S1S3		
Micrasema scotti	A brachycentrid caddisfly	G3G4	S3		
Micrasema sprulesi	A brachycentrid caddisfly	G5	S1S3		
Molanna tryphena	A molannid caddisfly	G5	S1S2		
Molanna uniophila	A molannid caddisfly	G5	S1S2		
Neophylax stolus	A uenoid caddisfly	G3	S3		
Ochrotrichia denningi	A microcaddisfly	G2G4	S1S3		
Ochrotrichia graysoni	A microcaddisfly	G3G4	S1S3		
Oxyethira pescadori	Pescador's bottle-cased caddisfly	G3G4	S1S2		
Parapsyche cardis	A hydropsychid caddisfly	G4	S2		
Phylocentropus auriceps	A caddisfly	G3G4	S2		
Phylocentropus carolinus	A caddisfly	G5	S2		
Polycentropus centralis	A polycentropodid caddisfly	G5	S1S2		
Polycentropus pixi	A polycentropodid caddisfly	G4	S1S2		
Pycnopsyche virginica	A limnephilid caddisfly	G3G4	S3		
Rhyacophila atrata	A rhyacophilid caddisfly	G5	S2		
Rhyacophila shenandoahensis	Shenandoah rhyacophilid caddisfly	G3	S3		
Setodes guttatus	A leptocerid caddisfly	G5	S1S3		
Theliopsyche grisea	A lepidostomatid caddisfly	G4	S1S3		
Theliopsyche melas	A lepidostomatid caddisfly	G4G5	S1S3		
Triaenodes dipsius	A leptocerid caddisfly	G5	S1S3		
Triaenodes taenia	A leptocerid caddisfly	G3G4	S1S3		

NATURAL HERITAGE INVERTEBRATE WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
LEPIDOPTERA (BUTTERFLIES, SKIPPERS & MOTHS)					
Butterflies					
Atlides halesus	Great purple hairstreak	G4G5	S3		
Calephelis borealis	Northern metalmark	G3G4	S3		
Celastrina nigra = *Celastrina ebenina*	Dusky azure	G4	S3S4		
Danaus plexippus plexippus	Monarch (eastern population)	G4T1	SU		
Enodia creola	Creole pearly eye	G3G4	S3S4		
Pieris virginiensis	West Virginia white	G3?	S3		
Satyrium edwardsii	Edwards' hairstreak	G4	S3		
Satyrium favonius ontario = *Fixsenia favonius ontario*	Northern oak hairstreak	G4T4	S3		
Speyeria diana	Diana fritillary	G3G4	S3		
Skippers					
Amblyscirtes aesculapias	Lace-winged roadside skipper	G3G4	S3		
Amblyscirtes carolina	Carolina roadside skipper	G3G4	S3S4		
Amblyscirtes reversa	Reversed roadside skipper	G3G4	S3		
Hesperia leonardus	Leonard's skipper	G4	S3?		
Poanes aaroni	Aaron's skipper	G4	S3		
Poanes yehl	Yehl skipper	G4	S3		
Polites mystic	Long dash	G5	S3		
Thorybes confusis	Confused cloudywing	G4	S2S4		
Moths					
Abrostola ovalis	A noctuid moth	G4	S2S4		
Acronicta haesitata	Hesitant dagger moth	G5	S2S4		
Acronicta radcliffei	Radcliffe's dagger moth	G5	S2S4		
Acronicta tristis	A dagger moth	GNR	S1S3		
Anaplectoides prasina	Green arches	G5	S1S3		
Apamea cariosa	A noctuid moth	G4	S1S3		
Apamea lignicolora	Wood-colored Apamea moth	G5	S2S4		
Apamea plutonia	A noctuid moth	G4	S2S4		
Apamea sordens = *Apamea finitima*	Bordered Apamea moth	GNR	S1S3		
Argyrostrotis quadrifilaris	Four-lined chocolate moth	G4	S1S3		
Arugisa latiorella = *Arugisa watsoni*	A noctuid moth	G4	S1S3		
Autographa ampla	Large looper moth	G5	S1S3		
Bellura brehmei	A wetland borer moth	GNR	S2S4		
Cabera quadrifasciaria	Four-lined Cabera moth	GNR	S1S3		
Callopistria granitosa	Granitosa fern moth	G4	S1S3		
Capsula subflava = *Archanara subflava*	A sedge borer moth	G4	S1S3		
Catocala angusi	Angus' underwing	G4	S2S4		
Catocala concumbens	Sleepy underwing	G5	S1S3		
Catocala crataegi	Hawthorn underwing	G5	S2S4		
Catocala insolabilis	Inconsolable underwing	G5	S1S3		
Catocala miranda	Miranda underwing	G3G4	S2S4		
Catocala parta	Mother underwing	G5	S2S4		
Catocala robinsoni	Robinson's underwing	G4	S3		
Catocala sappho	Sappho underwing	G4	S1S3		
Catocala serena	Serene underwing	G5	S2S4		
Crambidia pura	Pure lichen moth	G4	S1S3		
Cucullia florea	A noctuid moth	GNR	S2S4		

NATURAL HERITAGE INVERTEBRATE WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Moths (continued)					
Cutina aluticolor	A cypress moth	GNR	S3		
Darapsa versicolor	Hydrangea sphinx	G4	S2S4		
Dasychira pinicola	Pine tussock moth	G4	S1S3		
Dasychira plagiata	A tussock moth	GNR	S2S4		
Derrima stellata	Pink star moth	G4	S1S3		
Diachrysia balluca	A noctuid moth	GNR	S1S3		
Dysstroma truncata	Marbled carpet	GNR	S2S4		
Emarginea percara	A noctuid moth	G4	S3		
Erastria cruentaria	Thin-lined Erastria moth	G4	S2S4		
Eueretagrotis attenta	Attentive dart moth	G4	S1S3		
Eueretagrotis perattenta	Two-spot dart moth	G5	S1S3		
Eueretagrotis sigmoides	Sigmoid dart moth	G5	S3		
Eulithis molliculata	Dimorphic Eulithis moth	G4	S3		
Euxoa bostoniensis	Boston dart moth	GNR	S2S4		
Euxoa declarata	A dart moth	G4G5	S1S3		
Euxoa messoria	A dart moth	GNR	S2S4		
Euxoa obeliscoides	A dart moth	GNR	S2S4		
Euxoa redimicula	Fillet dart moth	GNR	S2S4		
Euxoa scholastica	Scholastic dart moth	GNR	S2S4		
Euxoa violaris	Violet dart moth	G4	S1S3		
Feralia comstocki	Comstock's sallow	G5	S1S3		
Givira francesca	A carpenterworm moth	GNR	S1S3		
Haploa colona	Colona moth	G4G5	S2S4		
Heliomata infulata	Rare spring moth	G3G4	S2S4		
Homochlodes disconventa	Dark Homochlodes moth	G4	S2S4		
Hydraecia stramentosa	Figwort borer moth	G4	S2S4		
Hypena sordidula	Sordid Hypena moth	G4?	S2S4		
= Bomolocha sordidula					
Iridopsis pergracilis	A geometrid moth	G4G5	S1S3		
= Anacamptodes pergracilis					
Isoparce cupressi	Cypress sphinx	G4	S3		
Lintneria eremitus	Hermit sphinx	G4G5	S1S3		
= Sphinx eremitus					
Lithophane petulca	Wanton noctuid moth	G5	S1S3		
Lithophane querquera	Shivering pinion moth	GNR	S2S4		
Lophocampa maculata	Spotted Tussock Moth	G5	S1S3		
Melanchra assimilis	Black arches	G5	S1S3		
Melipotis jucunda	Merry Melipotis moth	G5	S1S3		
Mesoleuca ruficillata	White-ribboned carpet	G4	S2S4		
Metanema inatomaria	Pale Metanema moth	GNR	S1S3		
Metarranthis sp. 1	Mid-Atlantic Metarranthis moth	G3G4	S1S3		
Morrisonia triangula	Triangle-barred Morrisonia moth	G3G4	S2S4		
Nemoria elfa	Elfin emerald	G4?	S1S3		
Neoligia crytora	A noctuid moth	GNR	S2S4		
= Oligia crytora					
Neoligia exhausta	A noctuid moth	GNR	S1S3		
= Oligia exhausta					
Panopoda repanda	Orange Panopoda moth	G5	S3		
Panthea acronyctoides	Black zipzag	G5	S2S4		
Papaipema impecuniosa	Aster borer moth	G5	S2S4		
Papaipema nepheleptena	Turtlehead borer moth	G4	S2S4		
Papaipema polymniae	Leafcup borer moth	G4	S2S4		
Papaipema pterisii	Bracken fern borer moth	G5	S3		
Papaipema speciosissima	Osmunda borer moth	G4	S3		
Papaipema unimoda	Meadow rue borer moth	G5	S2S4		
Pero zalissaria	A geometrid moth	G4	S3		

NATURAL HERITAGE INVERTEBRATE WATCH LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Moths (continued)					
Petrophora subaequaria	Northern Petrophora moth	G4G5	S1S3		
Polychrysia morigera	A noctuid moth	G4	S3		
Protapamea danieli	A cane moth	GNR	S1S3		
Protodeltote albidula	A noctuid moth	G5	S1S3		
= Lithacodia albidula					
Pseudohermonassa tenuicula	A dart moth	G4	S1S3		
= Xestia tenuicula					
Schinia florida	Primrose moth	G5	S2S4		
Schinia nubila	A flower moth	G5	S2S4		
Schinia saturata	Brown flower moth	G5	S2S4		
Sideridis congermana	German cousin moth	GNR	S1S3		
Speranza abruptata	A geometrid moth	G5	S2S4		
= Itame abruptata					
Speranza evagaria	A geometrid moth	G4G5	S1S3		
= Itame evagaria					
Speranza exauspicata	A geometrid moth	G4G5	S1S3		
= Itame exauspicata					
Speranza subcessaria	Barred Itame moth	G4	S2S4		
= Itame subcessaria					
Sphinx chersis	Great ash sphinx	G4G5	S2S4		
Sphinx drupiferarum	Wild cherry sphinx	G4	S1S3		
Spragueia dama	Southern Spragueia moth	G5	S2S4		
Xanthorhoe labradorensis	Labrador carpet	G4	S2S4		
Zale calycanthata	Double-banded Zale moth	G4	S2S4		
Zale submediana	A noctuid moth	G4	S2S4		

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PART THREE:

ANIMAL REVIEW LIST
(Taxa of Uncertain Status)

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NATURAL HERITAGE ANIMAL REVIEW LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
VERTEBRATES					
FISH					
Lepomis marginatus	Dollar sunfish	G5	SNR		
AMPHIBIANS					
Lithobates kauffeldi = *Rana kauffeldi*	Atlantic Coast leopard frog	GNR	SU		
REPTILES					
Lampropeltis elapsoides = *Lampropeltis triangulum elapsoides*	Scarlet kingsnake	G5	S2S4		
MAMMALS					
Peromyscus leucopus easti	Pungo mouse	G5T1	S1?		
Sylvilagus floridanus hitchensi	Smith Island cottontail	G5THQ	SH		
INVERTEBRATES					
GASTROPODA (SNAILS)					
Catinella hubrichti	Snowhill ambersnail	G3	SU		
Discus nigrimontanus	Black Mountain disc	G4	SU		
Euchemotrema leai = *Stenotrema leai aliciae*	Lowland pillsnail	G5	SU		
Fumonelix christyi = *Mesodon christyi*	Glossy covert	G3	SU		
Gastrocopta clappi = *Gastrocopta armifera clappi*	Bluegrass snaggletooth	G4G5	SU		
Gastrocopta pellucida	Slim snaggletooth	G5	SU		
Gastrodonta fonticula = *Gastrocopta interna fonticula*	Appalachia bellytooth	G3G4	SU		
Glyphyalinia praecox	Brilliant glyph	G4	SU		
Glyphyalinia sculptilis	Suborb glyph	G4	SU		
Helicodiscus shimeki	Temperate coil	G4G5	SU		
Holsingeria sp. 1	Skyline Caverns snail	G1Q	S1		
Inflectarius kalmianus = *Mesodon kalmianus*	Brown globelet	G3	SU		
Lobosculum pustuloides = *Polygyra pustuloides*	Tiny Liptooth	G4	SU		
Mesomphix subplanus	Flat button	G3G4	SU		
Oxyloma subeffusum	Chesapeake ambersnail	G3	SU		
Pallifera varia	Variable mantleslug	G2G4	SU		
Paravitrea grimmi	Buff Supercoil	G1G3Q	SU		
Paravitrea placentula	Glossy supercoil	G3	SU		
Paravitrea pontis	Natural Bridge supercoil	G3	SU		
Paravitrea reesei	Round supercoil	G3	SU		
Patera laevior	Smooth Bladetooth	G4	SU		
Pomatiopsis cincinnatiensis	Brown walker	G4	SU		
Pupilla muscorum	Widespread column	G5	SU		
Somatogyrus pennsylvanicus	Shale pebblesnail	G3	SU		
Stenotrema pilula	Pygmy slitmouth	G3G4	SU		
Stenotrema spinosum	Carinate slitmouth	G4	SU		
Striatura exigua	Ribbed striate	G5	SU		
Striatura milium	Fine-ribbed striate	G5	SU		
Triodopsis anteridon	Carter threetooth	G3	SU		
Triodopsis pendula	Hanging Rock threetooth	G3	SU		

NATURAL HERITAGE ANIMAL REVIEW LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Snails (continued)					
Vallonia parvula	Trumpet vallonia	G4	SU		
Ventridens decussatus	Crossed dome	G3	SU		
Ventridens lawae	Rounded dome	G4	SU		
Vertigo bollesiana	Delicate vertigo	G4	SU		
Vertigo clappi	Cupped vertigo	G1G2	SU		
Vertigo oralis	Palmetto vertigo	G5	SU		
Vertigo parvula	Smallmouth Vertigo	G3	SU		
Vertigo teskeyae	Swamp vertigo	G5	SU		
Vertigo ventricosa	Five-tooth vertigo	G5	SU		
Vitrinizonites latissimus	Glassy grapeskin	G4	SU		
BIVALVIA (MUSSELS & CLAMS)					
Clams					
Pisidium equilaterale	Round peaclam	G4G5	SU		
ARACHNIDA (SPIDERS, PSEUDOSCORPIONS & RELATIVES)					
Spiders					
Amaurobius borealis	An amaurobiid spider	G5	SU		
Barronopsis jeffersi	A funnel-web spider	G3	SU		
Castianeira trilineata	A two-clawed hunting spider	G4?	SU		
Clubiona spiralis	A two-clawed hunting spider	G4	SU		
Drassyllus louisianus	A gnaphosid spider	G4?	SU		
Drassyllus sp. 1	A gnaphosid spider	GU	SU		
Pisaurina dubia	A nursery-web spider	G4	SU		
Xysticus emertoni	Emerton's crab spider	G5	SU		
Sphodros rufipes	Red-legged purse-web spider	G4	SU		
Harvestmen					
Leiobunum hoffmani	A harvestman	GNR	S2?		
Pseudoscorpions					
Kleptochthonius polychaetus	Shenandoah pseudoscorpion	GU	SU		
CRUSTACEA (AMPHIPODS, ISOPODS & DECAPODS)					
Amphipods					
Crangonyx acicularis	A freshwater amphipod	G1G3	SU		
Crangonyx gracilis	A freshwater amphipod	G4	SU		
Stygobromus sp. 10	A cave amphipod (Botetourt Co.)	G1	S1		
Stygobromus sp. 11	A cave amphipod (Nelson Co.)	G1	S1		
Stygobromus sp. 12	A cave amphipod (Rockbridge Co.)	G1	S1		
Stygobromus sp. 19	A cave amphipod (Scott Co.)	G1	S1		
Stygobromus sp. 20	A cave amphipod (Bath, Highland Co.)	G1	S1		
Isopods					
Caecidotea sp. nov.	A groundwater isopod (Caroline Co.)	GNR	SNR		
Branchiopods					
Eulimnadia sp. 1	A clam shrimp	GNR	SU		
Decapods					
Cambarus buntingi	Longclaw crayfish	G4Q	S2		

NATURAL HERITAGE ANIMAL REVIEW LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
DIPLOPODA (MILLIPEDES)					
Auturus erythropygos	A millipede	G3	SU		
Chaetaspis albus	A millipede	G4	SU		
Euryurus leachii fraternus	A millipede	G4T?	SU		
Okeanobates americanus	A millipede	G4	SU		
Onomeris underwoodi	A millipede	G5	SU		
Orinisobates nigrior	A millipede	G4	SU		
Petaserpes rosalbus = *Polyzonium rosalbum*	A millipede	G5	SU		
Pseudopolydesmus paludicolus	A millipede	GU	SU		
Striaria columbiana	A millipede	G2	SU		
Striaria sp. 1	A millipede	G1	S1		
CHILOPODA (CENTIPEDES)					
Escaryus ethopus	A centipede	GNR	SU		
INSECTS					
DIPLURA (DIPLURANS)					
Litocampa sp. 10	A cave dipluran (Smyth)	G1	S1		
Litocampa sp. 11 (near *cookei*)	A cave dipluran (Lee/Scott/Wise)	G2	S2		
EPHEMEROPTERA (MAYFLIES)					
Ameletus cryptostimulus	Allegheny mayfly	G4	S2S4		
Ameletus tarteri	Tarter's Ameletus mayfly	G2G4	SU		
Isonychia arida	A mayfly	G5	SU		
Isonychia georgiae	Georgia Isonychia mayfly	G4	SU		
Isonychia tusculanensis	A mayfly	G4	SU		
Iswaeon anoka = *Heterocloeon anoka*	A mayfly	G5	SU		
Paraleptophlebia assimilis	A mayfly	G4	SU		
Paraleptophlebia jeanae	A mayfly	G3G4	SU		
Rhithrogena anomala	A mayfly	G3G4	SU		
Waynokiops dentatogriphus	A mayfly	GNR	SNR		
ODONATA (DAMSELFLIES & DRAGONFLIES)					
Epitheca costalis = *Tetragoneuria costalis*	Stripe-winged baskettail	G5	S2S4		
Gomphus hybridus	Cocoa clubtail	G4	SU		
Lestes dryas	Emerald spreadwing	G5	SNR		
Lestes vidua	Carolina spreadwing	G5	SNA		
Sympetrum internum = *Sympetrum janeae*	Cherry-faced meadowhawk	G5	SU		
PLECOPTERA (STONEFLIES)					
Allocapnia harperi	Stonyfork snowfly	G4	SU		
Alloperla banksi	Tufted sallfly	G4	SU		
Alloperla biserrata	Dusky sallfly	G3	SU		
Alloperla idei	*Vernal sallfly	G3	SU		
Alloperla nanina	Swannanoa sallfly	G4	SU		
Alloperla neglecta	Tennessee sallfly	G3	SU		
Bolotoperla rossi	Smoky willowfly	G4	SU		
Hansonoperla appalachia	Appalachian stonefly	G3	SU		
Isogenoides varians	Rock Island springfly	G3G4	SU		

NATURAL HERITAGE ANIMAL REVIEW LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Stoneflies (continued)					
Isoperla nelsoni	Nelson stripetail stonefly	GNR	SNR		
Isoperla powhatan	Powhatan stripetail stonefly	GNR	SNR		
Isoperla reesi	Elk Garden stripetail stonefly	GNR	SNR		
Isoperla stewarti	Stewart stripetail stonefly	GNR	SNR		
Isoperla yuchi	Yuchi stripetail stonefly	GNR	SNR		
Ostrocerca complexa	Notched forestfly	G4	S1S3		
Ostrocerca prolongata	Bent forestfly	G3	S1S3		
Paragnetina ichusa	Widecollar stonefly	G3	S1S3		
Perlesta roblei	Dragon Run stonefly	G3	SU		
Perlesta shawnee	Shawnee stonefly	G3	SU		
Perlesta teaysia	Teays stonefly	G4	SU		
Pteronarcys comstocki	Spiny salmonfly	G3	SU		
Pteronarcys scotti	Carolina salmonfly	G4	SU		
Shipsa rotunda	Intrepid forestfly	G5	SU		
Tallaperla cornelia	Southeastern roachfly	G4	SU		
ORTHOPTERA (GRASSHOPPERS, KATYDIDS, CRICKETS & RELATIVES)					
Melanoplus celatus	A spur-throat grasshopper	GU	SU		
Melanoplus devius	A spur-throat grasshopper	GU	SU		
Melanoplus impudicus	Immodest spur-throat grasshopper	G4G5	SU		
Melanoplus pachycercus	A spur-throat grasshopper	G2G3	SNR		
HEMIPTERA (TRUE BUGS, CICADAS, LEAFHOPPERS & RELATIVES)					
Acantholomidea denticulata	A shield bug	GNR	SU		
Allopodops mississippiensis	Mississippi turtle bug	G2G3	SU		
Botocudo modestus	A seed bug	G5	SU		
Corixidea major	A true bug	GU	SU		
Elasmostethus atricornis	Hercules club stink bug	G3?	SU		
Eurygaster alternata	A shield bug	G5	SU		
Galgupha denudata	A shield bug	G3	SU		
Glyptocombus saltator	A true bug	GNR	SU		
Isocytus chapmani	Chapman’s shore bug	GNR	SU		
Isthmocorius piceus	Black stalk-eyed bug	G5	SU		
Ligyrocoris depictus	A seed bug	G4?	SU		
Nannocoris arenarius	A true bug	GU	SU		
Neolygus crataegi	Hawthorn plant bug	GNR	SU		
Nepa apiculata	A water scorpion	GNR	SU		
Oncozygia clavicornis	A turtle bug	G3	SU		
Plagiognathus repetitus	Pine barrens plant bug	GNR	SU		
Pnirontis languida	An assassin bug	G4	SU		
Ranatra australis	Southern water scorpion	G5	SU		
Ranatra drakei	Drake’s water scorpion	G4	SU		
Stachyocnemus apicalis	Sandpit alydid bug	G4	SU		
Tominotus communis	A burrower bug	G5	SU		
Trialeurodes phlogis	Phlox whitefly	GU	SU		
COLEOPTERA (BEETLES)					
Anthophylax hoffmani	A longhorned beetle	GNR	S1S3		
Calligrapha pnirsa	A leaf beetle	G3	S1S3		
Cyclotrachelus incisus	A ground beetle	G4	SU		
Diabrotica cristata	A leaf beetle	GNR	SU		
Eucaerus varicornis	A ground beetle	G4?	SU		
Helops sulcipennis	A flightless darkling beetle	G3?	S1S3		

NATURAL HERITAGE ANIMAL REVIEW LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Beetles (continued)					
Hoperius planatus	A predaceous diving beetle	GNR	SU		
Hydrobiomorpha casta	A water scavenger beetle	GNR	SU		
Laccophilus schwarzi	Schwarz' diving beetle	GNR	SU		
Paralichas trivittis = *Odontonyx trivittis*	A beetle	GNR	SU		
Pentagonica picticornis	A ground beetle	GNR	SU		
Phanaeus igneus	A scarab beetle	G5	SU		
Pseudaptinus lecontei	A ground beetle	GNR	SU		
Pseudaptinus pygmaeus = *Thalpius pygmaeus*	A ground beetle	GNR	SU		
Sosylus costatus	A beetle	GNR	SU		
Stenocorus schaumi	Schaum's longhorn beetle	GNR	SU		
Urographis triangulifer = *Graphisurus triangulifer*	A longhorned beetle	G4?	SU		
MECOPTERA (SCORPIONFLIES)					
Boreus nivoriundus	A snow scorpionfly	G4	SU		
TRICHOPTERA (CADDISFLIES)					
Agapetus hessi	A glossosomatid caddisfly	G4G5	S2S4		
Agapetus iridis	A glossosomatid caddisfly	G5	S2S4		
Agapetus minutus	A glossosomatid caddisfly	G4G5	SU		
Agapetus pinatus	A glossosomatid caddisfly	G5	S2S4		
Brachycentrus solomoni	A brachycentrid caddisfly	G4	S2S4		
Brachycentrus spinae	A brachycentrid caddisfly	G4	S2S4		
Ceraclea ophioderus	A leptocerid caddisfly	G5	S2S4		
Ceratopsyche alhedra	A hydropsychid caddisfly	G5	S2S4		
Cheumatopsyche gracilis	A hydropsychid caddisfly	G5	S2S4		
Cheumatopsyche gyra	A hydropsychid caddisfly	G4G5	S2S4		
Cheumatopsyche halima	A hydropsychid caddisfly	G5	S2S4		
Frenesia difficilis	A limnephilid caddisfly	G5	S2S4		
Frenesia missa	A limnephilid caddisfly	G5	S2S4		
Goerita betteni	A caddisfly	G4	S2S4		
Glossosoma intermedium	A glossosomatid caddisfly	G5	S2S4		
Homoplectra doringa	A hydropsychid caddisfly	G5	S2S4		
Hydropsyche franclemonti	A hydropsychid caddisfly	G5	S2S4		
Hydroptila acadia	A microcaddisfly	GU	SU		
Hydroptila ajax	A microcaddisfly	G5	SU		
Hydroptila amoena	A microcaddisfly	G5	SU		
Hydroptila artesa	A microcaddisfly	G2G3	SU		
Hydroptila dentata	A microcaddisfly	G3G4	SU		
Hydroptila eramosa	A microcaddisfly	G1G3	SU		
Hydroptila fiskei	A microcaddisfly	G4	SU		
Hydroptila lennoxi	A microcaddisfly	G2G4	SU		
Hydroptila lonchera	A microcaddisfly	G2G3	SU		
Hydroptila maculata	A microcaddisfly	G3G4	SH/SU		
Hydroptila spinata	A microcaddisfly	G4	SU		
Hydroptila talladega	A microcaddisfly	G4	SU		
Hydroptila tortosa	A microcaddisfly	G4G5	SH/SU		
Hydroptila vala	A microcaddisfly	G4	SU		
Hydroptila virgata	A microcaddisfly	G5	SU		
Ironoquia parvula	A limnephilid caddisfly	G5	S2S4		
Ithytrichia clavata	A microcaddisfly	G5	SU		
Lepidostoma pictile	A lepidostomatid caddisfly	G5	S2S4		

NATURAL HERITAGE ANIMAL REVIEW LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Caddisflies (continued)					
Leptocerus americanus	A leptocerid caddisfly	G5	S2S4		
Limnephilus indivisus	A limnephilid caddisfly	G5	S2S4		
Limnephilus moestus	A limnephilid caddisfly	G5	S2S4		
Macrostemum transversum	A hydropsychid caddisfly	G3G5	S2S4		
Mayatrichia ayama	A microcaddisfly	G5	SU		
Micrasema burksi	A brachycentrid caddisfly	G4G5	S2S4		
Neophylax ornatus	A uenoid caddisfly	G4G5	S2S4		
Neophylax wigginsi	A uenoid caddisfly	G3G4	S2S4		
Neotrichia vibrans	A microcaddisfly	G5	SU		
Ochrotrichia arva	A microcaddisfly	G4G5	SU		
Ochrotrichia tarsalis	A microcaddisfly	G5	SU		
Ochrotrichia wojcickyi	A microcaddisfly	G4G5	SU		
Orthotrichia cristata	A microcaddisfly	G5	SU		
Oxyethira dualis	A microcaddisfly	G5	SH/SU		
Oxyethira janella	Little-entrance Oxyethiran microcaddisfly	G5	SU		
Oxyethira michiganensis	A microcaddisfly	G5	SU		
Oxyethira rivicola	A microcaddisfly	G5	SU		
Paranyctiophylax denningi	A polycentropodid caddisfly	G4G5	SU		
Paranyctiophylax serratus	A polycentropodid caddisfly	G4	SU		
Polycentropus interruptus	A polycentropodid caddisfly	G5	SU		
Polycentropus nascotius	A polycentropodid caddisfly	G5	SU		
Polycentropus pentus	A polycentropodid caddisfly	G5	SU		
Pseudostenophylax sparsus	A limnephilid caddisfly	G5	S2S4		
Ptilostomis semifasciata	A phryganeid caddisfly	G5	S2S4		
Pycnopsyche conspersa	A limnephilid caddisfly	G3G4	S2S4		
Pycnopsyche flavata	A limnephilid caddisfly	G4	S2S4		
Rhyacophila acutiloba	A rhyacophilid caddisfly	G5	S2S4		
Rhyacophila formosa	A rhyacophilid caddisfly	G5	S2S4		
Rhyacophila invaria	A rhyacophilid caddisfly	G5	S2S4		
Rhyacophila manistee	A rhyacophilid caddisfly	G5	S2S4		
Rhyacophila otica	A rhyacophilid caddisfly	G3G4Q	S1S3		
Rhyacophila vibox	A rhyacophilid caddisfly	G5	S2S4		
Stactobiella martynovi	A microcaddisfly	G4	SU		
Wormaldia shawnee	A philopotamid caddisfly	G4G5	S2S4		
LEPIDOPTERA (BUTTERFLIES, SKIPPERS & MOTHS)					
Butterflies					
Celastrina lucia = *Celastrina ladon lucia*	Northern spring azure	G5	SU		
Celastrina serotina	Cherry gall azure	G5	SU		
Euphydryas phaeton	Baltimore checkerspot	G4	SU		
Papilio appalachiensis = *Pterourus appalachiensis*	Appalachian tiger swallowtail	G4	SU		
Satyrium caryaevorus	Hickory hairstreak	G4	SU		
Skippers					
Autochton cellus	Golden-banded skipper	G4	SU		
Moths					
Acronicta dactylina	Fingered dagger moth	G5	SU		
Acronicta subochrea	Puzzling dagger moth	G4?	SU		
Apameini new genus 2, sp. 1	A cane moth	GNR	SNR		
Apameini new genus 2, sp. 2	A cane moth	GNR	SNR		
Apameini new genus 2, sp. 3	A cane moth	GNR	SNR		

NATURAL HERITAGE ANIMAL REVIEW LIST

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
Moths (continued)					
Bellura vulnifica	A wetland borer moth	GNR	SU		
= *Bellura melanopyga*					
Catocala antinympha	Sweetfern underwing	G5	SU		
Cucullia alfarata	A noctuid moth	G4	SU		
Eupithecia peckorum	Peck's Eupithecia moth	G4	SU		
Glena cognataria	Blueberry Gray	G4	SU		
Hydriomena bistriolata	A geometrid moth	GNR	SU		
Hydriomena divisaria	Black-dashed Hydriomena moth	GNR	SU		
Idia majoralis	Major Idia moth	GNR	SU		
Lacinipolia lustralis	A noctuid moth	GNR	SU		
Leucania commoides	A noctuid moth	G5	SU		
Lithophane innominata	Nameless pinion moth	G5	SU		
Lithophane querquera	Shivering pinion moth	GNR	S2S4		
Orthofidonia exornata	A geometrid moth	GNR	SU		
Papaipema nelita	Coneflower borer moth	G4	SU		
Psaphida grandis	Gray sallow	G4	SU		
= *Eutolype grandis*					
Psaphida thaxterianus	A noctuid moth	G4	SU		
Schinia bina	Bina flower moth	G4	SU		
Sympistis badistriga	Brown-lined sallow moth	G4	SU		
= *Homohadena badistriga*					
Tarache delecta	Delightful Bird-dropping moth	GU	SU		
= *Acontia delecta*					
Virbia ferruginosa	Rusty tiger moth	G5	SU		
= *Holomelina ferruginosa*					
Virbia immaculata	Immaculate tiger moth	G4	SU		
= *Holomelina immaculata*					
Zale sp. 2 near *squamularis*	A Zale moth	G4Q	SU		
Zale sp. 3 near *buchholzi*	Maritime Zale moth	G3G4	SU		
Zanclognatha theralis	A noctuid moth	G4	SU		
= *Zanclognatha gypsalis*					
HYMENOPTERA (BEES, WASPS, ANTS, & RELATIVES)					
Bombus bohemicus	Ashton cuckoo bumble bee	G?	SH/SU		
= *Bombus ashtoni*					
Bombus citrinus	Lemon Cuckoo bumble bee	G4G5	SU		
Bombus fraternus	Southern Plains bumble bee	G4	SU		
Bombus pensylvanicus	American bumble bee	G3G4	SU		
Bombus sandersoni	Sanderson bumble bee	G4G5	SU		
Bombus terricola	Yellow-banded bumble bee	G2G4	SU		

APPENDIX 1. FEDERALLY ENDANGERED AND THREATENED VERTEBRATE ANIMALS OF VIRGINIA

(exclusive of extirpated species, see Appendix 3)

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
VERTEBRATES					
FISH					
Acipenser brevirostrum	Shortnose sturgeon	G3	SHB/S1N	LE	LE
Acipenser oxyrinchus	Atlantic sturgeon	G3	S2	LE	LE
Chrosomus cumberlandensis = *Phoxinus cumberlandensis*	Blackside dace	G2	S1	LT	LT
Erimonax monachus = *Cyprinella monacha, Hybopsis monacha*	Spotfin chub (= turquoise shiner)	G2	S1	LT	LT
Erimystax cahni = *Hybopsis cahni*	Slender chub	G1	S1	LT	LT
Etheostoma percnurum	Duskytail darter	G1	S1	LE	LE
Noturus flavipinnis	Yellowfin madtom	G1	S1	LT	LT
Percina rex	Roanoke logperch	G1G2	S1S2	LE	LE
AMPHIBIANS					
Plethodon shenandoah	Shenandoah salamander	G1	S1	LE	LE
REPTILES					
Caretta caretta	Loggerhead (sea turtle)	G3	S1B/S1N	LT	LT
Chelonia mydas	Green turtle	G3	SNA	LT	LT
Dermochelys coriacea	Leatherback (sea turtle)	G2	SNA	LE	LE
Eretmochelys imbricata	Atlantic hawksbill (sea turtle)	G3	SNA	LE	LE
Glyptemys muhlenbergii = *Clemmys muhlenbergii*	Bog turtle	G3	S2	LT/SA	LE
Lepidochelys kempii	Kemp's ridley (sea turtle)	G1	S1N	LE	LE
BIRDS					
Calidris canutus rufa	Red Knot	G4T2	S2N	LT	
Charadrius melodus	Piping Plover	G3	S2B/S1N	LT	LT
Picoides borealis	Red-cockaded Woodpecker	G3	S1	LE	LE
Setophaga kirtlandii = *Dendroica kirtlandii*	Kirtland's Warbler	G1	SNA	LE	LE
Sterna dougallii	Roseate Tern	G4	SHB	LE	LE
MAMMALS					
Balaenoptera borealis	Sei whale	G3	SNA	LE	LE
Balaenoptera musculus	Blue whale	G3G4	SNA	LE	LE
Balaenoptera physalus	Fin whale	G3G4	SNA	LE	LE
Corynorhinus townsendii virginianus = *Plecotus townsendii virginianus*	Virginia big-eared bat	G3G4T2	S1	LE	LE
Eubalaena glacialis = *Balaena glacialis*	Northern right whale	G1	SNA	LE	LE
Glaucomys sabrinus coloratus	Carolina northern flying squirrel	G5T2	S1	LE	LE
Megaptera novaeangliae	Humpback whale	G4	S1N	LE	LE
Myotis grisescens	Gray myotis (bat)	G3	S1	LE	LE
Myotis sodalis	Indiana bat (= social myotis)	G2	S1	LE	LE
Myotis septentrionalis	Northern long-eared Myotis (bat)	G1G3	S1S3	LT	
Physeter macrocephalus = *Physeter catodon*	Sperm whale	G3G4	SNA	LE	LE
Trichechus manatus	West Indian manatee	G2	SNA	LE/PT	LE

APPENDIX 2. FEDERALLY ENDANGERED AND THREATENED INVERTEBRATE ANIMALS OF VIRGINIA

(exclusive of extirpated species, see Appendix 3)

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
INVERTEBRATES					
GASTROPODA (SNAILS)					
Polygyriscus virginianus	Virginia coil (= Virginia fringed mountain snail)	G1	S1	LE	LE
BIVALVIA (MUSSELS)					
Alasmidonta heterodon	Dwarf wedgemussel	G1G2	S1	LE	LE
Cumberlandia monodonta	Spectaclecase	G3	S1	LE	LE
Cyprogenia stegaria	Fanshell	G1Q	S1	LE	LE
Dromus dromas	Dromedary pearlymussel	G1	S1	LE	LE
Epioblasma brevidens	Cumberland combshell	G1	S1	LE	LE
Epioblasma capsaeformis	Oyster mussel	G1	S1	LE	LE
*Epioblasma florentina walkeri**	Tan riffleshell	G1T1	S1	LE	LE
Epioblasma triquetra	Snuffbox	G3	S1	LE	LE
Fusconaia cor	Shiny pigtoe	G1	S1	LE	LE
Fusconaia cuneolus	Fine-rayed pigtoe	G1	S1	LE	LE
Hemistena lata	Cracking pearlymussel	G1	S1	LE	LE
Lemiox rimosus	Birdwing pearlymussel	G1	S1	LE	LE
Pegias fabula	Little-winged pearlymussel	G1	S1	LE	LE
Plethobasus cyphyus	Sheepnose	G3	S1	LE	LE
Pleurobema collina	James spinymussel	G1	S1	LE	LE
Pleurobema plenum	Rough pigtoe	G1	SH	LE	LE
Pleuronaia dolabelloides	Slabside pearlymussel	G2	S2	LE	LE
Ptychobranchus subtentum	Fluted Kidneyshell	G2	S2	LE	LE
Quadrula cylindrica strigillata	Rough rabbits foot	G3G4T2	S2	LE	LE
Quadrula intermedia	Cumberland monkeyface	G1	S1	LE	LE
Quadrula sparsa	Appalachian monkeyface	G1	S1	LE	LE
Villosa perpurpurea	Purple bean	G1	S1	LE	LE
CRUSTRACEA (AMPHIPODS, ISOPODS & DECAPODS)					
Antrolana lira	Madison Cave isopod	G2G4	S2	LT	LT
Lirceus usdagalun	Lee County cave isopod	G2G3	S1	LE	LE
ARACHNIDA (SPIDERS, PSEUDOSCORPIONS & RELATIVES)					
Microhexura montivaga	Spruce-fir moss spider	G1	S1	LE	LE
INSECTA (INSECTS)					
Beetles					
Cicindela dorsalis dorsalis = *Habroscelimorpha dorsalis dorsalis*	Northeastern beach tiger beetle	G4T2	S2	LT	LT
Nicrophorus americanus	American burying beetle	G2G3	SH	LE	
Butterflies					
Neonympha mitchellii	Mitchell's satyr	G2	S1	LE	LE

*Virginia populations were recently described as a new subspecies, *Epioblasma florentina aureola* (golden riffleshell).

APPENDIX 3. EXTINCT AND EXTIRPATED ANIMALS OF VIRGINIA

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
VERTEBRATES					
FISH					
Moxostoma lacerum = *Lagochila lacera*	Harelip sucker	GX	SX		
Percina bimaculata	Chesapeake darter	G1G2	SX		
Percina maculata	Blackside darter	G5	SX		
Percopsis omiscomaycus	Trout-perch	G5	SX		
BIRDS					
Conuropsis carolinensis	Carolina parakeet	GX	SX		
Ectopistes migratorius	Passenger pigeon	GX	SX		
Vermivora bachmanii	Bachman's warbler	GH	SX	LE	LE
MAMMALS					
Bos bison = *Bison bison*	American bison	G4	SX		
Canis lupus = *Canis lycaon*	Gray (= eastern timber) wolf	G4G5	SX	LE	LE
Canis rufus	Red wolf	G1Q	SX	LE	
Cervus elaphus = *Cervus canadensis*	Wapiti or elk	G5	SX*		
Puma concolor couguar = *Felis concolor couguar*	Eastern cougar (= mountain lion, puma)	G5THQ	SX	LE	LE
INVERTEBRATES					
BIVALVIA (MUSSELS)					
Epioblasma haysiana	Acornshell	GX	SX		
Epioblasma lenior	Narrow catspaw	GX	SX		
Epioblasma torulosa gubernaculum	Green-blossom pearlymussel	G2TX	SX	LE	LE
Lampsilis abrupta	Pink mucket	G2	SX	LE	LE
Villosa fabalis	Rayed bean	G2	SX	LE	LE
Villosa trabalis	Cumberland bean	G1	SX	LE	LE
INSECTS					
Phyciodes batesii batesii	Tawny crescent	G4T1	SX		

*The last record of a native elk in Virginia was from 1855. Small numbers of reintroduced elk from eastern Kentucky have moved into far southwestern Virginia in recent years and are currently considered a game species by the Virginia Department of Game and Inland Fisheries, which has initiated a reintroduction program in that portion of the state.

APPENDIX 4. LIST OF SYNONYMS

Synonym	Name used in lists above	Common name	Page
Acipenser oxyrhynchus	*Acipenser oxyrinchus*	Atlantic sturgeon	10
Acontia delecta	*Tarache delecta*	Delightful Bird-dropping moth	48
Aeshna mutata	*Rhionaeschna mutata*	Spatterdock darner	23
Aimophila aestivalis	*Peucaea aestivalis*	Bachman's Sparrow	14
Alasmidonta minor	*Alasmidonta viridis*	Slippershell mussel	17
Anacamptodes pergracilis	*Iridopsis pergracilis*	A geometrid moth	39
Anculosa subglobosa	*Leptoxis praerosa*	Onyx rocksnail	34
Anguispira alternata jessica	*Anguispira jessica*	Mountain disc	16
Anthrobia mammouthia	*Anthrobia monmouthia*	A cave spider	18
Apamea finitima	*Apamea sordens*	Bordered Apamea moth	38
Archanara subflava	*Capsula subflava*	A sedge borer moth	38
Arugisa watsoni	*Arugisa latiorella*	A noctuid moth	38
Balaena glacialis	*Eubalaena glacialis*	Northern right whale	49
Bellura melanopyga	*Bellura vulnifica*	A wetland borer moth	48
Bison bison	*Bos bison*	Bison	51
Bombus ashtoni	*Bombus bohemicus*	Ashton cuckoo bumble bee	48
Bomolocha sordidula	*Hypena sordidula*	Sordid Hypena moth	39
Brachoria falcifera	*Appalachioria falcifera*	Big Cedar Creek millipede	20
Brachoria separanda hamata	*Appalachioria separanda hamata*	A millipede	20
Brachoria separanda versicolor	*Appalachioria separanda versicolor*	A millipede	20
Brachoria turneri	*Appalachioria turneri*	Turner's millipede	20
Bufo quercicus	*Anaxyrus quercicus*	Oak toad	12
Cambarus veteranus (in part)	*Cambarus callainus*	Big Sandy Crayfish	20
Canis lycaon	*Canis lupus*	Gray wolf	51
Carpodacus purpureus	*Haemorhous purpureus*	Purple Finch	13
Carunculina glans	*Toxolasma lividus*	Purple liliput	18
Carunculina lividus	*Toxolasma lividus*	Purple liliput	18
Casmerodius albus	*Ardea alba*	Great Egret	13
Celastrina ebenina	*Celastrina nigra*	Dusky azure	38
Celastrina ladon lucia	*Celastrina lucia*	Northern spring azure	47
Cervus canadensis	*Cervus elaphus*	Wapiti or elk	51
Clemmys insculpta	*Glyptemys insculpta*	Wood turtle	12
Clemmys muhlenbergii	*Glyptemys muhlenbergii*	Bog turtle	12
Conradilla caelata	*Lemiox rimosus*	Birdwing pearlymussel	17
Cottus baileyi	*Uranidea baileyi*	Black sculpin	11
Cottus cognatus	*Uranidea cognata*	Slimy sculpin	11
Cottus kanawhae	*Uranidea kanawhae*	Kanawha sculpin	32
Cottus sp. 1	*Uranidea* sp. 1	Bluestone sculpin	11
Cottus sp. 4	*Uranidea* sp. 4	Clinch sculpin	11
Cottus sp. 5	*Uranidea* sp. 5	Holston sculpin	11
Cyprinella monacha	*Erimonax monachus*	Spotfin chub (= turquoise shiner)	10
Cyprogenia irrorata	*Cyprogenia stegaria*	Fanshell	17
Deciduphagus irus	*Callophrys irus*	Frosted elfin	27
Deciduphagus polios	*Callophyrs polios*	Hoary elfin	27
Dendroica cerulea	*Setophaga cerulea*	Cerulean Warbler	33
Dendroica fusca	*Setophaga fusca*	Blackburnian Warbler	14
Dendroica kirtlandii	*Setophaga kirtlandii*	Kirtland's Warbler	49
Dendroica magnolia	*Setophaga magnolia*	Magnolia Warbler	14
Dendroica virens waynei	*Setophaga virens waynei*	Wayne's Black-throated Green Warbler	14
Dixioria coronata	*Dixioria pela coronata*	A millipede	19
Ellipsoptera gratiosa	*Cicindela gratiosa*	Whitish tiger beetle	25
Ellipsoptera lepida	*Cicindela lepida*	Ghost tiger beetle	25
Enallagma cyathigerum (in part)	*Enallagma annexum*	Northern bluet	22
Ephemerella berneri	*Tsalia berneri*	Berner's Ephemerella mayfly	22
Epioblasma florentina walkeri (in part)	*Epioblasma florentina aureola*	Golden riffleshell	17
Erythroecia hebardi	*Psectrotarsia hebardi*	Hebard's noctuid moth	29
Etheostoma clarum	*Ammocrypta clara*	Western sand darter	10

APPENDIX 4 (continued)

Synonym	Name used in lists above	Common name	Page
Etheostoma stigmaeum jessiae	*Etheostoma jessiae*	Blueside darter	10
Etheostoma stigmaeum meadiae	*Etheostoma meadiae*	Bluespar darter	10
Etheostoma tippecanoe (in part)	*Etheostoma denoncourti*	Golden darter	10
Eumeces anthracinus	*Plestiodon anthracinus*	Coal skink	32
Eutolype grandis	*Psaphida grandis*	Gray sallow	43
Fallicambarus uhleri	*Fallicambarus fodiens*	A crayfish	35
Faronta rubripennis	*Dargida rubripennis*	Pink-streak moth	28
Felis concolor couguar	*Puma concolor couguar*	Eastern cougar	15
Fixsenia favonius ontario	*Satyrium favonius ontario*	Northern oak hairstreak	38
Foveacheles paralleloseta	*Traegaardia paralleloseta*	A cave mite	18
Fusconaia barnesiana	*Pleuronaia barnesiana*	Tennessee pigtoe	17
Fusconaia edgariana	*Fusconaia cor*	Shiny pigtoe	17
Gallinula chloropus (in part)	*Gallinula galeata*	Common Gallinule	13
Gastrocopta armifera clappi	*Gastrocopta clappi*	Bluegrass snaggletooth	42
Gastrocopta interna fonticula	*Gastrodonta fonticula*	Appalachia bellytooth	42
Gomphus brevis	*Gomphus adelphus*	Moustached clubtail	23
Goniobasis arachnoidea	*Elimia arachnoidea*	Spider Elimia	16
Graphisurus triangulifer	*Urographis triangulifer*	A longhorned beetle	46
Habroscelimorpha dorsalis dorsalis	*Cicindela dorsalis dorsalis*	Northeastern beach tiger beetle	25
Habroscelimorpha dorsalis media	*Cicindela dorsalis media*	White tiger beetle	36
Heterocloeon anoka	*Iswaeon anoka*	A mayfly	44
Heterocloeon rubrolaterale	*Iswaeon rubrolaterale*	A mayfly	22
Holomelina ferruginosa	*Virbia ferruginosa*	Rusty tiger moth	48
Holomelina immaculata	*Virbia immaculata*	Immaculate tiger moth	48
Homohadena badistriga	*Sympistis badistriga*	Brown-lined sallow moth	48
Hybopsis cahni	*Erimystax cahni*	Slender chub	10
Hybopsis dissimilis	*Erimystax dissimilis*	Streamline chub	32
Hybopsis insignis	*Erimystax insignis*	Blotched chub	32
Hybopsis labrosa	*Cyprinella labrosa*	Thicklip chub	10
Hybopsis monacha	*Erimonax monachus*	Spotfin chub (= turquoise shiner)	10
Incisalia irus	*Callophrys irus*	Frosted elfin	27
Incisalia polios	*Callophyrs polios*	Hoary elfin	27
Itame abruptata	*Speranza abruptata*	A geometrid moth	40
Itame evagaria	*Speranza evagaria*	A geometrid moth	40
Itame exauspicata	*Speranza exauspicata*	A geometrid moth	40
Itame ribearia	*Speranza ribearia*	Currant spanworm moth	29
Itame subcessaria	*Speranza subcessaria*	Barred Itame moth	40
Lagochila lacera	*Moxostoma lacerum*	Harelip sucker	51
Lampropeltis getula nigra	*Lampropeltis nigra*	Eastern black kingsnake	12
Lampropeltis triangulum elapsoides	*Lampropeltis elapsoides*	Scarlet kingsnake	42
Lampsilis orbiculata	*Lampsilis abrupta*	Pink mucket	17
Lastena lata	*Hemistena lata*	Cracking pearlymussel	17
Lepipolys perscripta	*Sympistis perscripta*	Scribbled sallow moth	29
Leurognathus marmoratus	*Desmognathus marmoratus*	Shovel-nosed salamander	12
Lexingtonia dolabelloides	*Pleuronaia dolabelloides*	Slabside pearlymussel	17
Lexingtonia subplana	*Fusconaia masoni*	Atlantic pigtoe	17
Libellula exusta	*Ladona exusta*	White corporal skimmer	23
Libellula julia	*Ladona julia*	Chalk-fronted corporal skimmer	23
Ligumia ochracea	*Leptodea ochracea*	Tidewater mucket	34
Ligumia recta latissima	*Ligumia recta*	Black sandshell	17
Limnaoedus ocularis	*Pseudacris ocularis*	Little grass frog	32
Liochlorophis vernalis	*Opheodrys vernalis*	Smooth greensnake	32
Lithacodia albidula	*Protodeltote albidula*	A noctuid moth	40
Lithobates virgatipes	*Rana virgatipes*	Carpenter frog	34
Lithophane lepida adipel	*Lithophane adipel*	A pinion moth	29
Loxagrotis apicalis	*Dichagyris grotei*	A noctuid moth	28
Lutra canadensis	*Lontra canadensis*	River otter	33
Merolonche dolli	*Acronicta dolli*	Doll's dagger moth	28

APPENDIX 4 (continued)

Synonym	Name used in lists above	Common name	Page
Mesodon christyi	*Fumonelix christyi*	Glossy covert	42
Mesodon clingmanicus	*Fumonelix wheatleyi clingmanicus*	Clingman covert	16
Mesodon kalmianus	*Inflectarius kalmianus*	Brown globelet	42
Mesodon panselenus	*Patera panselenus*	Virginia bladetooth	34
Microcreagris valentinei	*Lissocreagris valentinei*	Valentine's cave pseudoscorpion	18
Mitoura hesseli	*Callophrys hesseli*	Hessel's hairstreak	27
Moxostoma ariommum	*Scartomyzon ariommus*	Bigeye jumprock	34
Moxostoma hamiltoni	*Thoburnia hamiltoni*	Rustyside sucker	11
Neadysgonia telma	*Gondysia telma*	Telma darkwing moth	28
Neonympha areolatus septentrionalis	*Neonympha helicta*	Helicta satyr	27
Notropis hypsinotus	*Hybopsis hypsinotus*	Highback chub	10
Notropis lirus	*Lythrurus lirus*	Mountain shiner	10
Notropis whipplei	*Cyprinella whipplei*	Steelcolor shiner	10
Nuttallornis borealis	*Contopus cooperi*	Olive-sided Flycatcher	13
Nycticorax violaceus	*Nyctanassa violacea*	Yellow-crowned Night-heron	14
Odontonyx trivittis	*Paralichas trivittis*	A beetle	46
Oligia crytora	*Neoligia crytora*	A noctuid moth	39
Oligia exhausta	*Neoligia exhausta*	A noctuid moth	39
Ophiogomphus alleghaniensis	*Ophiogomphus incurvatus alleghaniensis*	Allegheny snaketail	23
Oporornis philadelphia	*Geothlypis philadelphia*	Mourning Warbler	13
Percina macrocephala	*Percina williamsi*	Sickle darter	11
Phoxinus cumberlandensis	*Chrosomus cumberlandensis*	Blackside dace	10
Phoxinus tennesseensis	*Chrosomus tennesseensis*	Tennessee dace	10
Phyciodes pascoensis	*Phyciodes cocyta*	Northern crescent	27
Phyciodes selenis	*Phyciodes cocyta*	Northern crescent	27
Physeter catodon	*Physeter macrocephalus*	Sperm whale	49
Pipistrellus subflavus	*Perimyotis subflavus*	Tricolored bat	15
Plauditus rubrolateralis	*Iswaeon rubrolaterale*	A mayfly	22
Plecotus rafinesquii macrotis	*Corynorhinus rafinesquii macrotis*	Eastern big-eared bat	15
Plecotus townsendii virginianus	*Corynorhinus townsendii virginianus*	Virginia big-eared bat	15
Pleurobema maculatum	*Pleurobema oviforme*	Tennessee clubshell	17
Pleurobema pyramidatum	*Pleurobema rubrum*	Pyramid pigtoe	17
Pleurocera catenaria	*Elimia catenaria*	Gravel Elimia	35
Polygyra plicata	*Millerelix plicata*	Cumberland liptooth	16
Polygyra pustuloides	*Lobosculum pustuloides*	Tiny Liptooth	42
Polyzonium rosalbum	*Petaserpes rosalbus*	A millipede	44
Pterourus appalachiensis	*Papilio appalachiensis*	Appalachian tiger swallowtail	47
Pyrgus wyandot	*Pyrgus centaureae wyandot*	Appalachian grizzled skipper	27
Rana kauffeldi	*Lithobates kauffeldi*	Atlantic Coast leopard frog	42
Rana virgatipes	*Lithobates virgatipes*	Carpenter frog	32
Rhodoecia aurantiago	*Pyrrhia aurantiago*	Aureolaria seed borer moth	29
Richia grotei	*Dichagyris grotei*	A noctuid moth	28
Scartomyzon ariommus	*Moxostoma ariommum*	Bigeye jumprock	32
Schinia inclara	*Schinia siren*	A flower moth	29
Seiurus noveboracensis	*Parkesia noveboracensis*	Northern Waterthrush	14
Semiothisa distribuaria	*Macaria distribuaria*	A geometrid moth	29
Semotilus margarita	*Margariscus margarita*	Pearl dace	32
Sphaeroderus nitidicollis schaumii	*Sphaeroderus schaumii*	Schaum's false snail-eating beetle	26
Sphinx eremitus	*Lintneria eremitus*	Hermit sphinx	39
Stenotrema leai alicia	*Euchemotrema leai*	Lowland pillsnail	42
Sterna antillarum	*Sternula antillarum*	Least Tern	14
Sterna caspia	*Hydroprogne caspia*	Caspian Tern	13
Sterna maxima	*Thalasseus maximus*	Royal Tern	14
Sterna nilotica	*Gelochelidon nilotica*	Gull-billed Tern	13
Sterna sandvicensis	*Thalasseus sandvicensis*	Sandwich Tern	14
Stizostedion canadense	*Sander canadensis*	Sauger	11
Sylvilagus transitionalis	*Sylvilagus obscurus*	Appalachian cottontail	33

APPENDIX 4 (continued)

Synonym	Name used in lists above	Common name	Page
Sympetrum janeae	*Sympetrum internum*	Cherry-faced meadowhawk	44
Tetracha carolina	*Megacephala carolina*	Carolina big-headed tiger beetle	37
Tetragoneuria canis	*Epitheca canis*	Beaverpond baskettail	23
Tetragoneuria costalis	*Epitheca costalis*	Stripe-winged baskettail	44
Tetragoneuria semiaquea	*Epitheca semiaquea*	Mantled baskettail	23
Tetragoneuria spinosa	*Epitheca spinosa*	Robust baskettail	36
Thalpius pygmaeus	*Pseudaptinus pygmaeus*	A ground beetle	46
Tischeria perplexa	*Coptotriche perplexa*	Chestnut leaf-mining moth	28
Trichopetalum packardi	*Zygonopus packardi*	Packard's blind cave millipede	35
Trichopetalum weyeriensis	*Zygonopus weyeriensis*	Grand Caverns blind cave millipede	21
Trichopetalum whitei	*Zygonopus whitei*	Luray Caverns blind cave millipede	21
Trionyx spiniferus	*Apalone spinifera*	Spiny softshell	12
Tritogonia verrucosa	*Quadrula verrucosa*	Pistolgrip	18
Troglodytes troglodytes (in part)	*Troglodytes hiemalis*	Winter Wren	14
Vermivora pinus	*Vermivora cyanoptera*	Blue-winged Warbler	33
Vermivora ruficapilla	*Oreothlypis ruficapilla*	Nashville Warbler	14
Wilsonia canadensis	*Cardellina canadensis*	Canada Warbler	33
Wyeomyia haynei	*Wyeomyia smythii*	Pitcher plant mosquito	30
Xestia tenuicula	*Pseudohermonassa tenuicula*	A dart moth	40
Zanclognatha gypsalis	*Zanclognatha theralis*	A noctuid moth	48

APPENDIX 5. RARE SPECIES SIGHTING FORM

Virginia Department of Conservation and Recreation, Division of Natural Heritage
600 E. Main Street, Richmond, Virginia 23219
(804) 786-7951

An important component of the natural heritage inventory and protection process involves gathering information from state experts, professionals, and avocational naturalists throughout the state. To facilitate this, the Division of Natural Heritage has developed this rare species sighting form. If you would like to participate in our inventory and protection activities, please take a few moments to complete the attached form for any species from our rare species list. These data will be evaluated for incorporation into the natural heritage database and used exclusively for the protection of the rare species and its habitat. Please send the form to the staff zoologist at the address above. Thank you for your support. The Division of Natural Heritage can only realize the protection of the Commonwealth's natural diversity by working through a network of knowledgeable and concerned individuals.

SPECIES OBSERVED:

DATE OBSERVED:

COUNTY:

USGS QUADRANGLE MAP NAME (if known; mark location on a photocopy of the appropriate map and submit with this form):

LOCATION (Provide a detailed description, including directions from nearest town, road intersection, etc.):

HABITAT DESCRIPTION (Include associated species, elevation, natural features, natural community type, etc.):

POPULATION DATA (Number of individuals observed, age, size, evidence of reproduction,etc.):

LANDOWNER (If know, provide name, address, and phone number):

THREATS TO SPECIES OR EVIDENCE OF HABITAT DISTURBANCE:

REPORTED BY (Include name, address, and phone number):

DATE OF REPORT:

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Enclosure 4. Plant Species of Greatest Conservation Need for the Virginia Mid-Atlantic Coastal Plain

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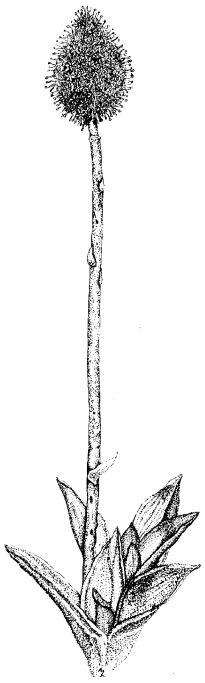
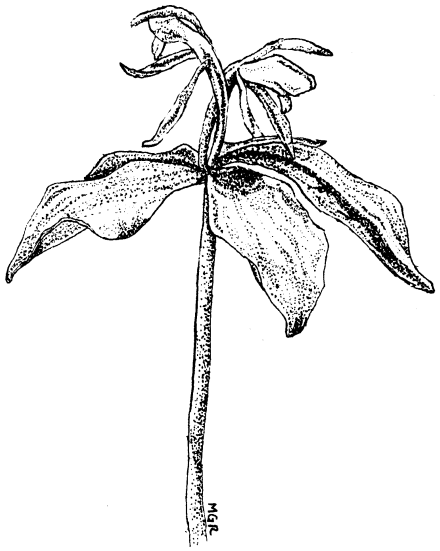
COMMONWEALTH of VIRGINIA

Natural Heritage Resources of Virginia: Rare Plants March 2019

Compiled by:
John F. Townsend, Staff Botanist





VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION
DIVISION OF NATURAL HERITAGE
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Cover illustrations (l. to r.) of Swamp Pink (*Helonias bullata*), dwarf burhead (*Echinodorus tenellus*), and small whorled pogonia (*Isotria medeoloides*) by Megan Rollins

This report should be cited as: Townsend, John F. 2019. Natural Heritage Resources of Virginia: Rare Plants. Natural Heritage Technical Report 19-15. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. Unpublished report. March 2019. 57 pages plus appendices

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL AND RECREATIONAL RESOURCES

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NATURAL HERITAGE RESOURCES OF VIRGINIA: RARE PLANTS

March 2019

VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION
DIVISION OF NATURAL HERITAGE
600 EAST MAIN STREET, 24TH FLOOR
RICHMOND, VIRGINIA 23219
(804) 786-7951

List Compiled by: John F. Townsend
Staff Botanist

Cover illustrations (l. to r.) of Swamp Pink (*Helonias bullata*), dwarf burhead (*Echinodorus tenellus*), and small whorled pogonia (*Isotria medeoloides*) by Megan Rollins

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INTRODUCTION

The Virginia Department of Conservation and Recreation's Division of Natural Heritage (DCR-DNH) was established to protect Virginia's Natural Heritage Resources. These Resources are defined in the Virginia Natural Area Preserves Act of 1989 (Section 10.1-209 through 217, *Code of Virginia*), as the habitat of rare, threatened, and endangered plant and animal species; exemplary natural communities, habitats, and ecosystems; and other natural features of the Commonwealth. DCR-DNH is the state's only comprehensive program for conservation of our natural heritage and includes an intensive statewide biological inventory, field surveys, electronic and manual database management, environmental review capabilities, and natural area protection and stewardship. Through such a comprehensive operation, the Division identifies Natural Heritage Resources which are in need of conservation attention while creating an efficient means of evaluating the impacts of economic growth.

To achieve this protection, DCR-DNH maintains lists of the most significant elements of our natural diversity. These lists focus the Division's inventory on the Natural Heritage Resources most likely to be lost without conservation action in the near future. Most importantly, these lists are not only useful for DCR-DNH, but can be used by other agencies, organizations, and individuals to guide protection and development decision-making. In formulating these lists, the Division uses information from previous studies, museum records, the observations and opinions of experts, DCR-DNH staff scientists, and field inventories.

The first list included in this report is the Rare Vascular Plant List. This list contains information on the legal and biological status of Virginia's rarest known native vascular plant taxa, **628** in all. This list includes all plants believed to be sufficiently rare or threatened to merit an inventory of their status and locations.

The second list included in this report is the Vascular Plant Watchlist. This list contains information on the legal and biological status of **231** additional taxa that are decidedly uncommon in Virginia but not scarce enough to merit inclusion on the Rare Vascular Plant List. Plants on this list are monitored to determine general population trends. If a species or variety on this list is found to be rare or threatened, it is placed on the Rare Vascular Plant List.

The third list included in this report is the Review List (Taxa of Uncertain Status). These taxa lack numerical ranks, indicating that they are poorly known from a taxonomic and distributional standpoint. Although some of these taxa may prove to be conservation targets, more field and herbarium data are needed to assess their distinctiveness and degree of rarity in Virginia. There are **71** taxa in this category.

The fourth list included in this report is the Rare Non-Vascular Plant List. This list contains information on the legal and biological status of **95** taxa thought to be rare in the state of Virginia. The lichens, liverworts, and mosses listed herein represent an attempt at designating imperiled species within this often-neglected group. The list is currently small compared to the vascular plant lists because the taxonomy and distributions of non-vascular plants are generally poorly known in Virginia at this time (with some exceptions).

Natural Heritage Resource lists are necessarily dynamic and are revised annually, with updates occurring as data become available. Such revisions assure the most current knowledge of the status of Virginia's plants. Taxa are added to the list when it is determined that they have become rare or threatened to such an extent that their continued existence in Virginia is in jeopardy. Plants are deleted from the list when data indicate they are common and do not warrant priority conservation efforts.

If you have information which could refine this list, please contact DCR-DNH staff botanist John Townsend at (804) 225-4855 (email: john.townsend@dcr.virginia.gov) or by mailing the Rare Species Sighting Form found at the end of this document.

All plants which are officially protected by federal or state endangered species acts are included in these lists. The Office of Plant Protection within the Virginia Department of Agriculture and Consumer Services (VDACS) has regulatory responsibility for the listing and protection of Virginia's endangered and threatened plants and insects under the Virginia Endangered Plant and Insect Species Act, as amended (Section 3.1 -1020 through 1030, *Code of Virginia*). The Act provides for the official listing and recovery of endangered and threatened plant and insect species in Virginia. The Act also establishes a permit system for collection of listed species. As of 2013, there were 26 state-listed plant species. A memorandum of agreement between DCR-DNH and VDACS facilitates data transfer between agencies and allows for DCR-DNH to nominate species for listing by VDACS.

Federally listed species are protected by the Endangered Species Act of 1973, as amended. The U.S. Department of the Interior's Fish and Wildlife Service administers the Act, listing and protecting federally endangered and threatened species. As of 2015, there were 16 plant species federally listed as endangered or threatened which occur or formerly occurred in Virginia.

The Virginia Department of Conservation and Recreation, Virginia Department of Agriculture and Consumer Services, and U. S. Fish and Wildlife Service work cooperatively to insure the continued survival of Virginia's diverse flora and other elements of natural diversity. The Division of Natural Heritage also works closely with other state and federal agencies, local governments, conservation organizations, and other organizations and individuals to seek adequate protection of Virginia's natural heritage.

FORMAT OF LISTS

Lists for each category (vascular plant lists, liverwort list, etc.) are alphabetized by scientific name. Each list has an identical format which presents six fields: scientific name, common name, global rank, state rank, federal status, and state status. To help interpret the list, a brief explanation of each field may be found on the following page.

Column 1. Scientific name:
Nomenclature for vascular plants almost exclusively follows Weakley, A.S., J.C. Ludwig, and J.F. Townsend, 2012. *Flora of Virginia*. Bland Crowder, ed. Foundation of the Flora of Virginia Project, Inc., Richmond. Fort Worth: Botanical Research Institute of Texas Press. A line is provided below the scientific name to provide synonyms when other names are used in popular botanical references.

Nomenclature for lichens follows Esslinger, T.L. 2014. A cumulative checklist for the lichen-forming, lichenicolous and allied fungi of the continental United States and Canada. North Dakota State University: http://www.ndsu.edu/pubweb/~esslinge/chcklst/chcklst7.htm (First Posted 1 December 1997, Most Recent Version (#19) 23 March 2014), Fargo, North Dakota.

Nomenclature for liverworts follows the Field Museum taxonomy module, located at:
http://emuweb.fieldmuseum.org/botany/taxonomic.php?_ga=1.125124173.613149090.1423754725

Nomenclature for mosses follows volumes 27 and 28 of Flora of North America, North of Mexico (Bryophytes, Part 1 and Part 2).

Column 2. Common name:
A common name is provided for the convenience of the user. Common names for plants follow the *Flora of Virginia*.

Column 3. Global rank:
Global ranks are assigned by a consensus of the network of natural heritage programs, scientific experts, and The Nature Conservancy to designate a rarity rank based on the range-wide status of a species or variety. This system was developed by The Nature Conservancy and is widely used by other agencies and organizations as the best available scientific and objective assessment of a taxon's rarity and level of threat to its existence. The ranks are assigned after considering a suite of factors, including number of occurrences, number of individuals, and severity of threats.

G1 = **Critically Imperiled** - At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2 = **Imperiled** - At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 = **Vulnerable** - At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 = **Apparently Secure** - Uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 = **Secure** – Common, widespread and abundant.

GH = **Possibly Extinct** - Missing; known from only historical occurrences but still some hope of rediscovery.

GX = **Presumed Extinct** - Not located despite intensive searches and virtually no likelihood of rediscovery.

GU = **Unrankable** - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. Whenever possible, the most likely rank is assigned and the question mark qualifier is added (e.g., G2?) to express uncertainty, or a range rank (e.g., G2G3) is used to delineate the range of uncertainty.

G_? = **Inexact Numeric Rank** - Denotes inexact numeric rank (e.g., G3?).

G_Q = **Questionable taxonomy** - Taxonomic distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower conservation priority (e.g., G3Q).

G_T_ = **Infraspecific Taxa** - Signifies the rank of a subspecies or variety. For example, the rank G5T1 would be assigned to a very rare and localized variety of an otherwise widespread and common taxon.

GNR = **Unranked** – Global rank not yet assessed.

GNA = **Not applicable** – A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

Column 4. State rank:
State ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Virginia. For example, whereas a plant which is endemic to Virginia (found nowhere else) will have the same global and state ranks, a plant which may be common in the northeastern United States, but only known from a few occurrences in Virginia will have different global and state ranks. By comparing the global and state ranks, the status, rarity, and the urgency of conservation needs can be ascertained.

S1 = Critically Imperiled - At very high risk of extirpation from the state due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

S2 = Imperiled - At high risk of extirpation from the state due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

S3 = **Vulnerable** - At moderate risk of extirpation from the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

S4 = Apparently Secure - Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 = Secure – Common, widespread and abundant.

SH = Possibly Extirpated - Known only from historical occurrences but still some hope of rediscovery.

SX = **Presumed Extirpated** - Not located despite intensive searches and virtually no likelihood of rediscovery.

SU = **Unrankable** - Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

S_? = **Inexact Numeric Rank** - Denotes inexact numeric rank (e.g., S3?).

SNR = **Unranked** – State conservation status not yet assessed.

SNA = **Not Applicable** - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.

Column 5. Federal Status:
Federal Status is determined by the U. S. Fish and Wildlife Service. This includes all species and varieties which are listed as endangered or threatened by the U. S. government and receive protection under the federal Endangered Species Act. The list also notes those taxa which are proposed for listing or are candidates for listing.

LE = **Listed Endangered** - A taxon is threatened with extinction throughout all or a significant portion of its range.

LT = **Listed Threatened** - A taxon is likely to become endangered in the foreseeable future.

PE = **Proposed Endangered** - A taxon is proposed for listing as endangered.

PT = **Proposed Threatened** - A taxon is proposed for listing as threatened.

C = **Candidate** - There is enough available information to propose the taxon for listing, but listing is "precluded by other pending proposals of higher priority". The U.S. Fish and Wildlife Service is "directed to make prompt use of the emergency listing if the well-being of any such species is at significant risk."

_* = An * following the status denotes that the species or variety is possibly extinct.

Column 6. State Status:
State status indicates those plants which are listed as state endangered or threatened under the authority of the Virginia Department of Agriculture and Consumer Services.

LE = **Listed Endangered**

LT = **Listed Threatened**

PE = **Proposed Endangered**

PT = **Proposed Threatened**

C = **Candidate for listing as threatened or endangered**

ACKNOWLEDGEMENTS

If not for the hard work of many biologists, these plant lists could not accurately reflect our current understanding of the Virginia flora. On the staff of the Division of Natural Heritage, Allen Belden, Gary Fleming, Chris Ludwig, Nancy Van Alstine, Karen Patterson, Kristin Taverna, Irvine Wilson, and Darren Loomis have provided many comments to refine the content of the lists. In addition to Heritage staff, members of the Virginia Botanical Associates have contributed greatly to our understanding of the Virginia flora via the continuously updated Digital Atlas of the Virginia Flora and through numerous personal communications.

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GENERA INDEX

If you can't find:	**Look under:**
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Agropyron	*Elymus*
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Arabis	*Turritis*
Arenaria	*Honckenya*
Arenaria	*Minuartia*
Arenaria	*Moehringia*
Armoracea	*Neobeckia*
Asarum	*Hexastylis*
Aster	*Eurybia*
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Bumelia	*Sideroxylon*
Cacalia	*Arnoglossum*
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Psoralea	*Pediomelum*
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Schrankia	*Mimosa*
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Senecio	*Packera*
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Solidago	*Oligoneuron*
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Triodia	*Tridens*
Tofieldia	*Triantha*
Trichomanes	*Crepidomanes*
Trichomanes	*Vandenboschia*
Uniola	*Chasmanthium*
Verbena	*Stylodon*
Xanthoxylum	*Zanthoxylum*
Zigadenus	*Stenanthium*

PART ONE:

RARE VASCULAR PLANT LIST

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Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Abies balsamea* (L.) P. Mill**	**Balsam fir**	**G5**	**S1**		
***Abies fraseri* (Pursh) Poir.**	**Fraser fir**	**G2**	**S1**		
***Acmispon helleri* (Britt.) A.A. Heller**	**Carolina Prairie-trefoil**	**G3**	**S1**		
syn: *Lotus helleri* Britton					
***Actaea rubifolia* (Kearney) Kartesz**	**Appalachian Black Cohosh**	**G3**	**S1**		
syn: *Cimicifuga rubifolia* Kearney					
***Adiantum capillus-veneris* L.**	**Venus'-hair Fern**	**G5**	**SH**		
***Aeschynomene virginica* (L.) B.S.P.**	**Sensitive Joint-vetch**	**G2**	**S2**	**LT**	**LT**
***Agalinis auriculata* (Michx.) Blake**	**Earleaf False Foxglove**	**G3**	**S1**		
syn: *Tomanthera auriculata* (Michx.) Raf.					
***Aletris aurea* Walt.**	**Golden Colicroot**	**G5**	**S1**		
***Allium allegheniense* Small**	**Allegheny Onion**	**G3?**	**S1**		
Under *A. cernuum* Roth in Fernald (1950) and Radford *et al.* (1968)					
***Allium oxyphilum* Wherry**	**Shale Barren Nodding Onion**	**G2**	**S1**		
***Alnus incana* (L.) Moench ssp. *rugosa* (Du Roi) Clausen**	**Speckled Alder**	**G5T5**	**S2**		
syn: *A. rugosa* (Du Roi) Spreng.					
***Amaranthus pumilus* Raf.**	**Sea-beach Amaranth**	**G2**	**S1**	**LT**	**LT**
***Amelanchier nantucketensis* Bickn.**	**Nantucket Shadbush**	**G3Q**	**S1**		
***Amphicarpum amphicarpon* (Pursh) Nash**	**Pine-barrens Peanut Grass**	**G4**	**S1**		
***Anagallis minima* (L.) Krause**	**Chaffweed**	**G5**	**SH**		
syn: *Centunculus minimus L.*					
***Anaphalis margaritacea* (L.) Benth. & Hook. f.**	**Pearly Everlasting**	**G5**	**S1**		
***Andropogon mohrii* (Hack.) Hack. ex Vasey**	**Mohr's Bluestem**	**G4?**	**SH**		
***Anemone berlandieri* Pritz.**	**Eastern Prairie Anemone**	**G4?**	**S1**		
***Anemone canadensis* L.**	**Canada Anemone**	**G5**	**SH**		
***Anthoxanthum hirtum* (Shrank) Y. Schouten & Veldkamp**	**Holy Grass**	**G5**	**S1**		
syn: *Hierochloe odorata* (L.) Beauv. ssp. *odorata*					
***Arabis patens* Sullivant**	**Spreading Rock Cress**	**G3**	**S1**		
***Arabis pycnocarpa* M. Hopkins var. *adpressipilis* M. Hopkins**	**Hairy Rock Cress**	**G5T4Q**	**S1S2**		
syn: *Arabis hirsuta* (L.) Scop. var. *adpressipilis* (M. Hopkins) Rollins					
***Aralia hispida* Vent.**	**Bristly Sarsaparilla**	**G5**	**S2**		
***Arctostaphylos uva-ursi* (L.) Spreng.**	**Bearberry**	**G5**	**S1**		
Arenaria lanuginosa* (Michx.) Rohrb. var. *lanuginosa	**Spreading Sandwort**	**G5T5**	**SH**		
***Arethusa bulbosa* L.**	**Dragon's-mouth**	**G5**	**SH**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Arnoglossum reniforme* (Hooker) H.E. Robins.** syn: *Arnoglossum muhlenbergii* (Schultz-Bip.) H.E. Robinson	**Great Indian-plantain**	**G4**	**S2**		
***Asclepias longifolia* Michx.**	**Long-leaf Milkweed**	**G4G5**	**S1**		
***Asclepias purpurascens* L.**	**Purple Milkweed**	**G5?**	**S2**		
***Asclepias rubra* L.**	**Red Milkweed**	**G4G5**	**S2**		
***Asclepias tuberosa* L. var. *rolfsii* (Britt. ex Vail) Woods.**	**Sandhills Butterfly-weed**	**G5TNR**	**S1**		
***Asplenium bradleyi* D.C. Eaton**	**Bradley's Spleenwort**	**G4**	**S2**		
Astragalus distortus* Torr. & Gray var. *distortus	**Ozark Milkvetch**	**G5T5?**	**SH**		
***Astragalus neglectus* (Torr. & Gray) Sheldon**	**Cooper's Milkvetch**	**G4**	**S2**		
***Atriplex glabriuscula* Edmondston**	**Maritime Orach**	**G5**	**SH**		
***Bacopa caroliniana* (Walt.) B.L. Robins.**	**Blue Water-hyssop**	**G4G5**	**SH**		
***Bacopa innominata* (G.Maza) Alain** Virginia material formerly named *B. stragula* Fern.	**Tropical Water-hyssop**	**G3G5**	**S2**		
***Bacopa rotundifolia* (Michx.) Wettst.** Virginia material formerly named *B. simulans* Fern.	**Round-leaf Water-hyssop**	**G5**	**SH**		
***Baptisia albescens* Small** Treated as *B. alba* (L.) R. Brown in Fernald (1950)	**Narrow-pod White Wild Indigo**	**G4**	**S1**		
***Baptisia cinerea* (Raf.) Fern. & Schub.**	**Gray-hairy Wild Indigo**	**G3G4**	**SH**		
***Bartonia verna* (Michx.) Raf. Ex Bart.**	**Spring Bartonia**	**G5?**	**S1**		
***Betula lenta* L. var. *uber* Ashe** *syn: Betula uber* (Ashe) Fern.	**Virginia Roundleaf Birch**	**G5T1Q**	**S1**	**LT**	
***Betula papyrifera* Marshall** Virginia material has traditionally been treated as *Betula cordifolia* but most populations closely resemble *B. papyrifera.* They are under study.	**Paper Birch**	**G5**	**S2**		
***Betula populifolia* Marsh.**	**Gray Birch**	**G5**	**S1**		
***Boechera dentata* (Raf.) Al-Shehbaz & Zarruchi** syn: *Arabis shortii* (Fern.) Gleason	**Short's Rock Cress**	**G5**	**S1**		
***Boechera serotina* (Steele) Windham & Al-Shehbaz** syn: *Arabis serotina* Steele	**Shale Barren Rock Cress**	**G2**	**S2**	**LE**	**LT**
***Bolboschoenus fluviatilis* (Torr.) J. Sojak** syn: *Schoenoplectus fluviatilis* (Torr.) M.T. Strong	**River Bulrush**	**G5**	**S2**		
***Boltonia asteroides* (L.) L'Her var. *glastifolia* (Hill) Fern.**	**Eastern Doll's-daisy**	**G5TNR**	**S2**		
***Boltonia montana* J.F. Townsend & V. Karaman-Castro**	**Valley Doll's-daisy**	**G1G2**	**S1**		**LE**

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Botrychium lanceolatum* (Gmel.) Angstr. var. *angustisegmentum* Pease & Moore**	**Triangle Grape Fern**	**G5T4**	**SH**		
Botrychium simplex* E. Hitchc. var. *simplex	**Dwarf Gape Fern**	**G5T5**	**S1**		
***Bromus ciliatus* L.**	**Fringed Brome Grass**	**G5**	**S1**		
***Bromus kalmii* Gray**	**Arctic Brome**	**G5**	**S1**		
***Buchnera americana* L.**	**American Bluehearts**	**G5?**	**S1S2**		
***Buckleya distichophylla* (Nutt.) Torr.**	**Piratebush**	**G3**	**S2**		
***Burmannia biflora* L.**	**Violet Burmannia**	**G4G5**	**SH**		
***Cabomba caroliniana* Gray**	**Carolina Fanwort**	**G3G5**	**S1S2**		
***Calamovilfa brevipilis* (Torr.) Scribn.**	**Pine Barren Sandreed**	**G4**	**S1**		
***Calopogon pallidus* Chapman**	**Pale Grass-pink**	**G4G5**	**S1**		
***Calopogon tuberosus* (L.) B.S.P.**	**Tuberous Grass-pink**	**G5**	**S1S2**		
***Calycanthus floridus* L.**	**Sweet-shrub**	**G5**	**S1**		
***Calystegia catesbeiana* Pursh**	**Catesby's False Bindweed**	**G3**	**S1**		
***Camassia scilloides* (Raf.) Cory**	**Wild Hyacinth**	**G4G5**	**S1**		
***Campanula rotundifolia* L.**	**Harebell**	**G5**	**S1**		
***Cardamine clematitis* Shuttlw. ex Gray**	**Mountain Bittercress**	**G3**	**S1**		
***Cardamine dissecta* (Leavenworth) Al-Shehbaz**	**Fork-leaf Toothwort**	**G4?**	**S1**		
***Cardamine flagellifera* O.E. Schulz**	**Blue Ridge Bittercress**	**G3**	**S1**		
***Cardamine micranthera* Rollins**	**Small-anthered Bittercress**	**G2**	**S2**	**LE**	**LE**
***Cardamine pratensis* L.** Only native Virginia populations are monitored	**Cuckoo-flower**	**G5**	**S1**		
***Carex aestivaliformis* Mackenz.** syn: *Carex x aestivaliformis* Mackenz.	**Small-fruited Summer Sedge**	**GNA**	**S1**		
***Carex aquatilis* Wahlenb**	**Aquatic sedge**	**G5**	**S1**		
***Carex arctata* Boott ex Hook.**	**Black Sedge**	**G5**	**S1**		
***Carex atherodes* Spreng.**	**Awned Sedge**	**G5**	**S1**		
***Carex barrattii* Schwein. & Torr.**	**Barratt's Sedge**	**G4**	**S2**		
***Carex bebbii* Olney ex Fern.**	**Bebb's Sedge**	**G5**	**S1**		
***Carex buxbaumii* Wahlenb.**	**Brown Bog Sedge**	**G5**	**S2**		
***Carex conoidea* Schkuhr ex Willd.**	**Field Sedge**	**G5**	**S1S2**		
***Carex crawei* Dewey**	**Crawe's Sedge**	**G5**	**S2**		
***Carex cristatella* Britt.**	**Crested Sedge**	**G5**	**S1**		
***Carex crus-corvi* Shuttlw. ex Kunze**	**Crowfoot Sedge**	**G5**	**S2**		
***Carex davisii* Schwein. & Torr.**	**Davis's Sedge**	**G4**	**S1**		
***Carex decomposita* Muhl.**	**Cypress-knee Sedge**	**G3G4**	**S1**		
***Carex flava* L.**	**Yellow Sedge**	**G5**	**S1**		
***Carex interior* Bailey**	**Inland Sedge**	**G5**	**S1S2**		
***Carex juniperorum* Catling, Reznicek, & Crins**	**Juniper Sedge**	**G3**	**S1**		**LE**
***Carex lacustris* Willd.**	**Lake-shore Sedge**	**G5**	**S1**		
***Carex lasiocarpa* Ehrh var. *americana* Fern.** Does not include *C. lanuginosa* Michx.	**Slender Sedge**	**G5T5**	**S1**		
***Carex lupuliformis* Sartwell ex Dewey**	**False Hop sedge**	**G4**	**S1S2**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Carex manhartii* Bryson**	**Blue Ridge Purple Sedge**	**G3G4**	**S1**		
***Carex ormostachya* Wieg.**	**Necklace Spike Sedge**	**G4G5**	**S1**		
***Carex pallescens* L.**	**Pale Sedge**	**G5**	**S1**		
***Carex polymorpha* Muhl.**	**Variable Sedge**	**G3**	**S2**		
***Carex prairea* Dewey ex Wood**	**Prairie Sedge**	**G5**	**S1**		
***Carex reniformis* (Bailey) Small**	**Kidney Sedge**	**G4?**	**S1**		
***Carex roanensis* F.J. Herm**	**Roan Mountain Sedge**	**G2G3**	**S2**		
***Carex schweinitzii* Dewey ex Schwein.**	**Schweinitz's Sedge**	**G3G4**	**S1**		
***Carex silicea* Olney**	**Sea-beach Sedge**	**G5**	**S1**		
***Carex* sp. 2 *sp. nov*.** Mountain species in Section *Acrocystis*	**A sedge**	**GNR**	**S1**		
***Carex sterilis* Willd.**	**Sterile Sedge**	**G4G5**	**S1**		
***Carex straminea* Willd. ex Schkuhr** Does not include *C. hormathodes* Fern.	**Straw Sedge**	**G5**	**S1**		
***Carex utriculata* Boott** Treated as *C. rostrata* Stokes in Fernald (1950)	**Beaked Sedge**	**G5**	**S1**		
***Carex vesicaria* L.**	**Inflated Sedge**	**G5**	**S1S2**		
***Carex vestita* Willd.**	**Velvet Sedge**	**G5**	**S2**		
***Carphephorus bellidifolius* (Michx.) Torr. & Gray**	**Sandy-woods Chaffhead**	**G4**	**S1S2**		
***Carphephorus tomentosus* (Michx.) Torr. & Gray**	**Woolly Chaffhead**	**G4**	**S1**		
***Carya carolinae-septentrionalis* (Ashe) Engl. & Graebn.**	**Carolina Shagbark Hickory**	**G5?**	**S1**		
Cerastium velutinum* Raf. var. *velutinum syn: *Cerastium arvense* L. ssp. *velutinum* (Raf.) Ugborogho.	**Field Chickweed**	**G5T4?**	**S1S2**		
***Cheilanthes alabamensis* (Buckl.) Kunze**	**Alabama Lip Fern**	**G4G5**	**S1**		
***Cheilanthes castanea* Maxon**	**Chestnut Lip Fern**	**G5?**	**S2**		
***Cheilanthes feei* T. Moore**	**Slender Lip Fern**	**G5**	**S1**		
***Chelone cuthbertii* Small**	**Cuthbert's Turtlehead**	**G3**	**S2**		
***Chelone obliqua* L.**	**Red Turtlehead**	**G4**	**S1**		
***Chenopodium foggii* H.A. Wahl**	**Fogg's Goosefoot**	**G2G3**	**S1?**		
***Chrysopsis gossypina* (Michx.) Ell.**	**Cottony Golden-aster**	**G5**	**S1**		
***Cicuta bulbifera* L.**	**Bulb-bearing Water-hemlock**	**G5**	**SH**		
***Cirsium altissimum* (L.) Hill**	**Tall Thistle**	**G5**	**S1**		
***Cirsium carolinianum* (Walt.) Fern. & Schub.**	**Carolina Thistle**	**G5**	**S1**		
***Cirsium nuttallii* DC.**	**Nuttall's Thistle**	**G5**	**SH**		
***Cirsium repandum* Michx.**	**Sandhill Thistle**	**G5**	**SH**		
***Cirsium virginianum* (L.) Michx.**	**Virginia Thistle**	**G3**	**S2**		
***Cladium jamaicense* Crantz**	**Sawgrass**	**G5T5**	**S1S2**		
***Cleistesiopsis bifaria* (Fern.) Pansarin & F. Barros**	**Small Spreading Pogonia**	**G4?**	**S2**		
***Cleistesiopsis divaricata* (L.) Pansarin & F. Barros**	**Large Spreading Pogonia**	**G4**	**S1**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Cleistesiopsis oricamporum* P.M. Brown**	**Small Coastal Plain Spreading Pogonia**	**G3?**	**S1**		
***Clematis addisonii* Britt.**	**Addison's Leatherflower**	**G1?**	**S1?**		
***Clematis catesbyana* Pursh** Under *C. virginiana* L. in Radford et al. (1968)	**Satin-curls**	**G4G5**	**S1**		
Clematis occidentalis* (Hornem.) DC. var. *occidentalis syn: *C. verticillatus* DC.	**Purple Clematis**	**G5T5**	**S1**		
***Clematis viticaulis* Steele**	**Millboro Leatherflower**	**G1**	**S1S2**		**LT**
***Clinopodium arkansanum* (Nutt.) House** often confused with *Calamintha glabella* (Michx.) Benth. syn: *Satureja arkansana* (Nutt.) Briquet	**Limestone Calamint**	**G5**	**SH**		
***Cocculus carolinus* (L.) A. DC.** Only native Virginia populations are monitored	**Carolina Coralbead**	**G5**	**S1**		
***Coelorachis rugosa* (Nutt.) Nash** syn: *Manisuris rugosa* (Nutt.) Kuntze	**Wrinkled Jointgrass**	**G5**	**S1**		
***Collinsia verna* Nutt.**	**Eastern Blue-eyed Mary**	**G5**	**S1**		
***Collinsonia verticillata* Baldw.**	**Whorled Horsebalm**	**G3G4**	**S1**		
***Conioselinum chinense* (L.) B.S.P.**	**Hemlock Parsley**	**G5**	**S1**		
***Corallorhiza bentleyi* Freudenstein**	**Bentley's Coralroot**	**G2**	**S2**		**LE**
***Corallorhiza maculata* (Raf.) Raf. var. *occidentalis* (Lindl.) Cockerell**	**Western Spotted Coralroot**	**G5T3T5**	**SH**		
***Corallorhiza trifida* Châtelain**	**Early Coralroot**	**G5**	**S1**		
***Coreopsis delphiniifolia* Lam.**	**Larkspur Coreopsis**	**G3?Q**	**S1**		
***Coreopsis falcata* Boynton**	**Pool Coreopsis**	**G4G5**	**S1**		
***Coreopsis linifolia* Nutt** syn: *C. oniscicarpa Fern.*	**Savanna Coreopsis**	**G4Q**	**S1**		
***Cornus canadensis* L.**	**Bunchberry**	**G5**	**S1**		
***Cornus obliqua* (Raf.) J.S. Wilson**	**Silky Dogwood**	**G5**	**S1**		
***Cornus rugosa* Lam.**	**Round-leaf Dogwood**	**G5**	**S1**		
***Crataegus calpodendron* (Ehrh.) Medik.**	**Pear Hawthorn**	**G5**	**S1**		
Crataegus mollis* Scheele var. *mollis	**Downy Hawthorn**	**G5T5**	**S1**		
***Crataegus succulenta* Schrad. ex Link var. *neofluvialis* (Ashe) Palmer**	**New River Hawthorn**	**G5TNR**	**SH**		
Crataegus succulenta* Schrad. ex Link var. *succulenta	**Fleshy Hawthorn**	**G5T5**	**S1**		
***Crocanthemum bicknellii* Fern. (Barnhart)**	**Plains Frostweed**	**G5**	**S1**		
***Crocanthemum propinquum* Bickn. (Bickn.)**	**Low Frostweed**	**G4**	**S1**		
***Crotalaria purshii* DC.**	**Pursh's Rattlebox**	**G5**	**S1**		
***Crotalaria rotundifolia* Walt. ex J.F. Gmel. var. *vulgaris* Windler** syn: *C. angulata* P. Mill.	**Low Rattlebox**	**G5TNR**	**SH**		
***Ctenium aromaticum* (Walt.) Wood**	**Toothache Grass**	**G5**	**S1**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Cuscuta cephalanthi* Engelm.**	**Buttonbush Dodder**	**G5**	**S1**		
***Cuscuta coryli* Engelm.**	**Hazel Dodder**	**G5?**	**S2**		
***Cuscuta indecora* Choisy**	**Big-seed Alfalfa Dodder**	**G5**	**S1**		
***Cuscuta polygonorum* Engelm.**	**Smartweed Dodder**	**G5**	**S1**		
***Cuscuta rostrata* Shuttlw. ex Engelm. & Gray**	**Beaked Dodder**	**G4**	**S1S2**		
***Cuthbertia graminea* Small**	**Grasslike Roselings**	**G5**	**S1**		
syn: *Tradescantia rosea* Vent. var. *graminea* (Small) E.S. Anderson & Woods					
syn: *Callisia graminea* (Small) G. Tucker					
***Cyperus acuminatus* Torr. & Hook. ex Torr.**	**Short-point flatsedge**	**G5**	**S1**		
***Cyperus dentatus* Torr.**	**Toothed Flatsedge**	**G4**	**S1**		
***Cyperus diandrus* Torr.**	**Umbrella Flatsedge**	**G5**	**S1**		
***Cyperus granitophilus* McVaugh**	**Granite Flatsedge**	**G3G4Q**	**S1**		
***Cyperus houghtonii* Torr.**	**Houghton's Flatsedge**	**G4?**	**SH**		
***Cyperus odoratus* L. var. *engelmannii* (Steud.) R. Carter**	**Slender Sand Sedge**	**G5T4Q**	**S1**		
***Cyperus plukenetii* Fern.**	**Plukenet's Flatsedge**	**G5**	**S2**		
***Cypripedium candidum* Muhl. ex Willd.**	**Small White Lady's-slipper**	**G4**	**S1**		
***Cypripedium kentuckiense* C.F. Reed**	**Kentucky Lady's-slipper**	**G3**	**S1**		
***Cypripedium reginae* Walt.**	**Showy Lady's-slipper**	**G4G5**	**S1**		
***Cystopteris tennesseensis* Shaver**	**Tennessee Bladder Fern**	**G5**	**S1**		
***Dasistoma macrophyllum* (Nutt.) Raf.**	**Mullein Foxglove**	**G4**	**S1**		
***Deschampsia cespitosa* (L.) Beauv.**	**Tufted Hairgrass**	**G5**	**S1**		
***Desmodium canadense* (L.) DC.**	**Showy Tick-trefoil**	**G5**	**S1**		
Desmodium cuspidatum* (Muhl. *ex* Willd.) DC. ex Loud. var. *cuspidatum	**Toothed Tick-trefoil**	**G5T5?**	**S2**		
***Desmodium ochroleucum* M.A. Curtis ex Canby**	**Cream-flowered Tick-trefoil**	**G2**	**S1**		
***Desmodium sessilifolium* (Torr.) Torr. & Gray**	**Sessile-leaf Tick-trefoil**	**G5**	**S2**		
***Desmodium strictum* (Pursh) DC.**	**Pineland Tick-trefoil**	**G4**	**S2**		
***Desmodium tenuifolium* Torr. & Gray**	**Slim-leaf Tick-trefoil**	**G4**	**S1**		
***Diamorpha smallii* Britt. ex Small**	**Small's Stonecrop**	**G4**	**S1**		
syn: *Sedum smallii* (Britton ex Small) Ahles					
***Dichanthelium caerulescens* (Hack. ex Hitchc.) Correll**	**Blue Panic Grass**	**G2G3**	**S1**		
syn: *Panicum caerulescens* Hack ex A.S. Hitchc.					
Under *D. dichotomum* (L.) Gould var. *dichotomum* in Kartesz (1999)					
***Dichanthelium consanguineum* (Kunth) Gould & C. A. Clark**	**Blood Panic Grass**	**G5**	**S1S2**		
syn: *Panicum consanguineum* Kunth					

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***Dichanthelium cryptanthum* (Ashe) LeBlond** syn: *Panicum scabriusculum* (Ell.) Gould & Clark var. *cryptanthum* (Ashe) Gleason	**Hidden-flowered Panic Grass**	**G3G4Q**	**S1**		
***Dichanthelium curtifolium* (Nash) LeBlond** syn: *Dichanthelium ensifolium* (Baldw. ex Ell.) Gould ssp. *curtifolium* (Nash) Freckmann & LeLong	**Short-leaved Witchgrass**	**G3?**	**S1**		
Dichanthelium ovale* (Ell.) Gould & C. A. Clark var. *ovale syn: *Panicum ovale* Ell. var. *ovale*	**Oval-flowered Panic Grass**	**G5T5**	**S1?**		
***Dichanthelium sp.* 12** Undescribed taxon known from shale woodlands in Bath County	**A Panic Grass**	**GNR**	**S1**		
***Dichanthelium sp.* 13** Undescribed taxon known from mafic woodlands in Halifax County	**A Panic Grass**	**GNR**	**S1**		
Dichanthelium strigosum* (Muhl. ex Ell.) Freckmann var. *strigosum syn: *Panicum strigosum* Muhl. ex Ell. var. *strigosum*	**Rough-hair Panic Grass**	**G5T5**	**SH**		
***Didiplis diandra* (Nutt. ex DC.) Wood** syn: *Peplis diandra* Nutt. ex DC.	**Water-purslane**	**G5**	**S1**		
***Digitaria cognata* (J.A. Schultes) Pilger** syn: *Leptoloma cognata* (J.A. Schultes) Chase	**Fall Witch Grass**	**G5**	**S1**		
***Digitaria serotina* (Walt.) Michx.**	**Dwarf Crabgrass**	**G5?**	**S1**		
***Drymocallis arguta* (Pursh) Rydberg** syn: *Potentilla arguta* Pursh	**Tall Cinquefoil**	**G5**	**S1**		
Dryopteris clintoniana (D.C. Eaton) Dowell	**Clinton's Wood Fern**	**G5**	**SH**		
***Echinacea laevigata* (C.L. Boynt. & Beadle) Blake**	**Smooth Coneflower**	**G2G3**	**S2**	**LE**	**LT**
***Echinocystis lobata* (Michx.) Torr. & Gray**	**Wild Cucumber**	**G5**	**SH**		
***Echinodorus tenellus* (Mart.) Buch.** syn: *Echinodorus parvulus* Engelm.	**Dwarf Burhead**	**G5?**	**S1**		
***Elatine minima* (Nutt.) Fisch. & C.A. Mey.**	**Small Waterwort**	**G5**	**S1**		
***Eleocharis baldwinii* (Torr.) Chapman**	**Baldwin's Spikerush**	**G4G5**	**S1**		
***Eleocharis bifida* S.G. Smith**	**Glades Spikerush**	**G3G4**	**S1**		
Eleocharis compressa* Sullivant var. *compressa	**Flattened Spikerush**	**G4TNR**	**S2**		
***Eleocharis elliptica* Kunth**	**Elliptic Spikerush**	**G5**	**S1**		
***Eleocharis equisetoides* (Ell.) Torr.**	**Horsetail Spikerush**	**G4**	**S1**		
***Eleocharis intermedia* J.A. Schultes**	**Matted Spikerush**	**G5**	**S1**		
***Eleocharis melanocarpa* Torr.**	**Black-fruited Spikerush**	**G4**	**S2**		
***Eleocharis radicans* (A. Dietr.) Kunth**	**Rooted Spikerush**	**G5**	**SH**		
***Eleocharis robbinsii* Oakes**	**Robbins' Spikerush**	**G4G5**	**S1**		
***Eleocharis tricostata* Torr.**	**Three-angled Spikerush**	**G4**	**S1**		

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***Eleocharis uniglumis* (Link) Schultes** formerly listed as *Eleocharis halophila*	**One-scale Spikerush**	**G5**	**S1**		
***Eleocharis vivipara* Link**	**Viviparous Spikerush**	**G5**	**S1**		
***Eleocharis wolfii* (Gray) Gray ex Britt.**	**Wolf's Spikerush**	**G3G5**	**S1**		
Elymus canadensis* L. var. *canadensis	**Nodding Wild Rye**	**G5TNR**	**S1**		
Elymus trachycaulus* (Link) Gould ex Shinners ssp. *trachycaulus syn: *Agropyron trachycaulum* (Link) Malte ex H.F. Lewis	**Slender Wheatgrass**	**G5T5**	**S1**		
***Enemion biternatum* Raf.** syn: *Isopyrum biternatum* (Raf.) Torr. & Gray	**False Rue-anemone**	**G5**	**S1**		
Epilobium ciliatum* Raf. ssp. *ciliatum	**American Willow-herb**	**G5T5**	**S1**		
***Epilobium leptophyllum* Raf.**	**Bog Willow-herb**	**G5**	**S2S3**		
***Equisetum fluviatile* L.**	**Water Horsetail**	**G5**	**S1**		
***Equisetum sylvaticum* L.**	**Woodland Horsetail**	**G5**	**S1**		
***Erigeron vernus* (L.) Torr. & Gray**	**White-top Fleabane**	**G5**	**S2**		
***Eriocaulon aquaticum* (Hill) Druce**	**Seven-angled Pipewort**	**G5**	**S1**		
Eriocaulon decangulare* L. var. *decangulare	**Ten-angled Pipewort**	**G5T5?**	**S2**		
***Eriocaulon parkeri* B.L. Robins.**	**Parker's Pipewort**	**G3**	**S2**		
***Eryngium integrifolium* Walt.**	**Blue-flower Eryngo**	**G5**	**S1**		
Eryngium yuccifolium* Michx. var. *yuccifolium	**Northern Rattlesnake-master**	**G5T5**	**S2**		
Erysimum capitatum* (Dougl. ex Hook.) Greene var. *capitatum All Virginia *E. capitatum* is var. *capitatum*	**Western Wallflower**	**G5T5**	**S2**		
***Erythronium albidum* Nutt.**	**White Trout Lily**	**G5**	**S2**		
***Eupatorium linearifolium* Walter**	**Narrow-leaf Bushy Thoroughwort**	**G5**	**SH**		
***Eupatorium maritimum* E.E. Schilling** Newly named taxon, formerly lumped with *Eupatorium anomalum* Nash	**A Eupatorium**	**G2?**	**S1**		
***Euphorbia bombensis* Jacquin** syn: *Chamaesyce bombensis* (Jacquin) Dugand	**Southern Seaside Spurge**	**G4G5**	**S2**		
***Euphorbia exserta* (Small) Coker**	**Maroon Sandhills Spurge**	**G4?**	**S1**		
***Euphorbia purpurea* (Raf.) Fern.**	**Glade Spurge**	**G3**	**S2**		
***Eurybia radula* (Ait.) Nesom** syn: *Aster radula Ait.*	**Low Rough Aster**	**G5**	**S1**		
***Eurybia surculosa* (Michx) Nesom** syn: *Aster surculosus Michx.*	**Creeping Aster**	**G4G5**	**S1S2**		
Eutrochium maculatum* (L.) E.E. Lamont var. *maculatum syn: *Eupatorium maculatum* L. var. *maculatum*	**Spotted Joe-pye-weed**	**G5T5**	**S1**		
***Filipendula rubra* (Hill) B.L. Robins.**	**Queen-of-the-Prairie**	**G4G5**	**S2**		

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***Fimbristylis perpusilla* Harper *ex* Small & Britt.**	**Harper's Fimbry**	**G2**	**S1**		**LE**
Fimbristylis puberula* (Michx.) Vahl var. *puberula	**Hairy Fimbry**	**G5T5**	**S1**		
Under *F. spadicea* (L.) Vahl. in Radford et al. (1968)					
Under *F. caroliniana* (Lam.) Fern. in Fernald (1950)					
All Virginia *F. puberula* is var. *puberula*					
***Fleischmannia incarnata* (Walt.) King & H.E. Robins.**	**Pink Thoroughwort**	**G5**	**S2**		
syn: *Eupatorium incarnatum* Walter					
***Fragaria vesca* L. var. *americana* (Porter) Staudt**	**Woodland Strawberry**	**G5T5**	**S1**		
All native *F. vesca* is var. *americana*					
***Fuirena breviseta* (Coville) Coville**	**Short-bristled Umbrella-sedge**	**G5**	**SH**		
Under *F. squarrosa* Michx. in Radford et al. (1968)					
***Gaylussacia brachycera* (Michx.) Gray**	**Box Huckleberry**	**G3**	**S1**		
***Gentiana autumnalis* L.**	**Pine Barren Gentian**	**G3**	**S1**		
***Gentianella quinquefolia* (L.) Small var. *occidentalis* Gray**	**Western Stiff Gentian**	**G5T4T5**	**S1**		
***Gentianopsis crinita* (Froel.) Ma**	**Greater Fringed Gentian**	**G5**	**S1**		
***Geum aleppicum* Jacq.**	**Yellow Avens**	**G5**	**SH**		
***Geum laciniatum* Murr.**	**Rough Avens**	**G5**	**S1**		
***Gillenia stipulata* (Muhl. ex Willd.) Nutt.**	**American ipecac**	**G5**	**S1**		
syn: *Porteranthus stipulatus* (Muhl. ex Willd.) Britt.					
Glyceria grandis* S. Wats. var. *grandis	**American Mannagrass**	**G5T5**	**S1**		
***Glyceria laxa* (Scribn.) Scribn.**	**Northern Mannagrass**	**G5**	**S1**		
***Gnaphalium uliginosum* L.**	**Low Cudweed**	**G5**	**S1**		
***Goodyera repens* (L.) R. Br. ex Ait. f.**	**Dwarf Rattlesnake-plantain**	**G5**	**S1**		
***Gratiola ramosa* Walt.**	**Branched Hedge-hyssop**	**G4G5**	**S1**		
***Harperella nodosa* Rose**	**Harperella**	**G2**	**S1**	**LE**	**LE**
syn: *Ptilimnium nodosum* (Rose) Mathias					
***Helenium brevifolium* (Nutt.) Wood**	**Short-leaf Sneezeweed**	**G4**	**S2**		
***Helenium virginicum* Blake**	**Virginia Sneezeweed**	**G3**	**S2**	**LT**	**LE**
Helianthus occidentalis* Riddell ssp. *occidentalis	**Western Sunflower**	**G5T5**	**S1**		
Heliotropium curassavicum* L. var. *curassivicum	**Seaside Heliotrope**	**G5T5**	**S1**		
***Helonias bullata* L.**	**Swamp-pink**	**G3**	**S2S3**	**LT**	**LE**
***Heteranthera multiflora* (Griseb.) Horn**	**Mud Plantain**	**G4**	**S1**		
***Heuchera alba* Rydb.**	**White Alumroot**	**G2Q**	**S1**		

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***Heuchera caroliniana* (Rosendahl, Butters & Lakela) E. Wells**	**Carolina Alumroot**	**G3**	**S1**		
***Hexastylis contracta* Blomquist**	**Mountain Heartleaf**	**G3**	**S1**		
***Honckenya peploides* (L.) Ehrh. ssp. *robusta* (Fern.) Hulten** syn: *Honkenya peploides* (L.) Ehrh. syn: *Arenaria peploides* L. var. *robusta* Fern.	**Sea-beach Sandwort**	**G5T5**	**SH**		
Hordeum jubatum* L. ssp. *jubatum Only native Virginia occurrences are monitored	**Foxtail Barley**	**G5T5**	**S1**		
***Houstonia canadensis* Willd. ex Roemer & J.A. Schultes** syn: *Hedyotis canadensis* (Willd. ex Roemer & J.A. Schultes) Fosberg	**Canada Bluets**	**G4G5**	**S2**		
***Houstonia montana* Small** syn: *Houstonia purpurea* L. var. *montana* (Small) Terrell	**Roan Mountain Bluet**	**G2**	**S1**	**LE**	
Houstonia nigricans* (Lam.) Fernald var. *nigricans syn: *Hedyotis nigricans* (Lam.) Fosberg	**Glade Bluets**	**G5T5**	**S1**		
***Huperzia appressa* (Desvaux) A. Löve & D. Löve** syn: *Huperzia appalachiana* Beitel & Mickel Includes apparent hybrids between *H. appressa* and *H. lucidula*	**Appalachian Fir Clubmoss**	**G5**	**S2**		
***Huperzia porophila* (Lloyd & Underwood) Holub** syn: *Lycopodium porophilum* Lloyd & Underwood	**Rock Clubmoss**	**G4**	**S1**		
***Hydrocotyle bonariensis* Comm. ex Lam.**	**Coastal Water-pennywort**	**G5**	**S2**		
***Hypericum adpressum* Raf. ex W. Bart.**	**Bog St. John's-wort**	**G3**	**S1**		
***Hypericum boreale* (Britt.) Bickn.**	**Northern St. John's-wort**	**G5**	**S2**		
***Hypericum densiflorum* Pursh var. *interior* (Small) Sorrie & Weakley**	**Interior Bushy St. John's-wort**	**G5TNR**	**S1**		
***Hypericum denticulatum* Walt.** Does not include *H. virgatum* (=*H. denticulatum var. acutifolium* Ell.)	**Coppery St. John's-wort**	**G5**	**S1**		
***Hypericum ellipticum* Hook.**	**Pale St. John's-wort**	**G5**	**S1**		
***Hypericum fraseri* Spach** syn: *Triadenum fraseri* (Spach) Gleason	**Fraser's Marsh St. John's-wort**	**G5**	**S2**		
***Hypericum lloydii* (Svenson) P. Adams**	**Sandhill St.-John's-wort**	**G4?**	**SH**		
***Hypericum setosum* L.**	**Hairy St. John's-wort**	**G4G5**	**S1S2**		

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***Hypericum tubulosum* Walt.**	**Lesser Marsh St. John's-wort**	**G4?**	**S2**		
syn: *Triadenum tubulosum* (Walt.) Gleason					
***Hypoxis sessilis* L.**	**Glossy-seed Yellow Stargrass**	**G4**	**SH**		
Includes *H. longii* Fern.					
***Ilex collina* Alexander**	**Long-stalked Holly**	**G3**	**S1**		**LE**
syn: *Nemopanthus collinus* (Alexander) R. Clark					
***Ilex coriacea* (Pursh) Chapman**	**Big Gallberry**	**G5**	**S1**		
***Iliamna corei* Sherff**	**Peters Mountain Mallow**	**G1**	**S1**	**LE**	**LE**
***Iliamna remota* Greene**	**Kankakee Mallow**	**G1Q**	**S1**		
***Isoetes appalachiana* Brunton & Britton**	**Appalachian Quillwort**	**G4**	**S1**		
***Isoetes hyemalis* Brunton**	**Winter Quillwort**	**G2G3**	**S2**		
***Isoetes lacustris* L.**	**Lake Quillwort**	**G5**	**SH**		
***Isoetes mattaponica* L.J. Musselman & W.C. Taylor**	**Mattaponi Quillwort**	**GNR**	**S2**		
***Isoetes melanopoda* Gay & Durieu *ex* Durieu**	**Black-footed Quillwort**	**G5**	**S1**		
***Isoetes piedmontana* (N.E. Pfeiffer) C.F. Reed**	**Piedmont Quillwort**	**G4**	**S1**		
***Isoetes virginica* N.E. Pfeiffer**	**Virginia Quillwort**	**G1**	**S1**		**LE**
***Isotria medeoloides* (Pursh) Raf.**	**Small Whorled Pogonia**	**G2?**	**S2**	**LT**	**LE**
***Iva imbricata* Walt.**	**Dune Marsh-elder**	**G5?**	**S1**		
***Juncus articulatus* L.**	**Jointed Rush**	**G5**	**S1**		
***Juncus balticus* Willd. var. *littoralis* Engelm.**	**Baltic Rush**	**G5T5**	**S1**		
***Juncus brachycephalus* (Engelm.) Buch.**	**Small-headed Rush**	**G5**	**S2**		
***Juncus brevicaudatus* (Engelm.) Fern.**	**Narrow-panicled Rush**	**G5**	**S2**		
***Juncus caesariensis* Coville**	**New Jersey Rush**	**G2G3**	**S2**		**LT**
***Juncus elliottii* Chapman**	**Bog Rush**	**G4G5**	**S1**		
***Juncus megacephalus* M.A. Curtis**	**Big-headed Rush**	**G4G5**	**S2**		
***Juncus nodosus* L.**	**Knotted Rush**	**G5**	**S1**		
***Juncus pelocarpus* E. Mey.**	**Brown-fruited Rush**	**G5**	**S2**		
***Juncus torreyi* Coville**	**Torrey's Rush**	**G5**	**S1**		
***Juncus trifidus* L.**	**Highland Rush**	**G5**	**S1**		
***Juniperus communis* L. var. *depressa* Pursh**	**Ground Juniper**	**G5T5**	**S1**		
At least one Virginia population thought to be var. *depressa* has been redetermined as the introduced var. *communis*. Other populations should be re-examined.					
***Kalmia angustifolia* L.**	**Sheep Laurel**	**G5**	**S2**		
***Kalmia carolina* Small**	**Carolina Laurel**	**G4**	**S2**		
syn: *Kalmia anugustifolia* L. var. *caroliniana* (Small) Fernald					
***Lachnanthes caroliniana* (Lam.) Dandy**	**Redroot**	**G4**	**SH**		
***Lachnocaulon anceps* (Walt.) Morong**	**Common Bog-buttons**	**G5**	**S1**		
***Lathyrus palustris* L.**	**Marsh Pea**	**G5**	**S1**		

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Lechea intermedia* Leggett ex Britt. var. *intermedia	**Round-fruit Pinweed**	**G5T4T5**		**SH**	
***Leersia hexandra* Sw.**	**Southern Cutgrass**	**G5**		**SH**	
***Lemna trisulca* L.**	**Star Duckweed**	**G5**		**S1**	
***Leucothoe fontanesiana* (Steud.) Sleumer** syn: *L. axillaris* (Lam.) D. Don var. *editorum* (Fern. & Shub.) Ahles	**Highland Dog-hobble**	**G5**		**S1S2**	
***Lilaeopsis carolinensis* Coult. & Rose**	**Carolina Lilaeopsis**	**G3G5**		**S1**	
***Lilium catesbaei* Walt.**	**Pine Lily**	**G4**		**S1**	
***Lilium grayi* S. Wats.** Includes low-elevation (< 1200 m.) occurrences, which are likely intergrades between *L. grayi* and *L. canadense*	**Gray's Lily**	**G3**		**S2**	
***Lilium pyrophilum* M.W. Skinner & Sorrie** Virginia occurrences alleged to be closer genetically to *Lilium superbum* than typical L. pyrophilum of the Carolinas	**Sandhills Bog Lily**	**G2**		**S1**	
***Limosella australis* R. Br.** syn: *L. subulata* Ives	**Mudwort**	**G4G5**		**SH**	
***Liparis loeselii* (L.) L.C. Rich.**	**Bog Twayblade**	**G5**		**S2**	
***Lipocarpha maculata* (Michx.) Torr.**	**American Halfchaff Sedge**	**G5**		**S1**	
***Lipocarpha micrantha* (Vahl) G. Tucker** syn: *Hemicarpha micrantha* (Vahl) Pax	**Small-flower Halfchaff Sedge**	**G5**		**S2**	
***Lithospermum caroliniense* (Walt. ex J.F. Gmel.) MacM.**	**Golden Puccoon**	**G4G5**		**S1**	
***Lithospermum virginianum* L.** syn: *Onosmodium virginianum* (L.) DC.	**Virginia False Gromwell**	**G4**		**S2**	
***Litsea aestivalis* (L.) Fern.**	**Pondspice**	**G3?**		**S1**	
***Lobelia elongata* Small**	**Long-leaf Lobelia**	**G4G5**		**S1**	
***Ludwigia alata* Ell.**	**Winged Seedbox**	**G3G5**		**S1**	
***Ludwigia brevipes* (B.H. Long ex Britt., A. Braun & Small) Eames**	**Long Beach Seedbox**	**G2G3**		**S2**	
***Ludwigia hirtella* Raf.**	**Rafinesque's Seedbox**	**G5**		**S2**	
***Ludwigia pilosa* Walt.**	**Hairy Seedbox**	**G5**		**S1**	
***Ludwigia ravenii* Peng**	**Raven's Seedbox**	**G1G2**		**S1**	
***Ludwigia virgata* Michx.**	**Savanna Seedbox**	**G5**		**SH**	
***Lycopodiella inundata* (L.) Holub** syn: *Lycopodium inundatum* L.	**Northern Bog Clubmoss**	**G5**		**S1**	
***Lysimachia hybrida* Michx.**	**Lowland Loosestrife**	**G5**		**S2**	
***Lysimachia quadriflora* Sims**	**Prairie Loosestrife**	**G5?**		**S1**	
***Lysimachia radicans* Hook.**	**Trailing Loosestrife**	**G4G5**		**SH**	
***Lythrum alatum* Pursh**	**Winged Loosestrife**	**G5**		**S2**	
***Lythrum lanceolatum* Ell.** syn: *Lythrum alatum* Pursh var. *lanceolatum* (Ell.) Torr. & Gray ex Rothrock	**Lance-leaf Loosestrife**	**G5**		**SH**	

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***Magnolia macrophylla* Michx.**	**Bigleaf Magnolia**	**G5**	**S1**		
***Maianthemum stellatum* (L.) Link**	**Starry Solomon's-plume**	**G5**	**S1S2**		
***Malaxis bayardii* Fernald**	**Appalachian Adder's-Mouth**	**G1G2**	**SH**		
***Malvastrum angustum* A. Gray** *syn: Malvastrum hispidum* (Pursh) Hochreutiner	**Hispid False Mallow**	**G3G5**	**S1**		
***Manfreda virginica* (L.) Salisb. ex Rose** syn: *Agave virginica* L.	**Eastern False-aloe**	**G5**	**S2**		
***Marshallia legrandii* Weakley**	**Tall Barbara's-buttons**	**G1**	**S1**		
Marshallia obovata* (Walt.) Beadle & F.E. Boynt. var. *obovata	**Piedmont Barbara's-buttons**	**G4G5T3T5**	**S1**		
***Matelea decipiens* (Alexander) Woods.**	**Old-field Milkvine**	**G5**	**S1**		
***Matteuccia struthiopteris* (L.) Todaro var. *pensylvanica* (Willd.) C.V. Morton**	**Ostrich Fern**	**G5T5**	**S1**		
***Melica nitens* (Scribn.) Nutt. ex Piper**	**Three-flower Melic**	**G5**	**S1**		
***Menyanthes trifoliata* L.**	**Buckbean**	**G5**	**S1**		
***Micranthemum micranthemoides* (Nutt.) Wettst.**	**Nuttall's Micranthemum**	**GH**	**SH**		
***Micranthemum umbrosum* (J.F. Gmel.) Blake**	**Shade Mudflower**	**G5**	**S2**		
***Micranthes careyana* (A. Gray) Small** syn: *Saxifraga careyana* Gray	**Carey's Saxifrage**	**G3**	**S1**		
***Mimosa microphylla* Dryander** syn: *Schrankia microphylla* (Dry.) J.F. MacBr.	**Little-leaf Sensitive-brier**	**G5**	**S1**		
***Mimulus moschatus* Dougl. ex Lindl.**	**Muskflower**	**G5**	**SH**		
***Minuartia caroliniana* (Walt.) Mattf.**	**Carolina Sandwort**	**G5**	**SH**		
***Minuartia groenlandica* (Retz.) Ostenf.**	**Mountain Sandwort**	**G5**	**S1**		
***Mitreola petiolata* (J.F. Gmel.) Torr. & Gray** syn: *Cynoctonum mitreola* (L.) Britt.	**Lax Hornpod**	**G5**	**S1**		
***Mitreola sessilifolia* (J.F. Gmel) G. Don** syn: *Cynoctonum sessilifolium* J.F. Gmel.	**Swamp Hornpod**	**G4G5**	**S1**		
***Moehringia lateriflora* (L.) Fenzl** syn: *Arenaria lateriflora* L.	**Grove Sandwort**	**G5**	**S1**		
***Monarda fistulosa* L. var. *brevis* Fosberg & Artz**	**Smoke Hole Bergamot**	**G5T1T2**	**SH**		
***Morella pumila* (Michx.) Small**	**Dwarf Wax Myrtle**	**GNR**	**S1**		
***Muhlenbergia bushii* Pohl** Includes *M. brachyphylla* Bush	**Bush's Muhly**	**G5**	**S1**		
***Muhlenbergia cuspidata* (Torr. ex Hook.) Rydb.**	**Plains Muhly**	**G5**	**S2**		
***Muhlenbergia expansa* (Poir.) Trin.** *syn: M. capillaris* (Lam.) Trin. var. *trichopodes* (Ell.) Vasey	**Cut-over Muhly**	**G5**	**SH**		
***Muhlenbergia glabriflora* Scribn.**	**Inland Muhly**	**G4?**	**SH**		
***Muhlenbergia glomerata* (Willd.) Trin.**	**Marsh Muhly**	**G5**	**S2**		
***Myriophyllum humile* (Raf.) Morong**	**Low Water-milfoil**	**G5**	**S1**		

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***Myriophyllum laxum* Shuttlw. ex Chapm.**	**Loose Water-milfoil**	**G3**	**SH**		
***Nabalus autumnalis* (Walt.) Weakley** syn: *Prenanthes autumnalis* Walt.	**Slender Rattlesnake-root**	**G4G5**	**S1**		
***Napaea dioica* L.**	**Glade Mallow**	**G4**	**SH**		
***Nestronia umbellula* Raf.**	**Nestronia**	**G4**	**S1**		
***Nuphar sagittifolia* (Walt.) Pursh** syn: *Nuphar lutea* (L.) Sm. ssp. *sagittifolia* (Walt.) E.O. Beal	**Narrow-leaved Spatterdock**	**G2**	**S1**		**LT**
***Nymphoides aquatica* (J.F. Gmel.) Kuntze**	**Big Floating Heart**	**G5**	**S1**		
***Oenothera riparia* Nuttall** syn: *O. tetragona* Roth ssp. *glauca* (Michaux) Munz var. *riparia* (Nuttall) Munz included in *O. fruticosa* L. by Radford et al. (1968)	**Riverbank Evening-primrose**	**G2G3**	**S1S2**		
***Oldenlandia boscii* (DC.) Chapman** syn: *Hedyotis boscii* DC.	**Bosc's Bluets**	**G5**	**S1**		
***Ophioglossum petiolatum* Hook.**	**Long-stem Adder's-tongue**	**G5**	**S1**		
***Ophioglossum pusillum* Raf.** syn: *O. vulgatum* L. var. *pseudopodium* (Blake) Farw.	**Northern Adder's-tongue**	**G5**	**SH**		
***Orbexilum onobrychis* (Nutt.) Rydb.** syn: *Psoralea onobrychis* Nutt.	**Lance-leaf Scurfpea**	**G5**	**SH**		
***Orthilia secunda* (L.) House** syn: *Pyrola secunda* L.	**One-sided Shinleaf**	**G5**	**SH**		
***Oryzopsis asperifolia* Michx.**	**Rough-leaved Ricegrass**	**G5**	**S1**		
***Osmanthus americanus* (L.) Benth. & Hook f. ex Gray**	**Wild Olive**	**G5**	**S1**		
***Osmundastrum cinnamomeum* (L.) C. Presl var. *glandulosum* (Waters) McAvoy**	**Glandular Cinnamon Fern**	**G5TNR**	**S1**		
***Oxypolis ternata* (Nutt.) A. Heller**	**Savanna Cowbane**	**G3**	**SH**		
***Packera crawfordii* (Britton) A. M. Mahoney & R. R. Kowal**	**Crawford's Ragwort**	**G2G3**	**S1**		
***Packera millefolium* (Torr. & Gray) Weber & Löve**	**Yarrow-leaved Ragwort**	**G3**	**S2**		
***Panicum hemitomon* J.A. Schultes**	**Maidencane**	**G5?**	**S2**		
***Parathelypteris simulata* (Davenport) Holttum** syn: *Thelypteris simulata* (Davenport) Nieuwland	**Bog Fern**	**G4G5**	**S1S2**		
***Parnassia grandifolia* DC.**	**Large-leaved Grass-of-Parnassus**	**G3**	**S2**		
Paronychia virginica* Spreng. var. *virginica	**Yellow Nailwort**	**G4T1Q**	**S1**		
***Paspalum bifidum* (Bertol.) Nash**	**Pitchfork Paspalum**	**G5**	**SH**		

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***Paspalum dissectum* (L.) L.**	**Walter's Paspalum**	**G4?**	**S2**		
***Paspalum distichum* L.**	**Joint Paspalum**	**G5**	**S1**		
***Paspalum praecox* Walt.**	**Early Paspalum**	**G4**	**S1**		
***Paxistima canbyi* Gray**	**Canby's Mountain-lover**	**G2**	**S2**		
syn: *Pachistima canbyi*					
***Pediomelum canescens* (Michx.) Rydb.**	**Buckroot**	**G3G4**	**S1**		
syn: *Psoralea canescens* Michx.					
***Penstemon australis* Small**	**Southern Beard-tongue**	**G5**	**S1?**		
***Penstemon calycosus* Small**	**Calico Beard-tongue**	**G5**	**SH**		
***Phacelia covillei* S. Watson ex A. Gray**	**Coville's Phacelia**	**G3**	**S1**		
***Phacelia fimbriata* Michx.**	**Fringed Phacelia**	**G4**	**S2**		
***Phalaris caroliniana* Walt.**	**Carolina Canary Grass**	**G5?**	**SH**		
***Phanopyrum gymnocarpon* (Ell.) Nash**	**Savanna Panic Grass**	**G5**	**S1**		
syn: *Panicum gymnocarpum* Ell.					
***Phemeranthus piedmontanus* S. Ware**	**Piedmont Fameflower**	**G1**	**S1**		
***Phlox amplifolia* Britt.**	**Large-leaf Phlox**	**G3G5**	**S1**		
***Phlox buckleyi* Wherry**	**Sword-leaf Phlox**	**G2**	**S2**		
***Phlox pilosa* L.**	**Downy Phlox**	**G5**	**S1**		
***Phyla nodiflora* (L.) Greene**	**Sawtooth Frogfruit**	**G5**	**S1**		
syn: *Lippia nodiflora* (L.) Michx.					
***Pinus palustris* P. Mill.**	**Longleaf Pine**	**G5**	**S1**		
***Pityopsis graminifolia* (Michx.) Nutt. var. *tenuifolia* (Torr.) Semple & Bowers**	**Narrowleaf Silk-Grass**	**G5T5?**	**S1**		
***Plantago cordata* Lam.**	**King-root**	**G4**	**SH**		
***Plantago maritima* L. var. *juncoides* (Lam.) Gray**	**Seaside Plantain**	**G5T5**	**S1**		
***Platanthera blephariglottis* (Willd.) Lindl.**	**Small White Fringed Orchid**	**G4G5**	**S2**		
Conflicting opinions on whether Virginia material is var. *blephariglottis* or var. *conspicua*					
***Platanthera grandiflora* (Bigelow) Lindl.**	**Large Purple Fringed Orchid**	**G5**	**S2**		
***Platanthera leucophaea* (Nutt.) Lindl.**	**Prairie Fringed Orchid**	**G2G3**	**SH**	**LT**	**LT**
***Platanthera peramoena* (Gray) Gray**	**Purple Fringeless Orchid**	**G5**	**S1**		
***Platanthera shriveri* P.M. Brown**	**Shriver's Frilly Orchid**	**G1**	**S1**		
***Poa languida* Hitchcock**	**Drooping Bluegrass**	**G3G4Q**	**S1**		
***Poa paludigena* Fern. & Wieg.**	**Bog Bluegrass**	**G3**	**S2**		
***Poa palustris* L.**	**Fowl Bluegrass**	**G5**	**S1S2**		
***Poa saltuensis* Fern. & Wieg.**	**Weak Bluegrass**	**G5**	**S2**		
Polanisia dodecandra* (L.) DC. var. *dodecandra	**Common Clammy-weed**	**G5T5?**	**S2**		

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***Polygala ramosa* Ell.**	**Low Pine Barren Milkwort**	**G5**	**SH**		
Polygonella polygama* (Vent.) Engelm. & Gray var. *polygama	**October-flower**	**G4TNR**	**S1**		
***Polygonum glaucum* Nutt.**	**Sea-beach Knotweed**	**G3**	**S2**		
***Populus tremuloides* Michx.**	**Quaking Aspen**	**G5**	**S1**		
***Portulaca smallii* P. Wilson**	**Small's Purslane**	**G3**	**S1**		
***Potamogeton amplifolius* Tuckerman**	**Bigleaf Pondweed**	**G5**	**S1**		
***Potamogeton bicupulatus* Fern.**	**Snailseed Pondweed**	**G4**	**S1**		
***Potamogeton friesii* Rupr.**	**Fries' Pondweed**	**G5**	**SH**		
***Potamogeton hillii* Morong**	**Hill's Pondweed**	**G3**	**S1**		
***Potamogeton oakesianus* J.W. Robbins**	**Oakes' Pondweed**	**G5**	**S1**		
***Potamogeton robbinsii* Oakes**	**Flatleaf Pondweed**	**G5**	**SH**		
***Potamogeton spirillus* Tuckerman**	**Spiral Pondweed**	**G5**	**SH**		
***Potamogeton strictifolius* Benn.**	**Straightleaf Pondweed**	**G5**	**SH**		
***Potamogeton tennesseensis* Fern.**	**Tennessee Pondweed**	**G2G3**	**S1**		
***Potamogeton zosteriformis* Fern.**	**Flatstem Pondweed**	**G5**	**S1**		
***Prunus maritima* Marshall**	**Beach Plum**	**G4**	**S1?**		
***Prunus nigra* Ait.**	**Canada Plum**	**G4G5**	**S1?**		
***Prunus susquehanae* Hort. ex Willd.** syn: *Prunus pumila* L. var. *susquehanae* (Hort. ex Willd.) Jaeger	**Susquehanna Sand Cherry**	**G4G5**	**S1**		
***Pseudognaphalium helleri* (Britt.) A. Anderb.**	**Heller's Cudweed**	**G4G5**	**S1**		
***Pseudognaphalium macounii* (Greene) Kartesz** syn: *Gnaphalium viscosum* Kunth	**Clammy Everlasting**	**G5**	**S1**		
***Pseudognaphalium micradenium* (Weatherby) Nesom**	**Small Rabbit Tobacco**	**G3?**	**S1**		
***Pseudolycopodiella caroliniana* (L.) Holub** syn: *Lydopodium carolinianum* L. syn: *Lycopodiella caroliniana* (L.) Pichi Sermolli	**Carolina Bog Clubmoss**	**G4**	**SH**		
***Puccinellia fasciculata* (Torr.) Bickn.**	**Eastern Alkali Grass**	**G3G5**	**SH**		
***Pycnanthemum clinopodioides* Torr. & Gray**	**Basil Mountain-mint**	**G1G2**	**S1**		
***Pycnanthemum setosum* Nutt.**	**Awned Mountain-mint**	**G4**	**S1**		
***Pycnanthemum torreyi* Benth.**	**Torrey's Mountain-mint**	**G2**	**S2**		
***Pyrola chlorantha* Sw.** syn: *P. virens* Schreb.	**Green Pyrola**	**G5**	**SH**		
***Pyrola elliptica* Nutt.**	**Shinleaf**	**G5**	**S1**		
Pyxidanthera barbulata* Michx. var. *barbulata	**Common Pyxie-moss**	**G4TNR**	**S1**		
***Quercus hemisphaerica* Bartr. ex Willd.** Under *Q. laurifolia* Michx. in Radford et al. (1968)	**Sand Laurel Oak**	**G5**	**S1**		
***Quercus incana* Bartr.**	**Bluejack Oak**	**G5**	**S2**		
***Quercus macrocarpa* Michx.**	**Bur Oak**	**G5**	**S1**		

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***Quercus prinoides* Willd.**	**Dwarf Chinquapin Oak**	**G5**	**S1**		
***Ranunculus ambigens* S. Wats.**	**Water-plantain Crowfoot**	**G4**	**S1**		
***Ranunculus flabellaris* Raf.**	**Yellow Water Crowfoot**	**G5**	**S2**		
***Ranunculus hederaceus* L.**	**Ivy-leaved Water Crowfoot**	**G5**	**SH**		
***Ranunculus laxicaulis* (Torr. & Gray) Darby**	**Mississippi Buttercup**	**G5?**	**SH**		
***Ranunculus longirostris* Godr.**	**Long-beaked Buttercup**	**G5**	**SH**		
syn: *Ranunculus aquatalis* L. var. *diffusus* Withering					
***Rhamnus alnifolia* L'Her.**	**Alder-leaved Buckthorn**	**G5**	**S1**		
***Rhamnus lanceolata* Pursh var. *glabrata* Gleason**	**Western Lance-leaf Buckthorn**	**G5T4T5**	**S1**		
***Rhexia petiolata* Walt.**	**Fringed Meadow Beauty**	**G5?**	**S1**		
***Rhododendron arborescens* (Pursh) Torr.**	**Sweet Azalea**	**G4G5**	**S2**		
***Rhus michauxii* Sarg.**	**Michaux's Sumac**	**G2G3**	**S1**	**LE**	**LT**
***Rhynchospora alba* (L.) Vahl**	**Northern White Beaksedge**	**G5**	**S2**		
***Rhynchospora capillacea* Torr.**	**Needle Beaksedge**	**G4G5**	**S1**		
***Rhynchospora cephalantha* Gray var. *attenuata* Gale**	**Small Bunched Beaksedge**	**G5T3?**	**S1**		
***Rhynchospora colorata* (L.) H. Pfieffer**	**Narrow-leaf Whitetop Sedge**	**G5**	**S1**		
syn: *Dichromena colorata* (L.) Hitchc.					
***Rhynchospora debilis* Gale**	**Savanna Beaksedge**	**G4?**	**S1**		
***Rhynchospora distans* (Michx.) Chapm.**	**Fasciculate Beaksedge**	**G4?**	**S1**		
***Rhynchospora fascicularis* (Michx.) Vahl**	**Fasciculate Beaksedge**	**G3G5**	**S2**		
***Rhynchospora filifolia* Gray**	**Thread-leaved Beaksedge**	**G5**	**SH**		
***Rhynchospora grayi* Kunth**	**Gray's Beaksedge**	**G4**	**SH**		
***Rhynchospora harveyi* W. Boott**	**Harvey's Beaksedge**	**G4**	**S1**		
***Rhynchospora miliacea* (Lam.) Gray**	**Millet Beaksedge**	**G5**	**SH**		
***Rhynchospora nitens* (Vahl) Gray**	**Short-beaked Beaksedge**	**G4?**	**SH**		
syn: *Psilocarya nitens* (Vahl) Wood					
***Rhynchospora oligantha* Gray**	**Feather-bristled Beaksedge**	**G4**	**S1**		
***Rhynchospora pallida* M.A. Curtis**	**Pale Beaksedge**	**G3**	**SX**		
***Rhynchospora scirpoides* (Torr.) Gray**	**Long-beaked Beaksedge**	**G4**	**S1**		
syn: *Psilocarya scirpoides* Torr.					

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***Rhynchospora stenophylla* Chapman**	**Coastal Bog Beaksedge**	**G4**	**S1**		
***Rhynchospora wrightiana* Boeckl.**	**Wright's Beaksedge**	**G5**	**S1**		
***Ribes americanum* P. Mill.**	**Wild Black Currant**	**G5**	**S1**		
***Rorippa aquatica* (Eat.) E.J. Palmer & Steyermark** syn: *Neobeckia aquatica* (Eaton) Greene	**Lake Cress**	**G4?**	**SH**		
***Rorippa sessiliflora* (Nutt.) A.S. Hitchc.**	**Stalkless Yellow Cress**	**G5**	**S2**		
***Rosa setigera* Michx.**	**Climbing Prairie Rose**	**G5**	**S1**		
***Rosa virginiana* Miller**	**Virginia Rose**	**G5**	**SH**		
***Rubus dalibarda* L.** syn: *Dalibarda repens* L.	**Dewdrop**	**G5**	**S1**		
***Rubus idaeus* L. var. *strigosus* (Michx.) Focke**	**Red Raspberry**	**G5T5**	**S2**		
***Rudbeckia heliopsidis* Torr. & Gray**	**Sun-facing Coneflower**	**G2**	**S1**		
***Rudbeckia laciniata* L. var. *bipinnata* Perdue**	**Northeastern cutleaf coneflower**	**G5TNR**	**S1**		
***Rudbeckia triloba* L. var. *beadlei* (Small) Fern.** syn: *Rudbeckia triloba* L. var. *pinnatiloba*	**Pinnate-lobed Coneflower**	**G5TNR**	**S1**		
***Sabatia campanulata* (L.) Torr.**	**Slender Marsh-pink**	**G5**	**S2**		
***Sabatia difformis* (L.) Druce**	**Lance-leaved Rose-gentian**	**G4G5**	**S1**		
***Saccharum coarctatum* (Fern.) R. Webster** syn: *Erianthus coarctatus* Fern. syn: *Erianthus coarctatus* var. *elliottianus* Fern.	**Compressed Plumegrass**	**G5?**	**S1**		
***Sagittaria brevirostra* Mackenzie & Bush**	**Short-beak arrowhead**	**G5**	**SH**		
***Sagittaria calycina* Engelm.**	**Long-lobe Arrowhead**	**G5**	**S1**		
***Sagittaria engelmanniana* J.G. Sm.**	**Engelmann's Arrowhead**	**G5?**	**SH**		
***Sagittaria rigida* Pursh**	**Sessile-fruited Arrowhead**	**G5**	**S1**		
***Sagittaria spatulata* (J.G. Smith) Buchenau** syn: *Sagittaria calycina* Engelm. var. *spongiosa* Engelm.	**Tidal Arrowhead**	**G4**	**S1**		
***Salix discolor* Muhl.**	**Pussy Willow**	**G5**	**S1**		
***Salix exigua* Nutt. var. *sericans* (Nees) Nesom**	**Sandbar Willow**	**G5TNR**	**S1**		
***Sanguisorba canadensis* L.**	**Canada Burnet**	**G5**	**S2**		
***Sarracenia flava* L.**	**Yellow Pitcher Plant**	**G5?**	**S1**		
***Sarracenia purpurea* L.**	**Purple Pitcher Plant**	**G5**	**S2**		
***Sceptridium jenmanii* Underwood (Lyon)** syn: *Botrychium jenmanii* Underwood	**Alabama Grape Fern**	**G3G4**	**SH**		
***Sceptridium multifidum* (S.G. Gmelin) M. Nishida** syn: *Botrychium multifidum* (Gmel.) Trev.	**Leathery Grape Fern**	**G5**	**S1**		

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***Sceptridium oneidense* (Gilbert) Holub** syn: *Botrychium oneidense* (Gilbert) House	**Blunt-lobe Grape Fern**	**G4**	**S1**		
***Schizachne purpurascens* (Torr.) Swallen**	**Purple Oatgrass**	**G5**	**S1**		
Schoenoplectus acutus* (Muhl. *ex* Bigelow) Love & Love var. *acutus	**Hard-stem Bulrush**	**G5T5**	**S1**		
***Schoenoplectus etuberculatus* (Steud.) Sojak**	**Swamp Bulrush**	**G3G4**	**SH**		
***Schoenoplectus smithii* (Gray) Sojak**	**Smith's Bulrush**	**G5?**	**SH**		
***Schoenoplectus subterminalis* (Torr.) Sojak**	**Water Bulrush**	**G5**	**S1**		
***Schoenoplectus torreyi* (Olney) Palla**	**Torrey's Bulrush**	**G5?**	**S1**		
***Schwalbea americana* L.**	**Chaffseed**	**G2G3**	**SH**	**LE**	
***Scirpus ancistrochaetus* Schuyler**	**Northeastern Bulrush**	**G3**	**S2**	**LE**	**LE**
***Scirpus flaccidifolius* (Fern.) Schuyler**	**Reclining Bulrush**	**G2**	**S1S2**		**LT**
Scleria ciliata* Michx. var. *ciliata	**Hairy Nutrush**	**G5TNR**	**S1**		
***Scleria minor* W. Stone**	**Slender Nutrush**	**G4**	**S2**		
***Scleria verticillata* Muhl. ex Willd.**	**Whorled Nutrush**	**G5**	**S2**		
***Sclerolepis uniflora* (Walt.) B.S.P.**	**One-flowered Sclerolepis**	**G4**	**S1**		
***Scutellaria galericulata* L.** syn: *S. epilobiifolia* A. Hamilton	**Hooded Skullcap**	**G5**	**S1**		
***Scutellaria incana* Biehler**	**Hoary Skullcap**	**G5**	**S2**		
***Scutellaria parvula* Michx.**	**Dwarf Skullcap**	**G4**	**S1**		
***Sedum pulchellum* Michx.**	**Widow's-cross**	**G5**	**S1**		
***Senecio suaveolens* (L.) Elliott** syn: *Hasteola suaveolens* (L.) Pojark.	**Sweet-scented Indian-plantain**	**G4**	**S2**		
***Seymeria cassioides* (J.F. Gmel.) Blake**	**Senna Seymeria**	**G5**	**S1S2**		
***Sibbaldia tridentata* (Ait.) Paule & Soják** syn: *Potentilla tridentata* Ait.	**Three-toothed Cinquefoil**	**G5**	**S2**		
Sida elliottii* Torr. & Gray var. *elliottii Virginia material is referrable to *Sida inflexa* Fern., but treated here as an anomalous form of *S. elliottii* var. *elloittii*.	**Elliott's Sida**	**G4G5TNR**	**S1**		
***Sida hermaphrodita* (L.) Rusby**	**Virginia Sida**	**G3**	**S1**		
***Silene nivea* (Nutt.) Muhl. ex Otth**	**Snowy Campion**	**G4?**	**S1**		
***Silene ovata* Pursh**	**Mountain Catchfly**	**G3**	**S1**		
***Silene rotundifolia* Nutt.**	**Round-leaf Catchfly**	**G4**	**S2**		
***Silphium terebinthinaceum* Jacq.**	**Prairie Rosin Weed**	**G4G5**	**S1**		
***Sisyrinchium albidum* Raf.**	**White Blue-eyed-grass**	**G5?**	**S2**		
***Smilax ecirrata* (Engelm. ex Kunth) S. Wats.** also spelled *ecirrhata*	**Upright Carrion-flower**	**G5**	**S1**		
***Solidago lancifolia* Torr. & Gray** Under S. curtissii Torr. & Gray in Kartesz (1999) Radford et al. (1968). Recent research has affirmed taxonomic status and rarity	**Lance-leaf Goldenrod**	**G3G4Q**	**S1**		
***Solidago latissimifolia* P. Mill.** syn: *S. elliottii* Torr. & Gray	**Elliott's Goldenrod**	**G5**	**S2**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Solidago racemosa* Greene** syn: *S. simplex* Kunth ssp. *randii* (Porter) Ringius var. *racemosa* (Greene) Ringius syn: *S. simplex* Kunth var. *racemosa* (Greene) Ringius	**Sticky Goldenrod**	**G3?**	**S1**		
***Solidago randii* (Porter) Britt.** syn: *S. simplex* Kunth ssp. *randii* (Porter) Ringius var. *randii* syn: *S. simplex* Kunth var. *randii* (Porter) Ringius	**Rand's Goldenrod**	**G4**	**S2**		
***Solidago rigida* L. var. *glabrata* E.L. Braun** syn: *Oligoneuron rigidum* (L.) var. *glabratum* (E.L. Braun) Nesom	**Southeastern Stiff Goldenrod**	**G5T4**	**S1**		
Solidago rigida* L. var. *rigida syn: *Oligoneuron rigidum* (L.) Small var. *rigidum*	**Stiff Goldenrod**	**G5T5**	**S2**		
***Solidago rupestris* Raf.** Under *S. altissima* L. in Radford et al. (1968)	**Riverbank Goldenrod**	**G4?**	**S1**		
***Solidago salicina* Ell.** syn: *Solidago patula* Muhl. ex Willd. var. *strictula* Torr. & Gray	**Southern Rough-leaved Goldenrod**	**G5**	**SH**		
***Solidago stricta* Ait.** Includes *S. gracillima* Torr. & Gray, S. *perlonga* Fern.	**Southern Bog Goldenrod**	**G4?**	**S1**		
***Solidago tortifolia* Ell.**	**Twisted-leaf Goldenrod**	**G4G5**	**S1**		
Solidago uliginosa* Nutt. var. *uliginosa All Virginia *S. uliginosa* is var. *uliginosa*	**Bog Goldenrod**	**G5T4T5**	**S2**		
***Sparganium emersum* Rehmann**	**Narrow-leaf Bur-reed**	**G5**	**S1**		
***Spartina pectinata* Link**	**Freshwater Cordgrass**	**G5**	**S2**		
***Spermacoce glabra* Michx.**	**Smooth False Buttonweed**	**G4G5**	**S1**		
***Spermolepis divaricata* (Walt.) Raf. ex Ser.**	**Rough-fruit Scale-seed**	**G5**	**S1?**		
***Sphenopholis filiformis* (Chapman) Scribn.**	**Long-leaf Wedgegrass**	**G4?**	**S1**		
***Spiraea virginiana* Britt.**	**Virginia Spiraea**	**G2**	**S1**	**LT**	**LE**
***Spiranthes eatonii* Ames ex P.M. Brown**	**Eaton's Ladies'-tresses**	**G2G4**	**S1**		
***Spiranthes lucida* (H.H. Eat.) Ames**	**Shining Ladies'-tresses**	**G4**	**S1S2**		
***Spiranthes magnicamporum* Sheviak**	**Great Plains Ladies'-tresses**	**G3G4**	**S1**		

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Sporobolus compositus* (Poir.) Merr. var. *compositus	**Tall Dropseed**	**G5T5**	**S2**		
syn: *S. asper* (Beauv.) Kunth, All Virginia *S. compositus* is var. *compositus*					
***Sporobolus heterolepis* (Gray) Gray**	**Prairie Dropseed**	**G5**	**S1**		
***Sporobolus junceus* (Beauv.) Kunth**	**Purple Dropseed**	**G5**	**S1**		
***Sporobolus neglectus* Nash**	**Small Dropseed**	**G5**	**S1**		
***Sporobolus ozarkanus* Fernald**	**Ozark Dropseed**	**G5?**	**S1**		
***Stachys appalachiana* D.B. Poindexter & J.B. Nelson**	**Appalachian Hedge-Nettle**	**GNR**	**S1**		
***Stachys arenicola* Britt.**	**Hairy Hedge-nettle**	**G4?**	**S1**		
Given as *S. palustris* L. in Harvill et al. (1992)					
***Stachys aspera* Michx.**	**Rough Hedge-nettle**	**G4?**	**S2**		
syn: *S. hyssopifolia* Michx. var. *ambigua* Gray					
***Stachys eplingii* J. Nelson**	**Epling's Hedge-nettle**	**G1G2**	**S1**		
***Stachys matthewsii* G.P. Fleming, J.B. Nelson, & J.F. Townsend**	**Yadkin Hedge-nettle**	**G1G2**	**S1**		
		G5	**S1**		
***Steinchisma hians* (Ell.) Nash**	**Gaping Panic Grass**				
syn: *Panicum hians* Ell.					
Stellaria alsine Grimm	**Bog Chickweed**	**G5**	**S1**		
***Stenanthium densum* (Desr.) Zomlefer & Judd**	**Dense-flowered Camas**	**G5**	**S1**		
***Stenanthium leimanthoides* (A. Gray) Zomlefer & Judd**	**Pinebarrens Death-camas**	**G4Q**	**S1**		
***Stewartia ovata* (Cav.) Weatherby**	**Mountain Camellia**	**G4**	**S2**		
Stillingia sylvatica* Garden ex L. ssp. *sylvatica	**Queen's-delight**	**G5T5**	**S1**		
Stipulicida setacea* Michx. var. *setacea	**Pineland Scalypink**	**G4G5T4T5**	**S1**		
***Streptopus amplexifolius* (L.) DC.**	**White Mandarin**	**G5**	**S1**		
***Stylophorum diphyllum* (Michx.) Nutt.**	**Celandine Poppy**	**G5**	**S2**		
***Sullivantia sullivantii* (Torr. & Gray) Britt.**	**Sullivantia**	**G4**	**S1**		
Symphoricarpos albus* (L.) Blake var. *albus	**Common Snowberry**	**G5T5**	**S1**		
All native Virginia *S. albus* is var. *albus*, non-native material is *S. albus* var. *laevigatus* (Fern.) Blake					
***Symphyotrichum elliottii* (Torr. & Gray) Nesom**	**Elliott's Aster**	**G4**	**S1**		
syn: *Aster puniceus* L. var. *elliottii* (Torr. & Gray) A.G. Jones					
syn: *A. elliottii* Torr. & Gray					
***Symphyotrichum praealtum* (Poiret) Nesom var. *angustior* (Wiegand) Nesom**	**Willow-leaf Aster**	**G5T4**	**S1**		
syn: *Aster praealtus* Poir. var. *angustior* Wieg.					
***Symphyotrichum pratense* (Raf.) Nesom**	**Western Silvery Aster**	**G4?**	**S1**		
syn: *Aster pratensis* Raf.					
syn: *A. sericeus* Vent. var. *microphyllus* DC.					

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***Symphyotrichum shortii* (Lindl.) Nesom** syn: *Aster shortii* Lindl.	**Short's Aster**	**G5**	**S1**		
Symphyotrichum schistosum (Steele) Nesom syn: Aster schistosus Steele syn: A. x schistosus (Steele) Nesom in Kartesz (1999)	**Millboro Aster**	**GNA**	**S1**		
***Synandra hispidula* (Michx.) Baill.**	**Gyandotte Beauty**	**G4**	**S2**		
***Taxodium ascendens* Brongn.** Largest population contains trees transitional to *T. distichum*	**Pondcypress**	**G5**	**S1**		
***Tetragonotheca helianthoides* L.**	**Squarehead**	**G5**	**S1**		
***Thalictrum macrostylum* Small & Heller**	**Small-leaved Meadow-rue**	**G3G4**	**S1**		
***Tillandsia usneoides* (L.) L.**	**Spanish-moss**	**G5**	**S1S2**		
***Toxicodendron rydbergii* (Small ex Rydb.) Greene**	**Western Poison Ivy**	**G5**	**S1**		
***Triantha glutinosa* (Michx.) Pers.** syn: *Tofieldia glutinosa* (Michx.) Pers.	**Sticky False Asphodel**	**G5**	**S1**		
***Triantha racemosa* (Walt.) B.S.P.** syn: *Tofieldia racemosa* (Walt.) B.S.P.	**Coastal False Asphodel**	**G5**	**SH**		
***Trichostema setaceum* Houtt.**	**Narrow-leaf Blue Curls**	**G5**	**S2**		
***Tridens chapmanii* (Small) Chase** syn: *T. flavus* (L.) A.S. Hitchc. var. *chapmanii* (Small) Shinners	**Chapman's Purpletop**	**G3**	**S1**		
***Trifolium calcaricum* Collins and Wieboldt**	**Running Glade Clover**	**G1**	**S1**		**LE**
***Trifolium reflexum* L.**	**Buffalo Clover**	**G3G4**	**S1**		
***Trillium cernuum* L.**	**Nodding Trillium**	**G5**	**S2**		
***Trillium flexipes* Raf.**	**Drooping Trillium**	**G5**	**SH**		
***Trillium nivale* Riddell**	**Snow Trillium**	**G4**	**S1**		
***Trillium pusillum* Michx. var. *virginianum* Fern.** Includes var. *moniticulum* Bodkin & Reveal	**Virginia Least Trillium**	**G3T2**	**S2**		
Triphora trianthophora* (Sw.) Rydb. ssp. *trianthophora	**Three Birds Orchid**	**G3G4T3T4**	**S1**		
***Trisetum spicatum* (L.) Richter**	**Narrow False Oats**	**G5**	**S1**		
***Turritis glabra* L.** syn: *Arabis glabra* (L.) Bernh.	**Tower Mustard**	**G5**	**S1**		
***Utricularia juncea* Vahl**	**Southern Bladderwort**	**G5**	**S1**		
***Utricularia olivacea* C. Wright ex Griseb.**	**Dwarf Bladderwort**	**G4**	**SH**		
***Utricularia purpurea* Walt.**	**Purple Bladderwort**	**G5**	**S2**		
***Utricularia striata* Le Conte ex Torr.** syn: *U. fibrosa* Walt.	**Fibrous Bladderwort**	**G4G5**	**S1**		
***Vaccinium crassifolium* Andr.**	**Creeping Blueberry**	**G4G5**	**S1**		
***Vaccinium macrocarpon* Ait.**	**Cranberry**	**G5**	**S2**		
***Vaccinium myrtilloides* Michx.**	**Velvetleaf Blueberry**	**G5**	**S1**		
***Valeriana pauciflora* Michx.**	**Pink Valerian**	**G4**	**S1**		

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***Valerianella chenopodiifolia* (Pursh) A.P. de Candolle**	**Goosefoot Corn-salad**	**G4**	**SH**		
***Vandenboschia boschiana* (Sturm) Ebihara & K. Iwatsuki** syn: *Trichomanes boscianum* Sturm	**Appalachian Filmy Fern**	**G4**	**S1**		
***Verbena scabra* Vahl**	**Rough Vervain**	**G5**	**S1**		
***Veronica scutellata* L.**	**Marsh Speedwell**	**G5**	**S1**		
***Viburnum lentago* L.**	**Nannyberry**	**G5**	**S1**		
Vicia americana* Muhl. ex Willd. var. *americana	**American Vetch**	**G5T5**	**S1**		
***Viola* sp. 1** Unnamed taxon of shale barrens and woodlands, similar in appearance to *Viola pedatifida* G. Don	**A Violet**	**GNR**	**S1**		
***Viola tripartita* Ell. var. *glaberrima* (DC.) R.M. Harper**	**Three-parted Violet**	**G5T3?**	**S1**		
Viola walteri* House var. *walteri	**Prostrate Blue Violet**	**G4G5TNR**	**S2**		
***Vitis rupestris* Scheele**	**Sand Grape**	**G3**	**S1**		
***Wisteria frutescens* (L.) Poir.**	**American Wisteria**	**G5**	**S1**		
***Wolffia columbiana* Karst.**	**Columbian Watermeal**	**G5**	**S1**		
***Xyris caroliniana* Walt.**	**Carolina Yellow-eyed Grass**	**G4G5**	**S1**		
***Xyris curtissii* Malme** syn: *X. difformis* Chapman var. *curtisii* (Malme) Kral	**Curtiss' Yellow-eyed Grass**	**G5**	**S1**		
***Xyris fimbriata* Ell.**	**Fringed Yellow-eyed Grass**	**G5**	**S1**		
***Xyris iridifolia* Chapman** syn: *Xyris laxifolia* Mart. var. *iridifolia* (Chapman) Kral	**Iris-leaf Yellow-eyed Grass**	**G4G5**	**S1**		
***Xyris platylepis* Chapman**	**Tall Yellow-eyed Grass**	**G5**	**S2**		
***Yucca aloifolia* L.**	**Spanish Dagger**	**G5**	**S1**		
***Yucca flaccida* Haworth**	**Weakleaf Yucca**	**G5**	**S1**		
***Zenobia pulverulenta* (Bartr. ex Willd.) Pollard**	**Dusty Zenobia**	**G4?**	**S1**		
***Zigadenus glaberrimus* Michx.**	**Large Death-camas**	**G5**	**S1**		
***Zornia bracteata* J.F. Gmel.**	**Viperina**	**G5?**	**S1**		

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PART TWO:
VASCULAR PLANT WATCH LIST

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Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Acalypha deamii* (Weatherby) Ahles**	**Deam's Copperleaf**	**G4?**	**S3**		
***Aconitum reclinatum* Gray**	**White Monkshood**	**G3**	**S3**		
***Adlumia fungosa* (Ait.) Greene ex B.S.P.**	**Climbing Fumitory**	**G4**	**S3**		
***Agrostis scabra* Willd.**	**Rough Bentgrass**	**G5**	**S3?**		
***Amelanchier sanguinea* (Pursh) DC.**	**Roundleaf Serviceberry**	**G5**	**S3**		
Amsonia tabernaemontana* Walt. var. *tabernaemontana	**Eastern Blue-star**	**G5T5**	**S3**		
***Andropogon perangustatus* Nash**	**Narrow-leaved Bluestem**	**G4**	**S3**		
syn: A. *gyrans* Ashe var. *stenophyllus* (Hack.) C. Cambell					
***Andropogon virginicus* L. var. *decipiens* C. Campbell**	**Deceptive Bluestem**	**G5T4**	**S3**		
Under *A. virginicus* L. in Radford *et al.* (1968)					
Under *A. virginicus* L. var. *virginicus* in Fernald (1950)					
***Anemone quinquefolia* L. var. *minima* (DC.) Frodin**	**Dwarf Anemone**	**G5T3**	**S3**		
***Anticlea glauca* Kunth**	**White Death-camas**	**G4G5**	**S3**		
syn: *Zigadenus elegans* Pursh ssp. *glaucus* (Nutt.) Hulten					
***Aristida lanosa* Muhl. ex Ell.**	**Woolly Three-awn Grass**	**G5**	**S3**		
***Aristida tuberculosa* Nutt.**	**Sea-beach Needlegrass**	**G5**	**S3**		
Asclepias incarnata* L. var. *incarnata	**Swamp Milkweed**	**G5T5**	**S3**		
***Asclepias lanceolata* Walt.**	**Few-flower Milkweed**	**G5**	**S3**		
***Asimina parviflora* (Michx.) Dunal**	**Dwarf Pawpaw**	**G5**	**S3**		
***Bacopa monnieri* (L.) Pennell**	**Coastal Water-hyssop**	**G5?**	**S3**		
Baptisia australis* (L.) R. Br. ex Ait. f. var. *australis	**Blue Wild Indigo**	**G5T3T4**	**S3**		
Bartonia paniculata* (Michx.) Muhl. ssp. *paniculata	**Twining Bartonia**	**G5T5**	**S3**		
***Blephilia hirsuta* (Pursh) Benth.**	**Hairy Wood Mint**	**G5?**	**S3**		
***Bolboschoenus novae-angliae* (Britt.) S.G. Sm.**	**New England Bulrush**	**G5**	**S3**		
syn: *Schoenoplectus novae-angliae* (Britt.) M.T. Strong					
***Bulbostylis ciliatifolia* (Ell.) Fern.**	**Savanna Hairsedge**	**G3G5**	**S3?**		
***Bulbostylis coarctata* (Ell.) Fern.**	**Elliott's Hairsedge**	**G3G5**	**S3**		
syn: *Bulbostylis ciliatifolia* (Ell.) Fern. var. *coarctata* (Ell.) Kral					
***Callitriche palustris* L.**	**Vernal Water-starwort**	**G5**	**S3**		
syn: *C. verna* L.					
***Cardamine douglassii* Britt.**	**Purple Cress**	**G5**	**S3**		
***Carex austrodeflexa* P.D. McMillan, Sorrie, & van Eerden**	**Canebrake Sedge**	**G3G4**	**S3S4**		
***Carex canescens* L. var. *disjuncta* (Fern.) Toivonen**	**Silvery Sedge**	**G5T5**	**S3**		

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***Carex careyana* Torr. ex Dewey**	**Carey's Sedge**	**G4G5**	**S3**		
***Carex collinsii* Nutt.**	**Collins's Sedge**	**G4**	**S3**		
***Carex conjuncta* Boott**	**Soft Fox Sedge**	**G4G5**	**S3**		
***Carex floridana* Schwein.**	**Florida Sedge**	**G5?**	**S3**		
syn: *Carex nigromarginata* Schwein. var. *floridana* (Schwein.) Kukenth.					
***Carex fraseriana* Ker-Gawl.**	**Fraser's Sedge**	**G4**	**S3**		
syn: *Cymophyllus fraserianus* (Ker-Gawl.) Kartesz & Ghandi					
***Carex leptonervia* (Fern.) Fern.**	**Finely-nerved Sedge**	**G5**	**S3**		
***Carex lucorum* Willd. ex Link var. *austrolucorum* J. Rettig**	**Appalachian Woodland Sedge**	**G4T3T4**	**S3**		
syn: *C. pensylvanica* Lam. var. *distans* Peck					
***Carex meadii* Dewey**	**Mead's Sedge**	**G4G5**	**S3**		
Carex pedunculata* Muhl. ex Willd. var. *pedunculata	**Long-stalk Sedge**	**G5TNR**	**S3**		
***Carex pellita* Muhl. ex Willd.**	**Woolly Sedge**	**G5**	**S3S4**		
***Carex purpurifera* Mackenzie**	**Limestone Purple Sedge**	**G4?**	**S3**		
***Carex ruthii* Mackenzie**	**Ruth's Sedge**	**G3**	**S3**		
***Carex shortiana* Dewey**	**Short's Sedge**	**G5**	**S3**		
***Carex striata* Michx. var. *brevis* Bailey**	**Walter's Sedge**	**G4G5T4?**	**S3**		
syn: *C. walteriana* Bailey var. *brevis* (Bailey) Bailey					
***Carex suberecta* (Olney) Britt.**	**Prairie Straw Sedge**	**G4**	**S3**		
***Carex superata* Naczi, Reznicek, & B.A. Ford**	**Limestone Forest Sedge**	**G4?**	**S3**		
***Carex tetanica* Schkuhr**	**Rigid Sedge**	**G4G5**	**S3**		
Carex trisperma* Dewey var. *trisperma	**Three-seeded Sedge**	**G5T5**	**S3**		
***Carex venusta* Dewey**	**Dark Green Sedge**	**G4**	**S3?**		
***Castilleja coccinea* (L.) Spreng.**	**Eastern Indian Paintbrush**	**G5**	**S3**		
***Cenchrus incertus* M.A. Curtis**	**Coastal Sandbur**	**G5**	**S3**		
syn: *C. spinifex* Cav.					
***Chaerophyllum procumbens* (L.) Crantz var. *shortii* Torr. & Gray**	**Short's Spreading Chervil**	**G5T3T4Q**	**S3?**		
***Chamaecrista fasciculata* (Michx.) Greene var. *macrosperma* (Fern.) C.F. Reed**	**Marsh Senna**	**G5T3**	**S3**		
***Chamaecyparis thyoides* (L.) B.S.P.**	**Atlantic White-cedar**	**G4**	**S3**		
***Chenopodium simplex* (Torr.) Raf.**	**Maple-leaf Goosefoot**	**G5**	**S3**		
Under *C. hybridum* L. in Fernald (1950), syn: *C. gigantospermum* Aellen					
***Chrysogonum virginianum* L. var. *brevistolon* Nesom**	**Carolina Green-and-gold**	**G5TNR**	**S3**		
***Cinna latifolia* (Trev. ex Goepp.) Griseb.**	**Slender Wood Reedgrass**	**G5**	**S3**		

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***Clematis albicoma* Wherry**	**White-haired Leatherflower**	**G4**	**S3**		
***Clematis coactilis* (Fern.) Keener**	**Virginia White-haired Leatherflower**	**G3**	**S3**		
***Clematis crispa* L.**	**Marsh Swamp Leatherflower**	**G5**	**S3**		
***Coleataenia longifolia* (Torrey) Soreng ssp. *combsii* (Scribn. & C.R. Ball) Soreng** syn: *Panicum longifolium* Torrey var. *combsii* (Scribn. & Ball) Fern.	**Combs' Panic Grass**	**G5T5?**	**S3?**		
***Corallorrhiza wisteriana* Conrad**	**Spring Coralroot**	**G5**	**S3**		
***Croton monanthogynus* Michx.**	**Prairie Tea**	**G5**	**S3**		
***Cyperus haspan* L.**	**Sheathed Flatsedge**	**G5**	**S3**		
***Cyperus refractus* Engelm. ex Boeckl.**	**Reflexed Flatsedge**	**G5**	**S3**		
***Delphinium exaltatum* Ait.**	**Tall Larkspur**	**G3**	**S3**		
***Dendrolycopodium dendroideum* (Michx.) A. Haines** syn: *Lycopodium dendroideum* Michx.	**Prickly Tree-clubmoss**	**G5**	**S3**		
***Dendrolycopodium hickeyi* (W.H. Wagner, Beitel & Moran) A. Haines** syn: *Lycopodium hickeyi* W.H. Wagner, Beitel, & Moran	**Hickey's Tree-clubmoss**	**G5**	**S3?**		
***Descurainia pinnata* (Walt.) Britt. var. *brachycarpa* (Richards.) Detling**	**Western Tansy Mustard**	**G5T5**	**S3?**		
***Desmodium fernaldii* Schub.**	**Fernald's Tick-trefoil**	**G4**	**S3**		
***Desmodium lineatum* DC.**	**Sand Tick-trefoil**	**G5**	**S3**		
***Diarrhena americana* Beauv.**	**American Beakgrain**	**G4G5**	**S3**		
***Dichanthelium annulum* (Ashe) LeBlond**	**Ringed Panic Grass**	**G3G4**	**S3**		
***Dichanthelium fusiforme* (Hitchcock) Harvill** Under D. *aciculare* (Desv. ex Poir.) Gould & C.A. Clark in Kartesz (1999)	**Spindle-fruited Panic Grass**	**G5?**	**S3**		
***Dichanthelium portoricense* (Desv. ex Ham.) B.F. Hansen & Wunderlin ssp. *patulum* (Scribn. & Merr.) Freckmann & LeLong** syn: *Panicum lancearium* Trin.	**Hemlock Panic Grass**	**G5T5**	**S3**		
***Dichanthelium ravenelii* (Scribn. & Merr.) Gould** syn: *Pancium ravenelii* Scribn. & Merr.	**Ravenel's Panic Grass**	**G5**	**S3**		
***Dichanthelium scabriusculum* (Ell.) Gould & C.A. Clark** syn: *Panicum scabriusculum* Ell.	**Tall Swamp Panic Grass**	**G4**	**S3**		
***Dichanthelium wrightianum* (Scribn.) Freckmann** syn: *Panicum wrightianum* Scribn.	**Wright's Panic Grass**	**G4**	**S3**		
***Dicliptera brachiata* (Pursh) Spreng.**	**Branched Dicliptera**	**G5**	**S3**		
***Diphylleia cymosa* Michx.**	**Umbrella-leaf**	**G4**	**S3**		

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***Drosera brevifolia* Pursh** syn: *D. leucantha* Shinners	**Dwarf Sundew**	**G5**	**S3**		
***Drosera capillaris* Poir.**	**Pink Sundew**	**G5**	**S3**		
***Drosera intermedia* Hayne**	**Water Sundew**	**G5**	**S3**		
***Dryopteris campyloptera* Clarkson** syn: D. *spinulosa* (O.F. Muell.) Watt var. *americana* (Fisch.) Fern.	**Mountain Wood Fern**	**G5**	**S3**		
***Echinodorus cordifolius* (L.) Griseb.**	**Creeping Burhead**	**G5**	**S3**		
***Eleocharis albida* Torr.**	**White Spikerush**	**G4G5**	**S3**		
***Eleocharis palustris* (L.) Roemer & J.A. Schultes**	**Common Spikerush**	**G5**	**S3?**		
***Eleocharis rostellata* (Torr.) Torr.**	**Beaked Spikerush**	**G5**	**S3**		
***Erigenia bulbosa* (Michx.) Nutt.**	**Harbinger-of-spring**	**G5**	**S3**		
***Eriophorum virginicum* L.**	**Tawny Cottongrass**	**G5**	**S3**		
***Eurybia spectabilis* (Ait.) Nesom** *syn: Aster spectabilis* Ait. var. *spectabilis* and var. *suffultus* Fern. Under *A spectabilis* Ait. in Radford *et al.* (1968)	**Showy Aster**	**G5**	**S3**		
***Fallopia cilinodis* (Michx.) Holub** syn: *Polygonum cilinode* Michx.	**Fringed Bindweed**	**G5**	**S3**		
***Floerkea proserpinacoides* Willd.**	**False Mermaid**	**G5**	**S3**		
***Fraxinus nigra* Marsh.**	**Black Ash**	**G5**	**S3**		
***Fraxinus quadrangulata* Michx.**	**Blue Ash**	**G5**	**S3**		
***Galium boreale* L.**	**Northern Bedstraw**	**G5**	**S3**		
***Galium hispidulum* Michx.**	**Coastal Bedstraw**	**G5**	**S3**		
***Gentiana austromontana* Pringle & Sharp**	**Appalachian Gentian**	**G3**	**S3?**		
***Geranium robertianum* L.**	**Herb Robert**	**G5**	**S3**		
***Glyceria acutiflora* Torr.**	**Sharp-scaled Mannagrass**	**G5**	**S3**		
***Glyceria canadensis* (Michx.) Trin.**	**Canada Mannagrass**	**G5**	**S3**		
***Gymnocarpium appalachianum* Pryer & Haufler**	**Appalachian Oak Fern**	**G3**	**S3**		
***Gymnocladus dioicus* (L.) K. Koch**	**Kentucky Coffee-tree**	**G5**	**S3**		
***Gymnopogon brevifolius* Trin.**	**Short-leaf Beard Grass**	**G5**	**S3**		
***Helianthus hirsutus* Raf.**	**Hairy Sunflower**	**G5**	**S3**		
***Heuchera hispida* Pursh**	**Purple Alumroot**	**G3?**	**S3?**		
***Heuchera parviflora* Bartl.**	**Small-flowered Alumroot**	**G4**	**S3**		
Hexalectris spicata* (Walt.) Barnh. var. *spicata	**Crested Coralroot**	**G5T4T5**	**S3**		
***Hexastylis lewisii* (Fern.) Blomquist & Oosting**	**Lewis's Heartleaf**	**G3**	**S3**		
***Hottonia inflata* Ell.**	**Featherfoil**	**G4**	**S3**		
***Hydrastis canadensis* L.**	**Golden-seal**	**G3G4**	**S3**		
***Hydrolea quadrivalvis* Walt.**	**Waterpod**	**G5**	**S3**		
***Hypericum drummondii* (Grev. & Hook.) Torr. & Gray**	**Nits-and-lice**	**G5**	**S3**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Hypericum mitchellianum* Rydb.**	**Blue Ridge St. John's-wort**	**G3**	**S3**		
***Hypericum virgatum* Lam.**	**Sharp-leaf St. John's-wort**	**G4?**	**S3**		
syn: H. *denticulatum* Walt. var. *acutifolium* (Ell.) Blake					
***Hypoxis curtissii* Rose in Small**	**Curtiss' Yellow Stargrass**	**G4?**	**S3**		
***Ilex vomitoria* Ait.**	**Yaupon**	**G5**	**S3**		
***Iresine rhizomatosa* Standl.**	**Eastern Bloodleaf**	**G5**	**S3**		
***Iris prismatica* Pursh ex Ker-Gwal.**	**Slender Blue Iris**	**G4G5**	**S3**		
***Iris versicolor* L.**	**Larger Blue Flag**	**G5**	**S3**		
***Isoetes riparia* Engelm. ex A. Braun**	**Shore Quillwort**	**G5**	**S3**		
***Juglans cinerea* L.**	**Butternut**	**G4**	**S3?**		
***Juncus longii* Fern.**	**Long's Rush**	**G3Q**	**S3?**		
Justicia ovata* (Walt.) Lindau var. *ovata	**Coastal Plain Water-willow**	**G5T4T5**	**S3**		
***Lechea maritima* Leggett ex B.S.P. var. *virginica* Hodgon**	**Virginia Beach Pinweed**	**G5T3Q**	**S3**		
***Leptochloa fascicularis* (Lam.) Gray**	**Bearded Sprangletop**	**G5**	**S3**		
syn: *L. fusca* (L.) Kunth ssp. *fascicularis* (Lam.) N. Snow					
***Leucospora multifida* (Michx.) Nutt.**	**Narrow-leaf Paleseed**	**G5**	**S3**		
***Liatris helleri* T.C. Porter**	**Heller's Blazing Star**	**GNR**	**S3**		
***Lilium philadelphicum* L.**	**Wood Lily**	**G5**	**S3**		
***Linum sulcatum* Riddell**	**Grooved Yellow Flax**	**G5**	**S3**		
***Listera smallii* Wieg.**	**Appalachian Twayblade**	**G4**	**S3**		
***Lithospermum latifolium* Michx.**	**American Gromwell**	**G4**	**S3**		
***Lithospermum tuberosum* Rugel ex DC.**	**Tuberous Gromwell**	**G4**	**S3**		
***Lonicera canadensis* Bartr. ex Marsh.**	**American Fly-honeysuckle**	**G5**	**S3**		
***Ludwigia glandulosa* Walt.**	**Cylindric-fruited Primrose-willow**	**G5**	**S3**		
***Ludwigia leptocarpa* (Nutt.) Hara**	**Angle-stem Primrose-willow**	**G5**	**S3**		
***Ludwigia sphaerocarpa* Ell.**	**Globe-fruited Seedbox**	**G5**	**S3**		
***Lygodium palmatum* (Bernh.) Sw.**	**American Climbing Fern**	**G4**	**S3**		
***Malaxis spicata* Sw.**	**Florida Adder's-mouth**	**G4?**	**S3**		
syn: M. *floridana* (Chapman) Kuntze					
***Meehania cordata* (Nutt.) Britt.**	**Meehan's Mint**	**G5**	**S3**		
***Micranthes caroliniana* (A. Gray) Small**	**Carolina Saxifrage**	**G3**	**S3**		
syn: *Saxifraga caroliniana* Gray					

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***Milium effusum* L. var. *cisatlanticum* Fern.**	**Tall Millet Grass**	**G5TNR**	**S3**		
***Minuartia patula* (Michx.) Mattf.**	**Pitcher's Stitchwort**	**G4**	**S3**		
***Monotropsis odorata* Schwein. *ex* Ell.**	**Sweet Pinesap**	**G3**	**S3**		
***Myriophyllum pinnatum* (Walt.) B.S.P.**	**Cut-leaf Water-milfoil**	**G5**	**S3**		
***Nabalus roanensis* Chickering** syn: *Prenanthes roanensis* (Chickering) Chickering	**Roan Mountain Rattlesnake-root**	**G3**	**S3**		
***Nelumbo lutea* Willd.**	**American Lotus**	**G4**	**S3**		
***Ophioglossum engelmannii* Prantl**	**Engelmann's Adder's-tongue**	**G5**	**S3**		
Packera paupercula (*Michx) Á. & D. Löve var. *paupercula *syn: Senecio pauperculus Michx.*	**Balsam Ragwort**	**G5TNR**	**S3?**		
***Panax quinquefolius* L.**	**Ginseng**	**G3G4**	**S3S4**		**LT**
***Paronychia baldwinii* (Torr. & Gray) Fenzl ex Walp.ssp. *riparia* (Chapman) Chaudhri**	**Baldwin's Nailwort**	**G4T4?**	**S3**		
***Parthenium integrifolium* L. var. *mabryanum* Mears**	**Mabry's Wild Quinine**	**G5T3**	**S3?**		
***Paspalum boscianum* Fluegge**	**Bull Paspalum**	**G5**	**S3**		
***Pedicularis lanceolata* Michx.**	**Swamp Lousewort**	**G5**	**S3**		
Pellaea glabella* Mett. ex Kuhn ssp. *glabella	**Smooth Cliff-brake**	**G5T5**	**S3**		
***Penstemon hirsutus* (L.) Willd.**	**Hairy Beard-tongue**	**G4**	**S3**		
***Phacelia purshii* Buckl.**	**Miami-mist**	**G5**	**S3**		
***Philadelphus hirsutus* Nutt.**	**Hairy Mock Orange**	**G5**	**S3**		
***Phlox nivalis* Lodd. ex Sweet**	**Trailing Phlox**	**G4**	**S3**		
***Phragmites australis* (Cav.) Trin. ex Steud. ssp. *americanus* Saltonstall, P.M. Peterson, & Soreng**	**American Common Reed**	**G5T5**	**S3**		
***Physalis walteri* Nutt.** syn: *P. maritima* M.A. Curtiss syn: *P. viscosa* L. ssp. *maritima* (M.A. Curtiss) Waterfall	**Dune Ground-cherry**	**G4**	**S3**		
***Physostegia leptophylla* Small**	**Slender-leaf False Dragonhead**	**G4?**	**S3**		
Platanthera flava* (L.) Lindl. var. *flava	**Southern Rein Orchid**	**G4?T4?Q**	**S3?**		
***Platanthera flava* (L.) Lindl. var. *herbiola* (R. Br. ex Ait. f.) Luer**	**Tubercled Rein Orchid**	**G4?T4Q**	**S3?**		
***Pogonia ophioglossoides* (L.) Ker-Gawl.**	**Rose Pogonia**	**G5**	**S3**		
***Polygala cruciata* L.**	**Cross-leaved Milkwort**	**G5**	**S3?**		
***Polygonella articulata* (L.) Meisn.**	**Coastal Jointweed**	**G5**	**S3**		
***Polygonum ramosissimum* Michx.**	**Bushy Knotweed**	**G5**	**S3**		
***Ponthieva racemosa* (Walt.) C. Mohr**	**Shadow Witch Orchid**	**G4G5**	**S3**		

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***Potamogeton perfoliatus* L.** Treated as *P. perfoliatus* L. var. *bupleuroides* (Fern.) Farw. in Radford et al. (1968), and Fernald (1950)	**Perfoliate Pondweed**	**G5**	**S3**		
***Prosartes maculata* (Buckl.) Gray** syn: *Disporum maculatum* (Buckl.) Britt.	**Spotted Mandarin**	**G3G4**	**S3**		
Prunus alleghaniensis* Porter var. *alleghaniensis	**Allegheny Plum**	**G4T4**	**S3**		
***Quercus laevis* Walt.**	**Turkey Oak**	**G5**	**S3**		
***Quercus margarettiae* Ashe ex Small** syn: Q. *stellata* Wangenh. var. *margaretta* (Ashe ex Small) Sarg.	**Sand Post Oak**	**G5**	**S3**		
***Quercus virginiana* P. Mill.**	**Live Oak**	**G5**	**S3**		
Rhamnus lanceolata* Pursh var. *lanceolata	**Lance-leaf Buckthorn**	**G5T4T5**	**S3**		
***Rhododendron cumberlandense* E.L. Braun**	**Cumberland Azalea**	**G4?**	**S3**		
***Rhynchospora caduca* Ell.**	**Angle-stem Beaksedge**	**G5**	**S3**		
Rhynchospora cephalantha* Gray var. *cephalantha	**Common Bunched Beaksedge**	**G5T4T5**	**S3**		
***Rhynchospora macrostachya* Torr. ex Gray**	**Horned Beaksedge**	**G4**	**S3**		
***Rhynchospora perplexa* Britt.**	**Pineland Beaksedge**	**G5**	**S3**		
***Rhynchospora rariflora* (Michx.) Ell.**	**Few-flowered Beaksedge**	**G5**	**S3**		
***Ribes glandulosum* Grauer**	**Skunk Currant**	**G5**	**S3**		
***Ruellia humilis* Nutt.**	**Low Wild-petunia**	**G5**	**S3**		
***Ruellia purshiana* Fern.**	**Pursh's Wild-petunia**	**G3**	**S3**		
***Sabatia brachiata* Ell.**	**Narrow-leaf Rose-pink**	**G5?**	**S3**		
***Sabatia calycina* (Lam.) Heller**	**Long-lobed Arrowhead**	**G5?**	**S3**		
***Sabatia dodecandra* (L.) B.S.P.**	**Large Marsh-pink**	**G5?**	**S3**		
***Scirpus divaricatus* Ell.**	**Spreading Bulrush**	**G5**	**S3**		
***Scirpus hattorianus* Makino**	**Northern Bulrush**	**G5**	**S3**		
***Scirpus lineatus* Michx.** syn: S. *fontinalis* Harper	**Drooping Bulrush**	**G4**	**S3**		
Scutellaria saxatilis Riddell	**Rock Skullcap**	**G3**	**S3**		
***Sesuvium maritimum* (Walt.) B.S.P.**	**Small Sea-purslane**	**G5**	**S3**		
***Sideroxylon lycioides* L.** syn: *Bumelia lycioides* (L.) Pers.	**Buckthorn Bumelia**	**G5**	**S3**		
***Sisyrinchium fuscatum* Bickn.** syn: S. *arenicola* Bickn.	**Coastal Plain Blue-eyed-grass**	**G5?**	**S3**		
***Solidago faucibus* Wieboldt**	**Gorge Goldenrod**	**G2G4**	**S3**		
***Solidago flaccidifolia* Small** syn*: S. curtisii* Torr. & Gray var. *flaccidifolia* (Small) Cook & Semple	**Mountain Goldenrod**	**G5**	**S3?**		
***Solidago hispida* Muhl. ex Willd.**	**Hairy Goldenrod**	**G5**	**S3**		

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***Solidago tarda* Mackenzie** Under *S. arguta* in Radford et al. (1968) Under *S. arguta* var. *arguta* in Kartesz (1999) syn: S. *ludoviciana* (Gray) Small	**Sandhill Goldenrod**	**G4?Q**	**S3?**		
***Sparganium eurycarpum* Engelm. ex Gray**	**Giant Bur-reed**	**G5**	**S3**		
***Spinulum annotinum* (L.) A. Haines** syn: *Lycopodium annotinum L.*	**Stiff Clubmoss**	**G5**	**S3?**		
***Spiranthes ochroleuca* (Rydb.) Rydb.**	**Yellow Nodding Ladies'-tresses**	**G4**	**S3**		
***Spiranthes odorata* (Nutt.) Lindl.** syn: S. *cernua* (L.) L.C. Rich var. *odorata* (Nutt.) Correll	**Fragrant Ladies'-tresses**	**G5**	**S3**		
***Stachys hyssopifolia* Michx.**	**Hyssop-leaf Hedge-nettle**	**G4G5**	**S3**		
***Stachys latidens* Small ex Britt.**	**Broad-tooth Hedge-nettle**	**G4G5**	**S3**		
***Stellaria corei* Shinners** syn: *Stellaria pubera* Michx. var. *sylvatica* (Beguinot) Weath.	**Tennessee Starwort**	**G4**	**S3**		
***Stewartia malacodendron* L.**	**Silky Camellia**	**G4**	**S3**		
Styrax americanus* Lam. var. *americanus	**American Snowbell**	**G5TNR**	**S3**		
***Styrax grandifolius* Ait.**	**Bigleaf Snowbell**	**G5**	**S3**		
***Suaeda linearis* (Ell.) Moq.**	**Tall Sea-blite**	**G5**	**S3**		
Symphyotrichum ericoides* (L.) Nesom var. *ericoides syn: *Aster ericoides L.*	**White Heath Aster**	**G5T5**	**S3**		
***Symphyotrichum urophyllum* (Lindl.) G.L. Nesom**	**Arrow-leaved Aster**	**G4G5**	**S3**		
***Taenidia montana* (Mackenzie) Cronq.**	**Mountain Pimpernel**	**G3**	**S3**		
***Taxus canadensis* Marshall**	**Canada Yew**	**G5**	**S3**		
***Thermopsis mollis* (Michx.) M.A. Curtis ex Gray**	**Appalachian Golden-banner**	**G3G4**	**S3**		
***Tradescantia subaspera* Ker-Gawl.**	**Zigzag Spiderwort**	**G5**	**S3**		
***Tragia urticifolia* Michx.**	**Nettle-leaf Noseburn**	**G5**	**S3**		
***Trifolium virginicum* Small ex Small & Vail**	**Kates Mountain Clover**	**G3**	**S3**		
***Triglochin striata* Ruiz & Pavon**	**Southern Arrowgrass**	**G5**	**S3**		
Triosteum aurantiacum* Bickn. var. *aurantiacum	**Orange-fruited Horse-gentian**	**G5T5**	**S3**		
***Tsuga caroliniana* Engelmann**	**Carolina Hemlock**	**G3**	**S3**		
***Typha domingensis* Pers.**	**Southern Cattail**	**G4G5**	**S3?**		
***Uniola paniculata* L.**	**Sea Oats**	**G5**	**S3**		
***Utricularia geminiscapa* Benj.**	**Two-flowered Bladderwort**	**G4G5**	**S3**		
***Utricularia macrorhiza* Le Conte** syn: *U. vulgaris* L.	**Common Bladderwort**	**G5**	**S3**		

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***Utricularia radiata* Small** syn: *U. inflata* Walt. var. *minor* Chapman	**Floating Bladderwort**	**G4**	**S3**		
Verbesina virginica* L. var. *virginica All Virginia *V. virginica* is var. *virginica*	**White Crownbeard**	**G5?T5?**	**S3**		
***Viola brittoniana* Pollard**	**Coast Violet**	**G4G5**	**S3?**		
***Viola esculenta* Ell.** syn: *Viola ×esculenta* Ell. (pro sp.) Under *V. septemloba* Le Conte in Radford et al. (1968)	**Salad Violet**	**G4G5**	**S3**		
***Viola macloskeyi* F. Lloyd var. *pallens* (Banks ex A.P. de Candolle) C.L. Hitchcock**	**Smooth White Violet**	**G5T5**	**S3**		
***Viola septentrionalis* Greene**	**Northern Blue Violet**	**G5**	**S3**		
***Wolffiella gladiata* (Hegelm.) Hegelm.** syn: *W. floridana* (J.D. Sm.) J.D. Sm. ex Hegelm.	**Sword Bogmat**	**G5**	**S3**		
***Zanthoxylum americanum* P. Mill.**	**Toothache Tree**	**G5**	**S3**		
***Zanthoxylum clava-herculis* L.**	**Hercules'-club**	**G4**	**S3**		

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PART THREE:

VASCULAR PLANT REVIEW LIST
(Taxa of Uncertain Status)

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Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Agalinis fasciculata* (Ell.) Raf.**	**Tall False Foxglove**	**G5**	**SU**		
syn: *Gerardia fasciculata* (Ell.) Raf.					
***Agrostis altissima* (Walt.) Tuckerman**	**Coastal Bog Bentgrass**	**G4**	**SNR**		
***Allium burdickii* (Hanes) A.G. Jones**	**Narrow-leaved ramps**	**G4G5**	**SU**		
Alopecurus aequalis* Sobol. var. *aequalis	**Short-awn Foxtail Grass**	**G5T5**	**SNA**		
***Ampelopsis cordata* Michx.**	**Heart-leaf Peppervine**	**G5**	**SNR**		
***Andropogon glaucopsis* Ell.**	**Chalky Bluestem**	**G3G5**	**SNR**		
syn: *A. virginicus* L. var. *glaucopsis* (Ell.) A.S. Hitchc.					
syn: A. *glomeratus* (Walt.) Britt. var. *glaucopsis* (Ell.) A.S. Hitchc.,					
Under *A. virginicus* L. in Radford *et al.* (1968)					
***Andropogon tenuispatheus* (Nash) Nash**	**Maritime Bushy Bluestem**	**G5**	**SU**		
syn: *A. glomeratus* (Walt.) Britt. var. *pumilus* Vasey ex Dewey					
***Antennaria howellii* Greene ssp. *petaloidea* (Fern.) Bayer**	**Small Pussytoes**	**G5T4T5**	**SU**		
syn: *A. petaloidea* (Fern.) Fern.					
***Arisaema triphyllum* (L.) Schott ssp. *stewardsonii* (Britt.) Huttleston**	**Bog Jack-in-the-pulpit**	**G5T4T5**	**SU**		
syn: *A. stewardsonii* Britt.					
***Asarum canadense* L. var. *acuminatum* Ashe**	**Wild ginger**	**G5TNR**	**SU**		
***Asplenium trichomanes* L. ssp. *quadrivalens* D.E. Meyer emend. Lovis**	**Limestone maidenhair**	**G5TNR**	**SU**		
***Boechera burkii* (Porter) Windham & Al-Shehbaz**	**Burk's Smooth Rock Cress**	**G3G5**	**SU**		
***Calystegia silvatica* (Kit.) Griseb. ssp. *fraterniflora* (Mackenzie & Bush) Brummitt**	**Large Bindweed**	**G5T5**	**SU**		
syn: *Convolvulus sepium* L. var. *fraterniflorus* Mackenzie & Bush					
***Carex cherokeensis* Schweinitz**	**Cherokee Sedge**	**G4G5**	**SNA**		
***Carex molesta* Mackenzie ex Bright**	**Troublesome Sedge**	**G4**	**SNR**		
***Carex muehlenbergii* Schkuhr ex Willd. var. *enervis* Boott**	**Small-fruited Muehlenberg's Sedge**	**G5T5**	**SNR**		
***Carex tribuloides* Wahlenberg var. *sangamonensis* Clokey**	**Midwestern Blunt Broom Sedge**	**G5T4T5**	**SNR**		
***Coleataenia anceps* (Michx.) Soreng ssp. *rhizomata* (A.S. Hitchc. & Chase) Soreng**	**Small Beaked Panic Grass**	**G5TNR**	**SU**		
syn: *Panicum anceps* Michx. var. *rhizomatum* (A.S. Hitchc. & Chase) Fern.					

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***Crataegus disperma* Ashe**	**Two-seed Hawthorn**	**G4G5**	**SU**		
***Crataegus iracunda* Beadle**	**Forest Hawthorn**	**G5**	**SU**		
Included in *C. flabellata* (Bosc.) K. Koch. in Radford *et al*. (1968)					
***Crataegus vailiae* Britt.**	**Vail's Hawthorn**	**G4?Q**	**SU**		
***Crepidomanes intricatum* (Farrar) Ebihara & Weakley**	**Grotto-felt**	**G4G5**	**SU**		
syn: *Trichomanes intricatum* Farrar					
Cypripedium parviflorum* Salisb. var. *parviflorum	**Small Yellow Lady's-slipper**	**G5T3T5**	**SNR**		
***Desmodium paniculatum* (L.) DC. var. *epetiolatum* Schub.**	**Narrow-leaf Tick-trefoil**	**G5T1Q**	**SNR**		
***Diarrhena obovata* (Gleason) Brandenburg**	**Western Beakgrain**	**G4G5**	**SNA**		
syn: *D. americana* Beauv. var. *obovata* Gleason					
***Dichanthelium spretum* (J.A. Schultes) Freckmann**	**Eaton's Panic Grass**	**G5**	**SNR**		
syn: *Panicum spretum* J.A. Schultes					
***Digitaria villosa* (Walt.) Pers.**	**Shaggy Crabgrass**	**G5**	**SU**		
syn: D. *filiformis* (L.) Koeler var. *villosa* (Walt.) Fern.					
Eragrostis pectinacea* (Michx.) Nees ex Steud. var. *pectinacea	**Tufted Lovegrass**	**G5T5**	**SNR**		
***Eupatorium cordigerum* (Fern.) Fern.**	**Clasping Round-leaf Thoroughwort**	**GNR**	**SU**		
syn: *Eupatorium rotundifolium* L. var. *cordigerum* Fern.					
***Eupatorium vaseyi* Porter**	**Vasey's Thoroughwort**	**G3G5**	**SU**		
syn: *Eupatorium sessilifolium* L. var. *vaseyi* (Porter) Fern. & Grisc.					
syn: E. *album* L. var. *monardifolia* Fern.					
***Euphorbia pubentissima* Michx.**	**False Flowering Spurge**	**G5**	**SU**		
***Euphorbia spathulata* Lam.**	**Woodland Spurge**	**G5**	**SU**		
Included with *E. obtusata* Pursh in Harvill *et al*. (1992).					
***Euthamia hirtipes* (Fern.) Sieren**	**Marsh Flat-top Goldenrod**	**GNR**	**SNR**		
syn: E. *graminifolia* (L.) Nutt. var. *hirtipes* (Fern.) C.&J. Taylor					
***Galium orizabense* Hemsl. ssp. *laevicaule* (Weatherby & Blake) Dempster**	**Bald Bedstraw**	**G5?T4?**	**SU**		
syn: G. *pilosum* Ait. var. *laevicaule* Weatherby & Blake					

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Glandularia canadensis* (L.) Nutt.** syn: *Verbena canadensis* (L.) Britt.	**Rose Vervain**	**G5**	**SNA**		
***Gratiola virginiana* L. var. *aestuariorum* Pennell**	**Roundfruit hedge-hyssop**	**G5T2T4**	**SU**		
***Isolepis carinata* Hooker & Arnott ex Torr.** syn: *Isolepis koilolepis Steud.* syn: *Scirpus koilolepis* (Steud.) Gleason	**Keeled Bulrush**	**G5**	**SNA**		
Juncus validus* Coville var. *validus syn: J. *crassifolius* Buch.	**Round-headed Rush**	**G5T3T5**	**SNA**		
***Lathyrus pusillus* Ell.**	**Tiny Pea**	**G5?**	**SNA**		
***Lemna minuta* Kunth**	**Pale duckweed**	**G4**	**SU**		
***Leptochloa panicea* (Retz) Ohwi ssp. *brachiata*(Steudel) N. Snow**	**Red Sprangletop**	**GNRTNR**	**SNA**		
***Leptochloa panicoides* (J. Presl) A.S. Hitchc.** *syn: Diplachne panicoides* (J. Presl) McNeill	**Amazon Sprangletop**	**G5**	**SNA**		
***Liatris squarrulosa* Michx.** Under *L. aspera* Michx. in Harvill et al. (1992) syn: *L. earlei (Greene) K. Schum.*	**Appalachian Blazing Star**	**G4G5**	**SU**		
***Ludwigia polycarpa* Short & Peter**	**A seedbox**	**G4**	**SU**		
***Lycopus angustifolius* Ell.** Under *M. unifolia* Michx. in Radford et al. (1968)	**Narrow-leaf Bugleweed**	**G4?Q**	**SU**		
***Melampyrum lineare* Desr. var. *pectinatum* (Pennell) Fern.**	**Pine Barren Cow-wheat**	**G5T5**	**SU**		
***Orobanche riparia* L.T. Collins**	**River Broomrape**	**G4?**	**SU**		
***Panicum gattingeri* Nash**	**Gattinger's Panic Grass**	**G4**	**SNR**		
Physalis angulata* L. var. *angulata	**Cut-leaf Ground-cherry**	**G5TNR**	**SNA**		
***Planodes virginicum* (L.) E.L. Greene** syn: *Sibara virginica* (L.) Rollins	**Virginia Winged Rock Cress**	**G5**	**SNR**		
***Pycnanthemum beadlei* (Small) Fern.**	**Beadle's Mountain-mint**	**G2G4**	**SU**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***Pycnanthemum loomisii* Nutt.** Under *P. incanum* (L.) Michx. in Radford et al. (1968) syn: *Pycnanthemum incanum* (L.) Michx. var. *loomisii* (Nutt.) Fern.	**Loomis' Mountain-mint**	**G4?**	**SU**		
***Rosa blanda* Aiton**	**Smooth Rose**	**G5**	**SU**		
***Rudbeckia laciniata* L. var. *humilis* Gray** Under *R. laciniata* L. in Radford et al. (1968)	**Southeastern Cutleaf Coneflower**	**G5T3?**	**SU**		
***Sagittaria platyphylla* (Engelm.) J.G. Sm.**	**Delta Arrowhead**	**G5**	**SU**		
***Salix lucida* Muhl.**	**Shining Willow**	**G5**	**SNA**		
Silphium asteriscus* L. var. *asteriscus	**Starry Rosin Weed**	**G5TNR**	**SNR**		
***Silphium asteriscus* L. var. *latifolium* (Gray) Clevinger**	**Broad-leaved Rosin Weed**	**G4?T4?**	**SNR**		
***Sisyrinchium capillare* Bickn.** Under *S. albidum* Raf. in Radford et al. (1968)	**Wiry Blue-eyed-grass**	**GNR**	**SU**		
Solidago canadensis* L. var. *canadensis	**Canada Goldenrod**	**G5T5**	**SNR**		
Spiranthes lacera* (Raf.) Raf. var. *lacera	**A ladies'-tresses**	**G5T5**	**SU**		
Symphyotrichum ontarionis* (Wiegand) Nesom var. *ontarionis	**Bottomland Aster**	**G5TNR**	**SNR**		
***Symphyotrichum* x *schistosum* (Steele) Nesom** syn: *Aster schistosus* Steele syn: *A. x schistosus* (Steele) Nesom in Kartesz (1999)	**Millboro aster**	**GNA**	**SNA**		
***Tridens strictus* (Nutt.) Nash** syn: *Triodia stricta* (Nutt.) Benth. ex Vasey	**Long-spike Tridens**	**G5**	**SNA**		
***Trillium luteum* (Muhl.) Harbison**	**Yellow Trillium**	**G4**	**SE?**		
***Viola incognita* Brainerd** syn.: *Viola blanda* Willd. var. *palustriformis* Gray	**Large-leaved White Violet**	**G4G5T4T5**	**SNR**		
***Vittaria appalachiana* Farrar & Mickel**	**Appalachian Shoestring Fern**	**G4**	**SU**		

PART FOUR:

RARE LICHEN AND BRYOPHYTE LISTS

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Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
LICHENS					
***Alectoria fallacina* Motyka**	**Witch's-hair lichen**	**G2**	**SH**		
***Arctoparmelia centrifuga* (L.) Hale**	**Concentric ring lichen**	**G5**	**S1**		
***Buellia stellulata* (Taylor) Mudd**	**Button lichen**	**GNR**	**S1**		
***Calvitmela talayana* (Haugen & Timdal) Andreev**	**A lichen**	**GNR**	**S1**		
***Cetradonia linearis* (Evans) J.-C. Wei & Ahti** syn: *Gymnoderma lineare* (A.Evans) Yoshim. & Sharp	**Rock-gnome lichen**	**G3**	**S1**	**LE**	
***Cetrelia monachorum* (Zahlbr.) Culb. & C. Culb.**	**Sea-storm lichen**	**G2G4**	**SH**		
***Cladonia coccifera* (L.) Willd.**	**A Cladonia**	**G5**	**S1?**		
***Heterodermia appalachensis* (Kurok.) Culb.**	**Appalachian fringe lichen**	**G2?**	**S1**		
***Heterodermia erecta* Lendemer**	**A fringe lichen**	**G1?**	S1		
***Hypogymnia krogiae* Ohlsson**	**Freckled tube lichen**	**G3G4**	**S1**		
***Hypotrachyna lividescens* (Kurok.) Hale**	**A loop lichen**	**GNR**	S1		
***Hypotrachyna oostingii* (J.P. Dey) Hale**	**Oosting's loop lichen**	**G2?**	**SH**		
***Hypotrachyna prolongata* (Kurok.) Hale**	**A loop lichen**	**G3G4**	**SH**		
***Hypotrachyna virginica* (Hale) Hale** syn: *Parmelia virginica* Hale	**A loop lichen**	**G1G2**	**SH**		
***Melanelia culbersonii* (Hale) Thell**	**Appalachian camouflage lichen**	**G2G4**	**S2**		
***Parmelia omphalodes* (L.) Ach.**	**Smoky crottle**	**G5**	**S2?**		
***Parmotrema louisianae* (Hale) Hale**	**A ruffle lichen**	**G3G5**	**S1**		
***Peltigera hydrothyria* Miadikowski & Lutzona** syn: *Hydrothyria venosa* J.L. Russell	**Waterfan**	**G4**	**S1**		
***Porpidia lowiana* Gowan**	**A boulder lichen**	**G2G3**	**S1**		
***Porpidia tuberculosa* (Sm.) Hertel & Knoph**	**A boulder lichen**	**G2G4**	**S1**		
***Psilolechea clavulifera* (Nyl.) Coppins**	**A lichen**	**GNR**	**S1**		
***Punctelia graminicola* (B. de Lesd.) Egan**	**Speckled shield lichen**	**GNR**	**S1**		
***Stereocaulon glaucescens* Tuck.**	**Bony foam lichen**	**G3**	**S2?**		
***Teloschistes flavicans* (Sw.) Norman**	**Powdered orange bush lichen**	**G4G5**	**SH**		
***Usnea angulata* Ach.**	**A beard lichen**	**G3G5**	**S1**		
LIVERWORTS					
***Anastrophyllum minutum* (Schreb.) R.M. Schust.**	**Comb Notchwort**	**G5**	**S1**		
***Aneura sharpii* Inoue & N.G. Mill.**	**A liverwort**	**G1G2**	**S1**		
***Barbilophozia attenuata* (Nees) Loeske**	**A liverwort**	**G5**	**S1**		
***Bazzania nudicaulis* A. Evans**	**A liverwort**	**G2G3**	**S1**		
***Bazzania tricrenata* (Wahlenb.) Trevis.**	**Three-toothed Whip Liverwort**	**G4**	**S1**		
***Cephaloziella spinicaulis* Douin**	**A liverwort**	**G3G4**	**S1**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
***LIVERWORTS*, continued**					
***Diplophyllum andrewsii* A. Evans**	**A moss**	**G3**	**SH**		
***Diplophyllum taxifolium* (Wahlenb.) Dumort.**	**Yew-leaved Earwort**	**G5**	**SH**		
***Drepanolejeunea appalachiana* R. M. Schuster**	**Appalachian threadwort**	**G2?**	**S1**		
***Frullania caulisequa* (Nees) Nees**	**A liverwort**	**G4G5**	**SH**		
***Lejeunea blomquistii* (Evans) Schust.**	**Blomquist's Leafy Liverwort**	**G1G2**	**S1**		
***Lejeunea ruthii* (Evans) Schust.**	**A liverwort**	**G3G4**	**S1**		
***Leptoscyphus cuneifolius* (Hook.) Mitt.**	**Wedge Flapwort**	**G4G5**	**SH**		
***Marsupella paroica* R. M. Schust.**	**A liverwort**	**G3**	**SH**		
***Metzgeria temperata* Kuwahara**	**Whiskered Veilwort**	**G4**	**S1**		
***Pellia endiviifolia* (Dicks.) Dumort.**	**Endive Pellia**	**G5**	**SH**		
***Plagiochasma rupestre* (Forst.) Steph.**	**A flapwort**	**G5**	**S1**		
***Plagiochila exigua* (Taylor) Taylor**	**A liverwort**	**G4?**	**SH**		
***Plagiochila sullivantii* Gottsche ex A. Evans**	**Sullivant's leafy liverwort**	**G2**	**SH**		
***Schistochilopsis incisa* (Schrad.) Konstant.**	**Jagged notchwort**	**G5**	**S1**		
***Solenostoma pyrifolium* Steph.**	**A liverwort**	**G4**	**SH**		
***Sphenolobopsis pearsonii* (Spruce) R.M. Schust**	**Horsehair threadwort**	**G2?**	**S1**		
***Tritomaria exsecta* (Schmidel ex Schrad.) Schiffn. ex Loeske**	**Cut Notchwort**	**G5**	**SH**		
***Tritomaria exsectiformis* (Breidl.) Schiffn. ex Loeske**	**Large cut notchwort**	**G5**	**SH**		
MOSSES					
***Bryoerythrophyllum ferruginascens* (Stirt.) Giacom.**	**Bryoerythrophyllum moss**	**G3G4**	**SH**		
***Calliergon cordifolium* (Hedw.) Kindb.**	**Calliergon moss**	**G5**	**S1**		
***Campylopus carolinae* Grout**	**A moss**	**G2**	**S1**		
***Campylopus surinamensis* Müll. Hal.**	**A moss**	**G4G5**	**S1**		
***Cirriphyllum piliferum* (Hedw.) Grout**	**Cirrhiphyllum moss**	**G5**	**S1**		
***Codriophorus aduncoides* (Bednarek-Ochyra) Bednarek-Ochyra & Ochyra**	**A moss**	**GNR**	**SH**		
***Conardia compacta* (Hook.) H. Rob.**	**A moss**	**G5**	**SH**		
***Coscinodon cribrosus* (Hedw.) Spruce**	**Copper Coscinodon**	**G3G4**	**S1**		
***Cryphaea nervosa* (Hook. & Wilson) Müll. Hal.**	**A moss**	**G4?**	**S1**		
***Dicranoweisia crispula* (Hedw.) Milde**	**Mountain Thatch Moss**	**G5**	**S1**		
***Dicranum muehlenbeckii* Bruch & Schimp.**	**A moss**	**G5**	**SH**		
***Entodon sullivantii* (Müll. Hal.) Lindb.**	**Sullivant's Entodon moss**	**G3G4**	**S2**		
***Forsstroemia producta* (Hornsch.) Paris**	**A moss**	**G5?**	**S1**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
MOSSES, continued					
Grimmia alpestris **(F. Weber & D. Mohr) Schleicher**	**A moss**	**GNR**	**S1**		
Herpetineuron toccoae **(Sull. & Lesq.) Cardot**	**A moss**	**G4G5**	**S1**		
Heterocladium macounii **Best**	**A moss**	**G4**	**S1**		
Homalia trichomanoides **(Hedw.) Schimp. var. *trichomanoides***	**Lime Homalia moss**	**G5T5**	**SH**		
Homaliadelphus sharpii **(R.S. Williams) Sharp**	**Sharp's Homaliadelphus moss**	**G3?**	**S1**		
Hylocomiastrum umbratum **(Hedw.) M. Fleisch. ex Broth.**	**A moss**	**G5**	**SH**		
Imbribryum gemmiparum **(De. Not.) J.R. Spence & H.P. Ramsay**	**Bud-tipped Bryum**	**G3G5**	**S1**		
Leptodontium viticulosoides **var. *sulphureum*** **(Müll. Hal.) R.H. Zander**	**Granfather Mountain Leptodontium**	**G2**	**SH**		
Neckera complanata **(Hedw.) Hübener**	**A moss**	**G5**	**S1**		
Oncophorus rauei **(Austin) Grout**	**A moss**	**G3**	**SH**		
Orthotrichum elegans **Schwägr. ex Hook. & Grev.**	**A moss**	**G5**	**S1**		
Orthotrichum keeverae **Crum & Anders.**	**Keever's bristle-moss**	**G2**	**S1**		
Plagiothecium latebricola **BSG**	**Lurking leskea**	**G3G4**	**SH**		
Platydictya minutissima	**Small willow moss**	**G3**	**SH**		
Polytrichastrum alpinum **(Hedw.) G. L. Sm. var. *alpinum***	**Alpine haircap moss**	**G5T5**	**SH**		
Polytrichastrum formosum **(Hedw.) G. L. Sm. var. *densifolium*** **(Mitten) Z. Iwatsuki & A. Noguchi**	**A haircap moss**	**G5TNR**	**SH**		
Pseudobryum cinclidioides **(Huebener) T.J. Kop.**	**River thyme moss**	**G5**	**SH**		
Rhabdoweisia crenulata **(Mitt.) H. Jameson**	**Himalayan Ribbed Weissia**	**G3G5**	**S1**		
Schistidium dupretii **(Thér.) W. A. Weber**	**A moss**	**GNR**	**SH**		
Schlotheimia rugifolia **(Hook.) Schwägr.**	**A moss**	**G3G5**	**SH**		
Sphagnum angustifolium **(C. Jens. ex Russ.) C. Jens.**	**Narrowleaf peatmoss**	**G5**	**S1S2**		
Sphagnum contortum **Schultz**	**A peatmoss**	**G5**	**S1**		
Sphagnum fuscum **(Schimp.) Klinggr.**	**Brown peatmoss**	**G5**	**SH**		
Sphagnum girgensohnii**Russ.**	**Girgensohn's peatmoss**	**G5**	**S1S2**		
Sphagnum macrophyllum **Bernh. ex Brid. var. *macrophyllum***	**Large-leaf peatmoss**	**G3G5T3?**	**S2**		
Sphagnum portoricense **Hampe**	**Puerto Rico peatmoss**	**G5**	**S1**		
Sphagnum rubellum **Wils.**	**Red peatmoss**	**G5**	**S2**		
Syntrichia amphidiacea **(Müll. Hal.) R.H. Zander**	**A moss**	**G3G5**	**SH**		
Syrrhopodon incompletus **Schwägr.**	**A moss**	**G5**	**SH**		

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status
MOSSES, continued					
***Tuerckheimia svihlae* (E.B. Bartram) R.H. Zander**	**A moss**	**GNR**	**S1**		
***Ulota hutchinsiae* (Sm.) Hammar var. *rufescens* (E. Britton) Dixon**	**A moss**	**G5T3**	**SH**		

APPENDIX 1: Changes to the 2018 Lists

Additions to the rare vascular plant list

Scientific Name	Old Rank	New Rank
Cleistesiopsis oricamporum P.M. Brown	G3?	S1
***Dichanthelium sp.* 12**	N/A	S1
***Dichanthelium sp.* 13**	N/A	S1
***Malaxis bayardii* Fernald**	G1G2	SH
***Symphyotrichum schistosum* (Steele) Nesom**	GNA	S1

Removals from the rare vascular plant list

Scientific Name	Old Rank	New Rank
***Spiranthes ochroleuca* (Rydb.) Rydb.**	S2	S3

Rank changes to the lists

Scientific Name	Old Rank	New Rank
***Grimmia alpestris* (F. Weber & D. Mohr) Schleicher**	G3G5	GNR
***Parmelia omphalodes* (L.) Ach.**	G2G4	G5
***Solidago lancifolia* Torr. & Gray**	G3G4Q	G2

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APPENDIX 2. RARE SPECIES SIGHTING FORM

An important component of the natural heritage inventory and protection process involves gathering information from state experts, professionals, and avocational naturalists throughout the state. To facilitate this, the Division of Natural Heritage has developed a rare species sighting form. If you would like to participate in ourinventory and protection activities, please take a few moments to complete the attached form for any taxon from our lists. This data will be incorporated into thenatural heritage data base and used exclusively for the protection of the rare taxon and its habitat. Please send the form or pertinent electronic files (including GIS data) to staff botanist John Townsend at: Department of Conservation and Recreation, Division of Natural Heritage, 600 East Main Street, 24th Floor, Richmond, VA 23219.

Thank you for your support. The Division of Natural Heritage can only realize the protection of the Commonwealth's natural diversity by working through a network of knowledgeable and concerned individuals.

TAXON NAME:

DATE SEEN:

CITY/COUNTY:

COLLECTION INFORMATION: (Include your personal collection number, if any, and the Herbarium where the specimen has been/will be deposited)

LOCATION: (Please provide as detailed a description as possible. (**Please include a topographic map or GIS file** showing the location.)

HABITAT DESCRIPTION: (Include associated species, natural features, vegetation, and other applicable habitat information).

POPULATION DATA: (Include number of individuals, age, size, spatial distribution, evidence of reproduction and other applicable population data.)

THREATS OR EVIDENCE OF DISTURBANCE TO SITE:

LAND OWNER(S):

REPORTED BY: (Please include name, address, telephone number, and email address.)

DATE OF THIS REPORT:

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Enclosure 5. Protection Wildlife Species of North Carolina

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Natural Heritage Program

List of Rare Animal Species of North Carolina

2018

Carolina Northern Flying Squirrel (*Glaucomys sabrinus coloratus*) photo by Clifton Avery

Compiled by
Judith Ratcliffe, Zoologist

North Carolina Natural Heritage Program
N.C. Department of Natural and Cultural Resources

www.ncnhp.org

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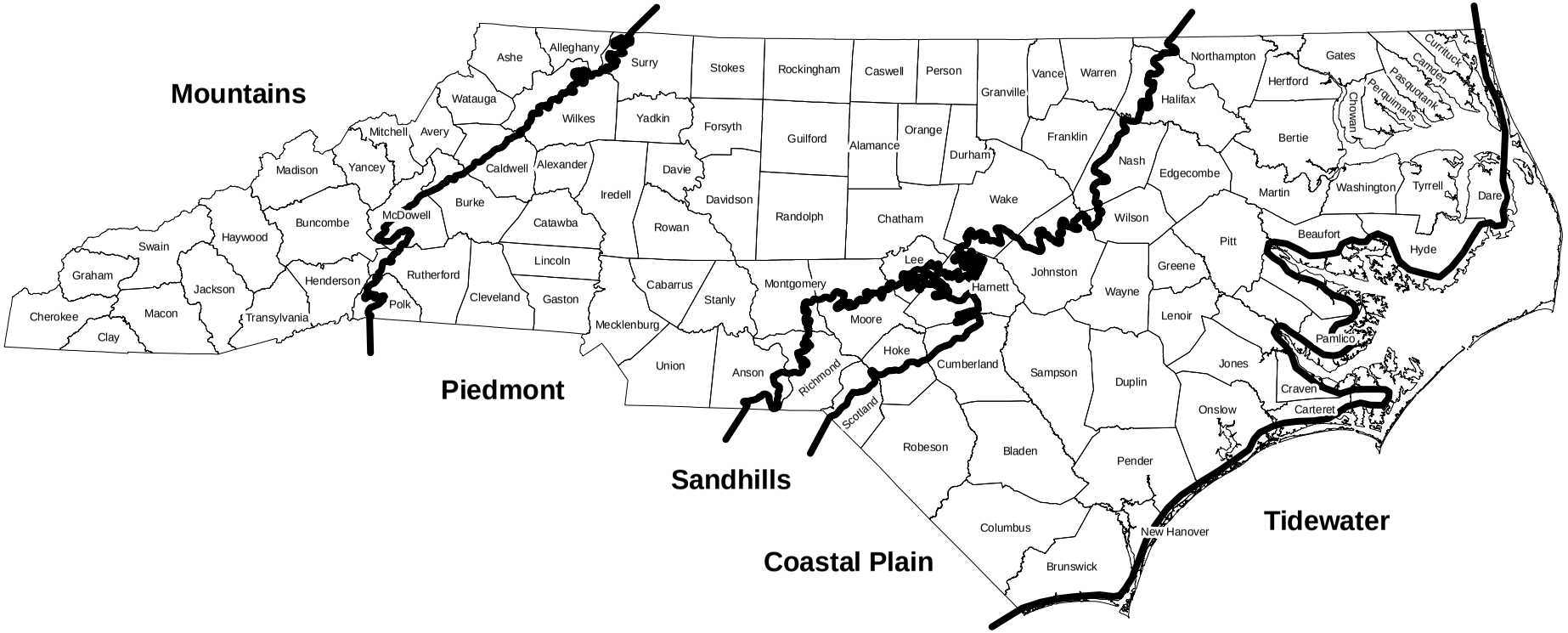

THE COUNTIES AND PHYSIOGRAPHIC PROVINCES OF NORTH CAROLINA

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Natural Heritage Program

List of Rare Animal Species of North Carolina

2018

Compiled by
Judith Ratcliffe, Zoologist

North Carolina Natural Heritage Program
N.C. Department of Natural and Cultural Resources
Raleigh, NC 27699-1651

www.ncnhp.org

This list is dynamic and is revised frequently as new data become available. New species are added to the list, and others are dropped from the list as appropriate. The list is published periodically, generally every two years. Further information may be obtained by contacting the North Carolina Natural Heritage Program, Department of Natural and Cultural Resources, 1651 MSC, Raleigh, NC 27699-1651 and the North Carolina Wildlife Resources Commission, 1701 MSC, Raleigh, NC 27699-1701. Additional information on rare species, as well as a digital version of this list, can be obtained from the Natural Heritage Program's website at www.ncnhp.org.

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The Endangered, Threatened, and Special Concern species lists of the North Carolina Wildlife Resources Commission make up the majority of vertebrate and mollusk species on the Rare Animal List. Scientific Councils compile recommendations for consideration by the Commission and upon approval these become legally protected species in North Carolina – the efforts of the Councils are very much appreciated.

The invertebrate lists have been developed with the assistance of taxa experts: Steve Hall (various groups including land snails, dragonflies and damselflies, moths, and grasshoppers and katydids), John Cooper (crayfishes), Trish MacPherson, Kathy Herring, Dave Lenat, Dave Penrose, Eric Fleek, Steven Beatty and Victor Holland (mayflies, stoneflies, caddisflies, and beetles), Dale Schweitzer (various groups but especially moths), Bo Sullivan (butterflies and moths), and Amy VanDevender (land snails). The dragonfly and damselfly lists were developed through collection records of Duncan Cuyler, with his data provided to NCNHP by Steve Roble and Bill Mauffray.

NORTH CAROLINA ANIMAL LIST – RARE

INTRODUCTION

The North Carolina Natural Heritage Program (NCNHP) conducts and maintains an inventory of known locations of rare animals and plants in the state as part of its mission to support conservation of natural areas. The primary functions of this inventory list are its use 1) in determining priorities for protection of the state's most important natural areas and the animals and plants contained therein, 2) in determining priorities for inventory, and 3) by public agencies and private persons for environmental assessment and land management planning.

The NCNHP is charged under the Nature Preserves Act (G.S. 143B-135.250 to -135.272) with compiling and maintaining information relevant to the protection of North Carolina's most important natural areas. NCNHP takes the lead role in North Carolina in the inventory of the state's natural diversity and the identification of important natural areas and rare species habitats. The list incorporates the most recent federal status designations determined by the U.S. Fish and Wildlife Service (USFWS) for all animal taxa native to North Carolina. Prior to 2018, NCNHP included Federal Species of Concern (FSC) as a federal status. The FSC list was collectively maintained by the North Carolina offices of the USFWS but FSC is not an official federal status. Under the guidance of the USFWS Region 4 office, the Raleigh Ecological Services office has revised their focus toward At-Risk Species and as such the NCNHP will no longer report FSC as a federal status. The At-Risk Species list is a dynamic list which includes species proposed for listing under the ESA, Candidate species, and species that have been petitioned for listing. Please refer to the At-Risk Species Finder at https://www.fws.gov/southeast/finder/#/species/list for more information.

This list also includes North Carolina legal status information from the N.C. Wildlife Resources Commission (NCWRC). NCWRC is responsible for the listing and protection of the state's nongame species of mammals, birds, reptiles, amphibians, freshwater fishes, mollusks, and crustaceans, under N.C. General Statutes - Chapter 113 Article 25. The NCNHP, NCWRC, and USFWS work cooperatively to ensure the continued survival of all of North Carolina's rich fauna. Over the past 25 years and continuing in the future, the advice and protection designations (for example, Endangered, Threatened, and Special Concern) of scientific councils and committees have been considered in the creation of the list.

Many species that lack formal legal protection are nonetheless imperiled in North Carolina. Therefore, NCNHP collects data on these species in addition to those classified under the three protection designations above and places them in two categories: Significantly Rare (SR) and Watch List (W). These species receive no special legal protection status; rather, the designation is used to convey information about the species' rarity within the state. The tracking of SR species, along with Endangered, Threatened, and Special Concern species, plays a critical role in how NCNHP evaluates natural areas for their importance in conservation of the state's native biodiversity. These status categories are defined in this list under "N.C. Status."

Because of the difficulty in gathering data for marine and estuarine fishes, marine invertebrates, millipedes, scorpionflies, most beetles, ants, and annelids, these animals are no longer tracked or included on the Rare or Watch lists. NCNHP requests locality and population data on the species listed in this publication. Survey forms can be downloaded from our website. For the most current information about the range of tracked species in North Carolina, visit www.ncnhp.org. Information, including maps and datasets, on animals, plants, and communities nationwide may be found on NatureServe Explorer (www.natureserve.org).

EXPLANATION OF STATUS AND RANK CODES FOR ANIMALS

Status Codes

In North Carolina, all state status (Endangered, Threatened, and Special Concern) changes must be approved by the N.C. Wildlife Resources Commission and published in the State Register for public comment. These taxa are given state protection under the State Endangered Species Act (G.S. 113-331 to 113-337). Significantly Rare and Watch List are NCNHP designations only, not affording official state protection.

United States Status is designated by the U.S. Fish and Wildlife Service (USFWS) and the U.S. National Marine Fisheries Service (USNMFS) in accordance with the U.S. Endangered Species Act of 1973 (USESA), as amended.

N.C. STATUS – ANIMALS

N.C. STATUS CODE	STATUS	DEFINITION
E	Endangered	Any native or once-native species of wild animal whose continued existence as a viable component of the state's fauna is determined to be in jeopardy or any species of wild animal determined to be an Endangered species pursuant to the Endangered Species Act. (G.S. 113-25.)
T	Threatened	Any native or once-native species of wild animal which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, or one that is designated as a Threatened species pursuant to the Endangered Species Act. (G.S. 113-25.)
SC	Special Concern	Any species of wild animal native or once-native to North Carolina which is determined by the NCWRC to require monitoring but which may be taken under regulations adopted under the provisions of the Article. (G.S.113-25)
SR	Significantly Rare	Any species which has not been listed as an Endangered, Threatened, or Special Concern species, but which exists in the state (or recently occurred in the state) in small numbers (generally fewer than 100 statewide populations) and has been determined by the NCNHP to need monitoring. Significantly Rare species include species of historical occurrence with some likelihood of rediscovery in the state and species substantially reduced in numbers by habitat destruction, direct exploitation, or disease.
SR-G	Significantly Rare-Game	Species is a game animal or a furbearer, and therefore (by law) cannot be listed for state protection as E, T, or SC.
WL	Watch List	Any other species believed to be rare and of conservation concern in the state but not warranting active monitoring at this time.

U.S. STATUS – ANIMALS

U.S. STATUS CODE	STATUS	DEFINITION
E	Endangered	A taxon that is in danger of extinction throughout all or a significant portion of its range (Public Law 93-205 87 Stat. 884).
T	Threatened	A taxon that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (Public Law 93-205 87 Stat. 884).
C	Candidate	Taxa for which the USFWS has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened. Proposed rules have not yet been issued because this action is precluded at present by other listing activity. Development and publication of proposed rules on these taxa are anticipated. The USFWS encourages state and other federal agencies as well as other affected parties to give consideration to these taxa in environmental planning (Federal Register, 28 February 1996). Taxa formerly considered "Category 1" are now considered "Candidate."
BGPA	Bald and Golden Eagle Protection Act	The Bald and Golden Eagle Protection Act (Eagle Act)(16U.S.C. 668-668d) prohibits take of bald and golden eagles and provides a statutory definition of "take" that includes "disturb." The USFWS has developed National Bald Eagle Management Guidelines to provide guidance to land managers, landowners, and others as to how to avoid disturbing bald eagles. For additional information please see http://www.fws.gov/migratorybirds/baldeagle.htm.
EXP	Experimental Population	A taxon listed as experimental (either essential or nonessential). Experimental, nonessential populations of endangered species (e.g., red wolf) are treated as threatened species on public land, for consultation purposes, and a species proposed for listing on private land.
P_	Proposed	Species proposed in the Federal Register as a status different from its current federal status.
T (S/A)	Threatened due to Similarity of Appearance	Section 4 (e) of the USESA authorizes the treatment of a species (subspecies or population segment) as endangered or threatened even though it is not otherwise listed as endangered or threatened if (a) the species so closely resembles in appearance an endangered or threatened species that enforcement personnel would have substantial difficulty in differentiating between the listed and unlisted species, (b) the effect of this substantial difficulty is an additional threat to an endangered or threatened species, and (c) such treatment of an unlisted species will substantially facilitate the enforcement and further the policy of the USESA [Federal Register 4 November 1997, Volume 62(213):59605-59623].
T-4(d)	Threatened with a 4(d) Rule	Section 4(d) of the ESA allows special regulations for threatened species that modify normal ESA protections when it is determined that such a modification is necessary and advisable to provide for the conservation of that species. A 4d rule is specific to the particular plant or animal for which it was created. For additional information, see links at http://www.fws.gov/midwest/endangered/mammals/nlba/.

Ranking System

Natural Heritage Programs and the NatureServe Network have developed a consistent method for evaluating the relative imperilment of both species and ecological communities. These assessments lead to the designation of a conservation rank. These ranks provide an estimate of extinction risk. Conservation rank values have been assigned over the past 30 years by the NCNHP, NatureServe, and a large number of collaborators in government agencies, universities, natural history museums, botanical gardens, and other conservation organizations. This information has been developed primarily to help in guiding conservation and informing environmental planning and management.

Conservation ranks are either state (S) or global (G) and are based on a one-to-five scale, ranging from critically imperiled (S1 or G1) to demonstrably secure (S5 or G5). These assessments are based on the best available information, considering a variety of factors such as abundance, distribution, population trends, and threats. Global ranks apply to the species throughout its range. The system is widely used by nationwide agencies and organizations as the best available scientific and objective assessment of a species' imperilment throughout its range.

A rank involving two numbers indicates uncertainty. For example, an S2S3 or a G2G3 rank indicates that the species may be S2 or S3 (or G2 or G3), but that existing data do not allow that determination to be made.

N.C. RANK – ANIMALS

N.C. RANK	NUMBER OF EXTANT OCCURRENCES	DESIGNATION	DESCRIPTION
S1	1-5	Critically Imperiled	Critically imperiled due to extreme rarity or some factor(s) making it especially vulnerable to extirpation (local extinction) from the state. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).
S2	6-20	Imperiled	Imperiled due to rarity or some factor(s) making it very vulnerable to extirpation from the state. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).
S3	21-100	Vulnerable	Vulnerable to extinction either because rare or uncommon, found only in a restricted range (even if abundant at some locations), or due to other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 to 10,000 individuals.
S4	101-1,000	Apparently Secure	Apparently secure and widespread, usually with more than 100 occurrences and more than 10,000 individuals.
S5	1,001+	Secure	Common, widespread, and abundant. Essentially ineradicable under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals.

N.C. RANK	NUMBER OF EXTANT OCCURRENCES	DESIGNATION	DESCRIPTION
SH	0?	Historical	Of historical occurrence, with some expectation that it may be rediscovered. Its presence may not have been verified in the past 20 years. Upon verification of an extant occurrence, SH-ranked elements would typically receive an S1 rank. Note: an element is not automatically assigned an SH (or SX) rank if it has not been verified in the past 20 years; some effort must have been made to locate or relocate occurrences.
SX	0	Presumed Extirpated	Believed to be extirpated. Has not been located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SU	Unknown	Unrankable	Currently unrankable due to lack of information or substantially conflicting information about status or trends. More information is needed.
SNR	Unknown	Not Ranked	Statewide rank not yet assessed.
SNA	N/A	Not Applicable	A conservation status rank is not applicable because the element is not a suitable target for conservation for one of these reasons: • Hybrid – an interspecific hybrid without conservation value; • Exotic Origin – not native to North Carolina; • Accidental/Nonregular – outside usual range and not regularly found in North Carolina; • Not Confidently Present – never documented as present in NC; • Synonym – the taxon is not recognized by the NCNHP.
S_B	1-?	Breeding	Rank of the breeding population in the state. Used for migratory species only. Ex: Bachman's sparrow (*Peucaea aestivalis*) is S3B,S2N).
S_N	1-?	Nonbreeding	Rank of the nonbreeding population in the state. Used for migratory species only. Ex: Bachman's sparrow.
S_?	---	Uncertain	Denotes inexact or uncertain numeric rank.

GLOBAL RANK – ANIMALS

GLOBAL RANK	NUMBER OF EXTANT POPULATIONS	DESIGNATION	DESCRIPTION
G1	1-5	Critically Imperiled	Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1,000) or acres (<2,000) or linear miles (<10).
G2	6-20	Imperiled	Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) or acres (2,000 to 10,000) or linear miles (10 to 50).
G3	21-100	Vulnerable	Vulnerable globally either because very rare throughout its range, found only in a restricted range (even if abundant at some locations), or other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
G4	101-1,000	Apparently Secure	Uncommon but not rare (although it may be rare in parts of its range, particularly on the periphery) and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern. Typically more than 100 occurrences and more than 10,000 individuals.
G5	1,001+	Secure	Common, widespread, and abundant (although it may be rare in parts of its range, particularly on the periphery). Not vulnerable in most of its range. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
GH	0?	Historical	Known only from historical occurrences, but with some expectation that it may be rediscovered. May still be extant; further searching is needed.
GX	0	Presumed Extinct	Believed to be extinct throughout its range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered. Not located despite intensive searches of historical sites and other appropriate habitat.

GLOBAL RANK	NUMBER OF EXTANT POPULATIONS	DESIGNATION	DESCRIPTION
GU	Unknown	Unrankable	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends; need more information.
GNR	Unknown	Not Ranked	Global rank not yet assessed.
G_T_	---	Subspecies or Variety Rank	As an example, G4T1 would apply to a subspecies of a species with an overall rank of G4, but the subspecies warranting a rank of G1.
G_?	---	Uncertain	Denotes inexact or uncertain numeric rank.
G_Q	---	Questionable Taxonomy	Taxonomic classification that may reduce conservation priority. Distinctiveness of this entity as a taxon at the current level is questionable. Resolution of this uncertainty may result in change from a species to a subspecies or inclusion of this taxon in another taxon, with the resulting element having a lower-priority conservation status rank.

Physiographic Province/Region. The provinces/regions in which the species is known to occur are indicated. This should not be regarded as the only province(s) or regions(s) of the state in which the species could occur; our knowledge of the fauna of North Carolina is still very imperfect. The provinces are abbreviated as follows:

ABBREVIATION	PROVINCE/REGION	DESCRIPTION
M	Mountains (Blue Ridge)	All parts of North Carolina west of the foot of the Blue Ridge Escarpment.
P	Piedmont	All parts of North Carolina east of the foot of the Blue Ridge Escarpment and west of the Fall Line, including outlying "foothill" ranges, such as the Brushy, Uwharrie, Sauratown, and South mountains. This province is shallowly underlain by crystalline metamorphic, igneous, or (rarely) consolidated sedimentary rocks.
C	Coastal Plain	All parts of North Carolina east of the Fall Line, but excluding the Sandhills region and those portions associated with Tidewater. Generally consisting of unconsolidated sands, silts, clays, and peats, though rarely shallowly underlain by consolidated coquina limestone ("marl").

S	Sandhills	Portions of Cumberland, Harnett, Hoke, Lee, Moore, Richmond, Scotland, and Montgomery counties consisting mostly of deep aeolian sands of the Middendorf and Pinehurst formations (Cretaceous to Tertiary age). The Sandhills are really part of the coastal plain but are here distinguished because of their distinctive geomorphology and vegetation. Areas somewhat resembling the Sandhills region but occurring in other parts of the state (such as Carolina bay rims and aeolian or beach ridge deposits in the outer Coastal Plain) are considered part of the Coastal Plain Province.
T	Tidewater	Areas associated with tidal water, such as the ocean and barrier islands, sounds, estuaries, and mainland brackish or salt marshes.

Habitat. The known habitats are described; as with provinces, these should not be regarded as the only possible habitats of the species in the state.

Counties of Known Occurrence. Following the description of habitats is a listing of the known counties of occurrence in the NCNHP database. We request information about any new occurrences in the state. County names are followed by symbols (defined below) if the species has not been recently verified within the county.

*	All recorded occurrences in the county are either extirpated, have not been found in recent surveys, or have not been surveyed recently enough to be confident they are still present. Unsurveyed occurrences are regarded as historical after 20-40 years, the number of years depending on the species and the amount of habitat alteration in the area. An asterisk should not be regarded as a definitive statement that the species is gone from the county but indicates that its continued existence is uncertain.

The zoological exploration of North Carolina is far from complete, and many additional county records will be found, generally (but not always) in proximity to counties listed. Visit the Natural Heritage Program website for the most up-to-date county occurrence information: www.ncnhp.org.

LIST FORMAT

Species are grouped by major taxa. Vertebrate animals are arranged by class, beginning with the most phylogenetically advanced (mammals). Within a given taxon, species are listed alphabetically by scientific name. The following information is presented for each species on the list: N.C. Status, U.S. Status, N.C. Rank, Global Rank, Physiographic Province/Region, Habitat, and Counties of Occurrence.

NUMBER OF ANIMAL TAXA BY STATUS

Numbers in the table indicate number of taxa – generally species as well as valid unique varieties and subspecies – for each group and status. Because many taxa have both an N.C. and a U.S. status, totals cannot be added across a complete line. The total number of species in North Carolina is an estimate of the species that do occur or have occurred at one time in the state.

GROUP	COUNT *	N.C. STATUS				U.S. STATUS		
		E	T	SC	SR	E	T	Other
Mammals	120	5	3	10	9	6	1 T, 1 T-4(d)	1 EXP
Birds	475	8	6	20	25	3	3	2 BGPA
Reptiles	75	4	6	12	6	3	2 T, 2 T(S/A)	-
Amphibians	90	3	5	13	11	-	-	-
Freshwater Fishes	245	12	14	28	20	4	2	-
Freshwater Bivalves	85	20	11	5	6	7	1	-
Gastropods	250+	4	8	26	52	-	1	1 C
Arachnids	?	-	-	-	13	1	-	-
Crustaceans	?	1	-	11	11	-	-	-
Mayflies	?	-	-	-	21	-	-	-
Stoneflies	?	-	-	-	13	-	-	-
Caddisflies	?	-	-	-	20	-	-	-
Dragonflies and Damselflies	190	-	-	-	37	-	-	-
Butterflies	175	-	-	-	39	1	-	-
Moths	2670+	-	-	-	112	-	-	1 C
Grasshoppers and Katydids	140	-	-	-	22	-	-	-
Beetles	?	-	-	-	7	1	-	-
True Bugs	?	-	-	-	1	-	-	-
Bees	?	-	-	-	1	1	-	-
Totals	---	57	53	125	426	27	13	5

* Approximate number known from North Carolina

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Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C	Rank Global
Mammals				
Canis rufus	**T**	**EXP**	**S1**	**G1Q**
Red Wolf				
C: swamps, pocosins, extensive forests (Beaufort, Bertie, Craven, Dare, Hyde, Martin, Pamlico, Pitt, Tyrrell, Washington)				
Condylura cristata pop. 1	**SC**		**S2**	**G5T2Q**
Star-nosed Mole - Coastal Plain population				
SC: moist meadows, bogs, swamps, bottomlands [mountain population not of concern] (Bladen, Brunswick, Columbus, Craven, Cumberland, Currituck*, Dare, Hoke, Mecklenburg*, Moore, New Hanover*, Pender, Pitt, Randolph, Richmond*, Robeson*, Sampson, Scotland*, Wake, Washington*)				
Corynorhinus rafinesquii macrotis	**SC**		**S3**	**G3G4T3**
Eastern Big-eared Bat				
SC: roosts in hollow trees, old buildings, and beneath bridges, usually near water (Beaufort, Bertie, Bladen, Brunswick, Camden, Chowan, Columbus*, Craven, Currituck, Dare, Duplin, Gates, Hertford, Hoke, Johnston, Martin, Moore, Nash, New Hanover, Northampton, Pender, Perquimans, Richmond, Robeson, Sampson, Scotland, Tyrrell, Washington, Wayne*)				
Corynorhinus rafinesquii rafinesquii	**T**		**S2**	**G3G4T3**
Rafinesque's Big-eared Bat				
M: roosts in caves, mines, and hollow trees, usually near water (Alexander*, Buncombe*, Burke, Cherokee*, Graham, Haywood, Jackson, Macon, Madison*, Swain, Transylvania, Washington)				
Corynorhinus townsendii virginianus	**E**	**E**	**S1**	**G4T2**
Virginia Big-eared Bat				
M: roosts in caves (and rarely in mines), especially in limestone areas (Avery, Watauga, Yancey)				
Glaucomys sabrinus coloratus	**E**	**E**	**S2**	**G5T2**
Carolina Northern Flying Squirrel				
M: high elevation forests, mainly spruce-fir (Ashe, Avery, Buncombe, Caldwell, Graham, Haywood, Jackson, McDowell, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Lasiurus intermedius floridanus	**SC**		**S1**	**G5T4**
Florida Yellow Bat				
PC: roosts in Spanish moss and other thick vegetation near water, often in longleaf pine habitats (Brunswick, Mecklenburg, New Hanover)				
Microtus chrotorrhinus carolinensis	**SC**		**S3**	**G5T3**
Southern Rock Vole				
M: rocky areas at high elevations, forests or fields (Avery*, Haywood, Jackson*, Macon*, Swain, Transylvania, Yancey)				
Mustela nivalis	**SR-G**		**S2**	**G5**
Least Weasel				
M: fields and forests, mostly at high elevations (Avery, Buncombe, Haywood, Henderson*, Jackson*, Madison, Swain, Watauga, Yancey)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Myotis austroriparius	**SC**		**S2**	**G4**
Southeastern Bat				
MPSC: roosts in buildings, hollow trees; forages near water; mainly in the Coastal Plain (Bertie, Bladen, Camden, Chowan, Clay, Columbus, Craven, Currituck, Gates, Halifax, Hertford, Hoke, Johnston, Jones, Martin, Moore, New Hanover, Onslow, Pender, Robeson, Scotland, Wake*)				
Myotis grisescens	**E**	**E**	**S1**	**G4**
Gray Bat				
M: roosts in caves; forages mainly over open water (Buncombe, Haywood, Madison, Swain, Transylvania, Yancey)				
Myotis leibii	**SC**		**S2**	**G4**
Eastern Small-footed Bat				
M: roosts in hollow trees and in rock crevices (warmer months), in caves and mines (winter) (Alleghany, Avery, Buncombe, Burke, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Rutherford, Swain, Transylvania, Watauga, Wilkes, Yancey)				
Myotis lucifugus	**SR**		**S2**	**G3**
Little Brown Bat				
MPC: roosts in buildings (summer), in caves and mines (winter) (Avery, Buncombe, Burke, Cherokee, Clay, Cleveland, Craven, Graham, Halifax, Haywood, Henderson*, Jackson, Jones, Macon, Madison, McDowell, Mecklenburg, Mitchell, Richmond, Rutherford, Stokes, Swain, Transylvania, Watauga, Wilkes, Yancey)				
Myotis septentrionalis	**T**	**T-4(d)**	**S2**	**G1G2**
Northern Long-eared Bat				
MPC: roosts in hollow trees and buildings (warmer months), in caves and mines (winter); mainly in the mountains (Ashe, Avery, Bertie, Bladen, Buncombe, Burke, Camden, Cherokee, Clay, Craven, Currituck, Dare, Gates, Graham, Haywood, Henderson, Jackson, Macon, Madison, Martin, McDowell, Mitchell, New Hanover, Pasquotank, Pender, Polk, Rutherford, Swain, Transylvania, Wake*, Washington, Watauga, Wilkes, Yancey)				
Myotis sodalis	**E**	**E**	**S1S2**	**G2**
Indiana Bat				
M: roosts in hollow trees or under loose bark and snags (warmer months), in caves (winter) (Cherokee, Graham, Haywood, Jackson*, Mitchell, Rutherford, Swain)				
Neotoma floridana floridana	**T**		**S1**	**G5T5**
Eastern Woodrat				
C: forests, mainly in moist areas (Brunswick*, Carteret*, Jones, New Hanover, Onslow, Pender)				
Neotoma magister	**SC**		**S2S3**	**G3G4**
Allegheny Woodrat				
MP: rocky places and abandoned buildings in deciduous or mixed forests in the northern mountains and adjacent Piedmont (Ashe, Avery, Buncombe, Burke, Caldwell, Iredell*, McDowell, Mitchell, Watauga, Yancey)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Perimyotis subflavus	**SR**		**S3**	**G2G3**
Tricolored Bat				
MPSC: roosts in clumps of leaves (mainly in summer), caves, rock crevices, and other dark and sheltered places (Alleghany*, Anson, Avery, Beaufort, Bertie, Bladen, Buncombe, Burke, Cabarrus, Camden, Carteret, Chatham, Cherokee, Clay, Cleveland, Craven, Cumberland, Currituck, Davidson, Gates, Graham, Harnett, Haywood, Henderson, Hoke, Jackson, Jones, Lenoir, Macon, Madison, Martin, McDowell, Mitchell, Montgomery, Moore, Onslow, Orange, Pender, Polk, Randolph, Robeson, Rutherford, Scotland, Stanly, Stokes, Swain, Transylvania, Tyrrell, Wake, Washington, Watauga, Wilkes, Yancey)				
Peromyscus leucopus buxtoni	**SC**		**S1**	**G5T1**
Buxton Woods White-footed Deermouse				
T: maritime forests in Cape Hatteras vicinity (endemic to this area) (Dare)				
Peromyscus leucopus easti	**SC**		**S1**	**G5T1**
Pungo White-footed Deermouse				
T: dunes and maritime thickets along coast south to Corolla (Currituck, Dare)				
Peromyscus polionotus	**SC**		**S1**	**G5**
Oldfield Deermouse				
P: sandy, fallow fields near South Carolina line (Cleveland*, Mecklenburg, Rutherford)				
Sorex dispar blitchi	**SR**		**S3**	**G4T3T4**
Southern Rock Shrew				
M: high elevation forests with talus or rocky slopes (Avery, Buncombe, Haywood, Henderson, Jackson, Macon, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Sorex palustris punctulatus	**SR**		**S3**	**G5T3**
Southern Water Shrew				
M: stream banks in montane forests (Avery*, Buncombe, Clay, Graham, Haywood, Jackson, Macon, Polk, Swain, Watauga)				
Spilogale putorius	**SR-G**		**S2**	**G4**
Eastern Spotted Skunk				
MP: forests with rocks, cliffs, and other den sites (Alleghany, Ashe*, Avery, Buncombe, Burke, Caldwell, Cherokee*, Graham, Haywood, Henderson*, Jackson, Macon*, Madison*, McDowell, Mitchell, Rutherford, Swain*, Transylvania, Wilkes, Yancey)				
Sylvilagus obscurus	**SR-G**		**S3**	**G4**
Appalachian Cottontail				
M: dense cover of montane woods and thickets (Alleghany, Ashe, Avery, Buncombe, Cherokee, Clay, Graham, Haywood, Jackson, Macon, Madison, Mitchell, Swain*, Transylvania, Yancey)				
Synaptomys cooperi helaletes	**SR**		**S2S3**	**G5T3**
Dismal Swamp Southern Bog Lemming				
C: low pocosins, early succession wetlands (Beaufort, Craven, Gates, Jones, Pasquotank*)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Trichechus manatus	**T**	**T**	**S1N**	**G2**
West Indian Manatee				
T: warm waters of estuaries and river mouths (Beaufort, Brunswick, Carteret, Craven, Currituck, Dare, Hyde, Jones, Lenoir, New Hanover, Onslow, Pamlico, Pender, Pitt)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C	Rank Global
Birds				
Accipiter striatus	**SR**		**S1B,S4N**	**G5**
Sharp-shinned Hawk				
MPS: forests and woodlands (for nesting) [breeding evidence only] (Avery, Caldwell, Durham, Jackson, Mitchell*, Orange, Watauga, Yancey)				
Aegolius acadicus	**T**		**S2B,S2N**	**G5**
Northern Saw-whet Owl				
M: spruce-fir forests or mixed hardwood/spruce forests (for nesting) [breeding season only] (Avery, Buncombe, Clay, Graham, Haywood, Jackson, Macon, Madison, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Ammodramus henslowii	**E**		**S1B,S1N**	**G4**
Henslow's Sparrow				
C: clearcut pocosins and other damp weedy fields [breeding season only] (Beaufort, Bertie*, Brunswick*, Carteret*, Edgecombe*, Gates*, Martin*, Onslow, Orange*, Pender*, Pitt, Wake*, Wilson*)				
Aquila chrysaetos	**SR**	**BGPA**	**SXB,S1N**	**G5**
Golden Eagle				
MC: grass balds or fields amid remote and extensive forests in higher mountains, near waterfowl impoundments or large lakes in coastal areas [regular wintering sites] (Alleghany, Hyde, Mitchell, Wilkes, Yancey)				
Botaurus lentiginosus	**SR**		**S1B,S3N**	**G5**
American Bittern				
CT: fresh or brackish marshes [breeding evidence only] (Beaufort, Carteret, Hyde, Pamlico)				
Calidris canutus rufa	**T**	**T**	**S2N**	**G4T2**
Red Knot - rufa subspecies				
T: beaches and sand flats [wintering habitat only] (New Hanover, Onslow)				
Catharus guttatus	**SR**		**S2B,S5N**	**G5**
Hermit Thrush				
M: spruce-fir forests; sparingly in northern hardwood forests [breeding evidence only] (Ashe, Avery, Buncombe, Graham, Haywood, Jackson, McDowell, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Catharus ustulatus	**SR**		**S1B,S5N**	**G5**
Swainson's Thrush				
M: spruce-fir forests [breeding evidence only] (Buncombe, Mitchell, Yancey)				
Certhia americana	**SC**		**S3B,S5N**	**G5**
Brown Creeper				
M: high elevation forests, favoring spruce-fir mixed with hardwoods [breeding evidence only] (Avery, Buncombe, Burke, Caldwell, Clay, Graham, Haywood, Jackson, Macon, Madison, McDowell, Mitchell, Swain, Transylvania, Watauga, Yancey)				

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Charadrius melodus circumcinctus	**E**	**E**	**S1N**	**G3T3**
Piping Plover - Interior subspecies T: ocean beaches and island-end flats [wintering only] (Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover, Onslow, Pender)				
Charadrius melodus melodus	**T**	**T**	**S1B,S1N**	**G3T3**
Piping Plover - Atlantic Coast subspecies T: ocean beaches and island-end flats [breeding evidence only] (Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover, Onslow, Pender)				
Charadrius wilsonia	**SC**		**S2B**	**G5**
Wilson's Plover T: beaches, island-end flats, estuarine islands [breeding evidence only] (Brunswick, Carteret, Dare, Hyde, New Hanover, Onslow, Pender)				
Chondestes grammacus	**SR**		**S1B**	**G5**
Lark Sparrow S: barren, sandy fields with scattered saplings in the sandhills region[breeding evidence only] (Cumberland, Hoke, Montgomery, Moore, Richmond, Scotland)				
Circus hudsonius	**SR**		**S1B,S4N**	**G5**
Northern Harrier T: extensive brackish marshes (for nesting) [breeding evidence only] (Carteret, Dare, Hyde)				
Coccyzus erythropthalmus	**SR**		**S2B**	**G5**
Black-billed Cuckoo M: deciduous forests, mainly at higher elevations [breeding evidence only] (Ashe, Avery, Buncombe, Burke, Caldwell, Haywood, Henderson, Jackson, Macon, McDowell, Mitchell, Transylvania, Watauga, Yancey)				
Columbina passerina	**SR**		**SXB**	**G5**
Common Ground-Dove T: dunes, sandy fields, margins of maritime woods and thickets [breeding evidence only] (Brunswick*, New Hanover*, Pender*)				
Dolichonyx oryzivorus	**SR**		**S1B**	**G5**
Bobolink M: meadows and other grasslands [breeding evidence only] (Ashe, Haywood, Henderson, Transylvania, Watauga)				
Egretta caerulea	**SC**		**S3B,S3N**	**G5**
Little Blue Heron CT: forests or thickets on maritime islands, rarely in swamps or at ponds [breeding evidence only] (Brunswick, Carteret, Columbus, Cumberland, Currituck, Dare, Hyde, Jones, New Hanover, Pender, Robeson)				

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Egretta thula	**SC**		**S2S3B,S3N**	**G5**
Snowy Egret				
CT: forests or thickets on maritime islands, rarely in swamps or at ponds [breeding evidence only] (Brunswick, Carteret, Columbus, Currituck, Dare, Hyde, New Hanover, Robeson)				
Egretta tricolor	**SC**		**S3B,S3N**	**G5**
Tricolored Heron				
T: forests or thickets on maritime islands [breeding evidence only] (Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover)				
Elanoides forficatus	**SR**		**S1B**	**G5**
Swallow-tailed Kite				
C: swamps and bottomlands near lower Cape Fear River, often forages over nearby fields or marshes [breeding evidence only] (Bladen, Pender)				
Empidonax alnorum	**SR**		**S2B**	**G5**
Alder Flycatcher				
M: high elevation shrub/sapling thickets [breeding evidence only] (Alleghany, Ashe, Avery, Buncombe, Haywood, Jackson, Mitchell, Watauga, Yancey)				
Falco peregrinus anatum	**E**		**S1B,S2N**	**G4T4**
American Peregrine Falcon				
MT: cliffs (nesting); coastal ponds and mudflats (foraging in winter) [breeding evidence; regular wintering sites] (Avery, Brunswick, Buncombe, Burke, Carteret*, Dare, Haywood, Henderson, Hyde, Jackson, Macon, Madison, Mecklenburg, Rutherford, Stokes*, Surry, Swain, Transylvania, Wilkes*, Yancey)				
Falco sparverius	**SR**		**S2B,S5N**	**G5**
American Kestrel				
MPSC: open country, such as extensive farmland; nests in cavities [breeding evidence only] (records not yet entered)				
Gelochelidon nilotica	**T**		**S1S2B**	**G5**
Gull-billed Tern				
T: sand flats on maritime islands [breeding evidence only] (Brunswick, Carteret, Dare, Hyde, New Hanover, Onslow)				
Haematopus palliatus	**SC**		**S2S3B,S3N**	**G5**
American Oystercatcher				
T: estuaries, oyster beds, mudflats [breeding evidence only] (Brunswick, Carteret, Dare, Hyde, New Hanover, Onslow, Pender)				

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Haliaeetus leucocephalus	**T**	**BGPA**	**S3B,S3N**	**G5**
Bald Eagle				
MPCT: mature forests near large bodies of water (nesting); rivers, lakes, and sounds (foraging) [breeding evidence only] (Anson, Beaufort, Bertie, Bladen, Brunswick, Buncombe, Burke, Cabarrus, Camden, Carteret, Catawba, Chatham, Cherokee, Chowan, Clay, Cleveland, Columbus, Craven, Currituck, Dare, Davidson, Durham, Edgecombe, Franklin, Gaston, Gates, Graham, Granville, Guilford, Halifax, Harnett*, Haywood, Hyde, Iredell, Johnston, Jones, Lee*, Lenoir, Macon, Martin, Mecklenburg, Montgomery, Nash, New Hanover, Northampton, Onslow, Orange, Pamlico, Pasquotank, Pender, Perquimans, Pitt, Rowan, Rutherford, Stanly, Surry, Swain, Tyrrell, Union, Vance, Wake, Warren, Washington, Watauga, Wayne, Wilkes, Yadkin)				
Himantopus mexicanus	**SR**		**S1B**	**G5**
Black-necked Stilt				
T: fresh or brackish ponds and impoundments [breeding evidence only] (Beaufort, Brunswick, Carteret, Currituck, Dare, New Hanover, Onslow, Pamlico)				
Hydroprogne caspia	**T**		**S1B,SZN**	**G5**
Caspian Tern				
T: sand flats on maritime islands [breeding evidence only] (Dare, Hyde)				
Ixobrychus exilis	**SC**		**S2S3B**	**G4G5**
Least Bittern				
PCT: fresh or brackish marshes [breeding evidence only] (Beaufort, Brunswick, Carteret, Craven*, Currituck, Dare, Hyde, Moore*, New Hanover, Onslow, Pamlico, Pender, Tyrrell*, Washington, Wayne)				
Laterallus jamaicensis	**SC**	**PT**	**S1**	**G3G4**
Black Rail				
PCT: brackish marshes, rarely fresh marshes [breeding evidence only] (Carteret, Currituck, Dare, Hyde, New Hanover, Onslow, Pamlico)				
Loxia curvirostra	**SC**		**S2**	**G5**
Red Crossbill				
M: coniferous forests, preferably spruce-fir (Ashe*, Avery, Buncombe, Burke*, Graham, Haywood, Jackson, Macon, Madison, McDowell, Mitchell, Swain, Transylvania, Wake*, Watauga, Yancey)				
Mycteria americana	**T**	**T**	**S1B,S1N**	**G4**
Wood Stork				
CT: swamps, fresh or brackish ponds (foraging) [breeding evidence and regular non-breeding sites] (Bladen, Brunswick, Columbus, Robeson, Sampson)				
Nyctanassa violacea	**SR**		**S2B**	**G5**
Yellow-crowned Night-Heron				
PCT: inland swamps; woods or thickets on maritime islands [breeding evidence only] (Carteret, Dare, Durham, Forsyth, Guilford, Mecklenburg)				

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Passerculus sandwichensis	**SR**		**S2B,S5N**	**G5**
Savannah Sparrow				
M: grassy fields and pastures [breeding evidence only] (Alleghany, Ashe, Watauga)				
Passerina ciris	**SC**		**S2B**	**G5**
Painted Bunting				
T: maritime shrub thickets and forest edges [breeding evidence only] (Brunswick, Carteret, New Hanover, Onslow, Pender)				
Pelecanus occidentalis	**SR**		**S3B,S4N**	**G4**
Brown Pelican				
T: maritime islands [breeding evidence only] (Brunswick, Carteret, Dare, Hyde, New Hanover, Onslow)				
Peucaea aestivalis	**SC**		**S3B,S2N**	**G3**
Bachman's Sparrow				
PSC: open longleaf pine forests, old fields [breeding evidence only] (Bladen, Brunswick, Buncombe*, Carteret, Chatham, Columbus*, Craven, Cumberland, Guilford*, Halifax, Harnett, Hoke, Jones, Macon*, Moore, New Hanover, Onslow, Orange*, Pender, Richmond, Robeson*, Sampson, Scotland, Wake*, Warren*)				
Phalacrocorax auritus	**SR**		**S1B,S5N**	**G5**
Double-crested Cormorant				
PCT: lakes with scattered trees, coastal sand bars (nesting) [breeding evidence only] (Carteret, Chatham, Craven, Onslow)				
Picoides borealis	**E**	**E**	**S2**	**G3**
Red-cockaded Woodpecker				
SC: mature open pine forests, mainly in longleaf pine [breeding evidence only] (Anson*, Beaufort*, Bertie*, Bladen, Brunswick, Camden, Carteret, Chatham*, Columbus, Craven, Cumberland, Currituck, Dare, Duplin*, Edgecombe*, Gates, Greene*, Halifax*, Harnett, Hertford, Hoke, Hyde, Johnston, Jones, Lee*, Lenoir*, Montgomery*, Moore, Nash*, New Hanover, Northampton*, Onslow, Pamlico*, Pender, Pitt*, Richmond, Robeson, Sampson, Scotland, Tyrrell, Wake*, Washington, Wayne*, Wilson*)				
Plegadis falcinellus	**SC**		**S1S2B**	**G5**
Glossy Ibis				
T: forests or thickets on maritime islands [breeding evidence only] (Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover)				
Poecile atricapillus	**SC**		**S3**	**G5**
Black-capped Chickadee				
M: high elevation forests, mainly spruce-fir [breeding evidence only] (Avery, Buncombe*, Caldwell, Haywood, Jackson, Swain, Transylvania, Watauga, Yancey*)				

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Pooecetes gramineus	**SC**		**S2B,S2N**	**G5**
Vesper Sparrow				
M: high elevation pastures and grassy fields [breeding evidence only] (Ashe, Avery, Haywood, Mitchell, Watauga)				
Porphyrio martinicus	**SR**		**SHB**	**G5**
Purple Gallinule				
C: freshwater ponds with floating vegetation [breeding evidence only] (Brunswick*, Carteret*, Onslow*, Robeson*)				
Riparia riparia	**SR**		**S1B**	**G5**
Bank Swallow				
MP: high, vertical banks for nesting [breeding evidence only] (Avery, Wilkes*)				
Rynchops niger	**SC**		**S2B,S3N**	**G5**
Black Skimmer				
T: sand flats on maritime islands [breeding evidence only] (Brunswick, Carteret, Dare, Hyde, New Hanover, Onslow, Pender)				
Setophaga cerulea	**SC**		**S2B**	**G4**
Cerulean Warbler				
MC: mature hardwood forests; steep slopes and coves in mountains, natural levees in Coastal Plain [breeding evidence only] (Alleghany*, Ashe, Bertie, Buncombe, Caldwell, Clay, Graham, Halifax, Haywood, Henderson, Johnston*, Macon, Madison, Martin, McDowell, Mitchell, Northampton, Polk, Rutherford, Swain, Transylvania, Watauga, Wilkes, Yancey)				
Setophaga coronata	**SR**		**S1B,S5N**	**G5**
Yellow-rumped Warbler				
M: spruce-fir forests, especially in immature stands [breeding evidence only] (Avery, Haywood, Jackson, Mitchell, Swain, Yancey)				
Setophaga magnolia	**SR**		**S2B**	**G5**
Magnolia Warbler				
M: spruce-fir forests, especially in immature stands [breeding evidence only] (Avery, Buncombe, Caldwell, Graham, Haywood, Jackson, McDowell, Mitchell, Watauga, Yancey)				
Setophaga virens waynei	**E**		**S2B**	**G5T1**
Wayne's Black-throated Green Warbler				
C: nonriverine wetland forests, especially where white cedar or cypress are mixed with hardwoods [breeding evidence only] (Beaufort, Bladen, Brunswick*, Camden, Carteret, Columbus*, Craven, Cumberland, Currituck, Dare, Gates, Hyde, Jones, Onslow, Pamlico, Pasquotank, Tyrrell, Washington)				
Sphyrapicus varius	**SR**		**S2S3B,S5N**	**G5**
Yellow-bellied Sapsucker				
M: mature, open hardwoods with scattered dead trees [breeding evidence only] (Ashe, Avery, Buncombe, Clay*, Graham, Haywood, Jackson, Macon, Madison, Mitchell*, Swain, Transylvania, Watauga*, Yancey)				

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Spiza americana	**SR**		**S2B,SZN**	**G5**
Dickcissel				
PC: fallow fields and pastures with tall forbs [breeding evidence for consistent year-to-year sites only] (Carteret)				
Sterna dougallii dougallii	**E**	**E**	**SHB**	**G4T3**
Roseate Tern				
T: sand flats on maritime islands [breeding evidence only] (Carteret*, Dare*)				
Sterna hirundo	**E**		**S2B**	**G5**
Common Tern				
T: sand flats on maritime islands [breeding evidence only] (Brunswick*, Carteret, Dare, Hyde, New Hanover, Onslow, Pamlico*, Pender)				
Sternula antillarum	**SC**		**S3B**	**G4**
Least Tern				
T: beaches, sand flats, open dunes, gravel rooftops [breeding evidence only] (Brunswick, Carteret, Craven, Currituck, Dare, Hyde, New Hanover, Onslow, Pender)				
Thryomanes bewickii	**E**		**SXB**	**G5**
Bewick's Wren				
M: woodland borders or openings, farmlands or brushy fields, at high elevations [breeding evidence only] (Ashe*, Avery*, Buncombe*, Haywood*, Henderson*, Jackson*, Macon*, Transylvania*, Watauga*)				
Tyto alba	**SC**		**S2S3B,S3N**	**G5**
Barn Owl				
MPCT: extensive open country, nesting in old buildings, silos, large tree cavities [breeding evidence only] (Madison)				
Vermivora chrysoptera	**SC**		**S2S3B**	**G4**
Golden-winged Warbler				
M: old fields and successional hardwoods [breeding evidence only] (Alleghany, Ashe, Avery, Buncombe, Clay, Graham, Haywood, Iredell*, Jackson, Macon, Madison, Polk*, Swain, Watauga, Yancey)				
Vermivora cyanoptera	**SR**		**S2B**	**G5**
Blue-winged Warbler				
M: low elevation brushy fields and thickets [breeding evidence only] (Alleghany, Ashe, Buncombe, Cherokee, Clay, Graham*, Haywood, Jackson, Macon, Rutherford, Transylvania)				
Vireo gilvus	**SR**		**S2B**	**G5**
Warbling Vireo				
MP: groves of hardwoods along rivers and streams [breeding evidence only] (Alleghany, Ashe, Avery, Bertie, Buncombe, Caldwell, Cleveland, Forsyth, Halifax, Henderson, Macon*, Orange, Wake, Watauga)				

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Reptiles

Alligator mississippiensis **T** **T(S/A)** **S3** **G5**

American Alligator

CT: fresh to slightly brackish lakes, ponds, rivers, and marshes (Beaufort, Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Currituck, Dare, Duplin, Gates, Hertford, Hoke*, Hyde, Jones, Lenoir*, New Hanover, Onslow, Pamlico, Pender, Pitt*, Robeson, Sampson, Scotland, Tyrrell, Washington)

Apalone spinifera spinifera **SC** **S1** **G5T5**

Eastern Spiny Softshell

M: large streams in the French Broad system (Buncombe, Henderson*, Madison)

Caretta caretta **T** **T** **S3B,S3N** **G3**

Loggerhead Seaturtle

T: nests on beaches; forages in ocean and sounds [breeding evidence only] (Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover, Onslow, Pender)

Chelonia mydas **T** **T** **S1B,SUN** **G3**

Green Seaturtle

T: nests on beaches; forages in ocean and sounds [breeding evidence only] (Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover, Onslow, Pender)

Crotalus adamanteus **E** **S1** **G4**

Eastern Diamondback Rattlesnake

C: pine flatwoods, savannas, pine-oak sandhills (Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland*, Duplin*, Jones*, New Hanover*, Northampton*, Onslow, Pender, Robeson*, Sampson*)

Crotalus horridus **SC** **S3** **G4**

Timber Rattlesnake

MPC: wetland forests in the Coastal Plain; rocky, upland forests elsewhere [NHP tracking only den/hibernacula sites and selected isolated populations] (Alexander, Alleghany, Anson, Ashe, Avery*, Beaufort, Bertie, Bladen, Brunswick, Buncombe, Burke, Cabarrus, Camden, Carteret, Catawba, Cherokee, Chowan, Clay*, Cleveland, Columbus, Craven, Cumberland, Currituck, Dare, Davidson, Duplin, Durham, Gaston, Graham, Granville, Haywood, Henderson, Hoke, Hyde, Jackson, Jones, Lenoir, Lincoln, Macon, Madison, McDowell, Mecklenburg, Mitchell*, Montgomery, Moore, New Hanover, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Pitt, Polk, Randolph, Richmond, Robeson, Rutherford, Sampson, Scotland, Stanly, Stokes, Surry, Swain, Transylvania, Tyrrell, Union, Wake, Washington, Watauga, Wayne, Wilkes, Yadkin, Yancey*)

Deirochelys reticularia reticularia **SC** **S3** **G5T5**

Eastern Chicken Turtle

SC: quiet waters of ponds, ditches, and sluggish streams (Bladen, Brunswick, Carteret, Columbus, Craven*, Cumberland, Dare, Duplin*, Hoke, New Hanover, Onslow, Pender, Richmond, Robeson, Sampson, Scotland, Wayne*)

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Dermochelys coriacea	**E**	**E**	**S1B,SUN**	**G2**
Leatherback Seaturtle				
T: nests on beaches; forages in oceans, rarely in sounds [breeding evidence only] (Brunswick, Carteret, Craven*, Currituck, Dare, Hyde, New Hanover)				
Farancia erytrogramma	**SR**		**S3**	**G4**
Rainbow Snake				
SC: swamps, lakes, rivers, and other sluggish water (Beaufort, Bertie, Bladen, Brunswick, Camden*, Carteret*, Chowan, Columbus, Craven, Cumberland*, Currituck, Dare, Duplin*, Gates, Harnett, Hertford*, Hoke*, Hyde, Johnston*, Jones*, Lenoir*, Moore*, New Hanover, Onslow*, Pamlico*, Pasquotank*, Pender, Perquimans*, Pitt*, Robeson, Sampson, Tyrrell, Washington)				
Glyptemys muhlenbergii	**T**	**T(S/A)**	**S2**	**G3**
Bog Turtle				
MP: bogs, wet pastures, wet thickets (Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Catawba, Cherokee*, Clay, Forsyth, Gaston, Graham, Henderson, Iredell*, Macon, McDowell, Mitchell, Rutherford, Surry, Transylvania, Watauga, Wilkes, Yancey)				
Graptemys geographica	**SR**		**S1**	**G5**
Common Map Turtle				
M: rivers in the Hiwassee system (Cherokee)				
Heterodon simus	**T**		**S2**	**G2**
Southern Hognose Snake				
SC: sandy woods, particularly pine-oak sandhills (Bladen, Brunswick, Carteret*, Craven*, Cumberland, Duplin, Edgecombe*, Hoke, Jones*, Moore, New Hanover, Onslow, Pender, Pitt*, Richmond, Robeson, Sampson, Scotland, Wake*, Wayne*)				
Lampropeltis getula sticticeps	**SC**		**S2**	**G5T2Q**
Outer Banks Kingsnake				
T: maritime forests, thickets, and grasslands on the Outer Banks (endemic to North Carolina) (Carteret*, Currituck*, Dare*, Hyde)				
Lepidochelys kempii	**E**	**E**	**S1B,SUN**	**G1**
Kemp's Ridley Seaturtle				
T: nests on beaches, forages in ocean and sounds [breeding evidence only] (Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover, Onslow, Pender)				
Liodytes rigida	**SR**		**S2S3**	**G5**
Glossy Crayfish Snake				
C: marshes, cypress ponds, other wetlands (Bladen, Brunswick, Carteret*, Columbus, Craven, Dare, Hoke*, Hyde*, Jones*, New Hanover*, Onslow, Robeson, Tyrrell)				
Malaclemys terrapin	**SC**		**S3**	**G4**
Diamondback Terrapin				
T: salt or brackish marshes, estuaries (Beaufort, Bertie, Brunswick, Carteret, Craven*, Dare, Hyde, Jones, New Hanover, Onslow, Pamlico, Pender, Perquimans)				

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Masticophis flagellum	**SR**		**S3**	**G5**
Coachwhip				
PSCT: dry and sandy woods, mainly in pine/oak sandhills (Anson*, Bladen, Brunswick, Carteret*, Columbus, Craven*, Cumberland, Duplin*, Harnett, Hoke, Lenoir*, Montgomery, Moore, New Hanover, Onslow, Pender, Richmond, Robeson*, Sampson, Scotland, Stanly*, Union*, Wayne*)				
Micrurus fulvius fulvius	**E**		**S1**	**G5**
Eastern Coralsnake				
SC: pine-oak sandhills, sandy flatwoods, maritime forests (Bladen, Brunswick*, Cumberland*, Harnett*, Hoke*, Moore*, New Hanover, Onslow*, Pender, Robeson, Sampson, Scotland*)				
Nerodia sipedon williamengelsi	**SC**		**S3**	**G5T3**
Carolina Watersnake				
T: salt or brackish marshes (endemic to North Carolina) (Beaufort, Carteret, Currituck, Dare, Hyde, Pamlico)				
Ophisaurus attenuatus	**SR**		**S2**	**G5**
Slender Glass Lizard				
MPSC: old fields, wooded edges, open woods (Beaufort*, Bertie*, Bladen*, Brunswick*, Carteret*, Chatham*, Cherokee*, Chowan*, Columbus*, Durham*, Gates, Granville*, Harnett*, Iredell*, Johnston*, Lenoir*, Pender, Pitt, Stanly*, Vance*, Wake, Warren*)				
Ophisaurus mimicus	**SC**		**S1**	**G3**
Mimic Glass Lizard				
C: pine flatwoods, savannas, pine/oak sandhills (Bladen*, Brunswick, Carteret, Cherokee*, Columbus*, New Hanover*, Onslow*, Pender, Sampson*)				
Pituophis melanoleucus melanoleucus	**T**		**S2**	**G4T4**
Northern Pinesnake				
MSC: dry and sandy woods, mainly in pine/oak sandhills (Brunswick, Cherokee, Clay, Cumberland, Graham*, Harnett, Hoke, Montgomery, Moore, New Hanover*, Richmond, Rutherford, Scotland, Swain*)				
Plestiodon anthracinus	**SR**		**S2S3**	**G5**
Coal Skink				
M: rocky slopes, wooded hillsides, roadbanks (Avery, Buncombe*, Caldwell, Clay*, Graham*, Haywood, Henderson*, Jackson, Macon, Polk, Rutherford, Swain*, Transylvania, Wilkes*)				
Seminatrix pygaea paludis	**SC**		**S2**	**G5T4**
Carolina Swamp Snake				
C: in lush vegetation of ponds, ditches, or sluggish streams (Brunswick*, Carteret*, Craven, Dare, Hyde, New Hanover*, Onslow, Pender, Tyrrell*)				

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Sistrurus miliarius miliarius	**SC**		**S3**	**G5T4T5**
Carolina Pigmy Rattlesnake				
PSC: pine flatwoods, pine/oak sandhills, other pine/oak forests (Beaufort, Bladen, Brunswick*, Carteret, Cleveland*, Craven*, Cumberland*, Dare*, Gaston*, Harnett*, Hoke, Hyde, Montgomery*, Moore, New Hanover, Onslow, Pamlico, Pender, Pitt, Richmond*, Sampson, Scotland, Tyrrell, Washington)				
Sternotherus minor	**SC**		**S1**	**G5**
Loggerhead Musk Turtle				
M: streams and rivers in Mississippi drainage (Cherokee, Madison)				
Trachemys scripta troostii	**SC**		**S1**	**G5T4**
Cumberland Slider				
M: rivers in French Broad drainage (Madison)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global

Amphibians

Ambystoma mabeei **T** **S2?** **G4**

Mabee's Salamander

SC: shallow ephemeral wetlands, such as Carolina bays, vernal pools, and sinkholes (Bladen, Brunswick, Carteret*, Columbus, Cumberland, Dare*, Duplin, Hoke, Jones, New Hanover*, Onslow, Pender*, Perquimans*, Robeson, Sampson, Scotland)

Ambystoma talpoideum **SC** **S2S3** **G5**

Mole Salamander

MP: breeds in fish-free semipermanent woodland ponds; forages in adjacent woodlands (Alleghany*, Buncombe, Cherokee, Davidson, Granville, Guilford, Henderson, Macon, McDowell, Montgomery*, Orange, Person, Pitt*, Polk, Richmond*, Rockingham, Rowan, Stanly, Surry, Transylvania, Union, Wake*, Yadkin)

Ambystoma tigrinum **T** **S2** **G5**

Eastern Tiger Salamander

SC: breeds in fish-free semipermanent ponds; forages in adjacent woods, usually sandy pinewoods (Cumberland, Hoke, Moore, Richmond, Robeson, Scotland, Wake)

Anaxyrus quercicus **SR** **S2** **G5**

Oak Toad

SC: pine flatwoods and savannas, pine sandhills where near water (Beaufort, Bladen, Brunswick*, Carteret, Columbus*, Craven, Cumberland, Dare, Duplin*, Gates, Harnett, Hoke*, Hyde*, Johnston*, Jones*, Lee*, Moore*, New Hanover, Onslow, Pamlico*, Pender, Perquimans*, Pitt, Richmond, Robeson*, Sampson, Scotland, Tyrrell*, Washington*, Wayne*, Wilson*)

Aneides aeneus **T** **S2S3** **G3G4**

Green Salamander

M: damp, shaded crevices of cliffs or rock outcrops in deciduous forests (southern mountains) (Buncombe, Henderson, Jackson, Macon, Madison, Polk, Rutherford, Transylvania)

Cryptobranchus alleganiensis alleganiensis **SC** **S3** **G3G4T2**

Eastern Hellbender

M: large and clear fast-flowing streams (Alleghany, Ashe, Avery, Buncombe, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Madison, Mitchell, Swain, Transylvania, Watauga, Yancey)

Desmognathus folkertsi **SC** **S1** **G2**

Dwarf Black-bellied Salamander

M: small streams and seeps in forests (Clay)

Desmognathus organi **SR** **S2S3** **G3**

Northern Pygmy Salamander

M: spruce-fir and other high elevation forests; northeast of the French Broad River (Ashe, Avery, Buncombe, Caldwell, Madison*, McDowell, Mitchell, Watauga, Yancey)

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C	Rank Global
Desmognathus wrighti	**SR**		**S2S3**	**G3**
Southern Pygmy Salamander				
M: mid to high elevation forests, often in spruce-fir; west of the French Broad River (Buncombe*, Clay, Graham*, Haywood, Henderson, Jackson, Macon, Madison*, Swain, Transylvania)				
Eurycea junaluska	**T**		**S1S2**	**G3**
Junaluska Salamander				
M: forests near seeps and streams in the Cheoah River system [records from Cherokee and Clay represent specimens of uncertain taxonomy] (Cherokee, Clay, Graham)				
Eurycea longicauda longicauda	**SC**		**S1S2**	**G5T5**
Longtail Salamander				
M: moist woods and floodplains; small ponds for breeding (Alleghany*, Ashe*, Avery, Buncombe*, Burke*, Cherokee*, Clay, Graham, Haywood, Henderson*, Jackson*, Macon, Transylvania*, Watauga)				
Eurycea quadridigitata	**SC**		**S2**	**G5**
Dwarf Salamander				
C: pocosins, Carolina bays, pine flatwoods, savannas, and other wetland habitats (Avery*, Bladen*, Brunswick, Columbus, Craven, Cumberland, Duplin*, Edgecombe, Gaston*, Greene*, Halifax*, Harnett*, Hoke, Johnston*, Jones*, Lenoir*, Martin*, Moore*, Nash, Pamlico, Pender, Pitt*, Richmond*, Robeson, Sampson*, Scotland, Stanly*, Wake)				
Hemidactylium scutatum	**SC**		**S3**	**G5**
Four-toed Salamander				
MPC: pools, bogs, and other wetlands in hardwood forests (Alamance*, Avery, Bladen, Buncombe, Chatham, Cherokee, Cumberland*, Duplin*, Durham, Franklin, Gates, Graham, Granville, Guilford, Henderson*, Macon, McDowell, Montgomery, Moore, Nash, Orange, Pender, Person, Polk*, Randolph, Rockingham, Stanly, Stokes, Surry, Wake, Wilkes)				
Hyla andersonii	**SR**		**S3**	**G4**
Pine Barrens Treefrog				
SC: pocosins, bay forests, boggy areas (Bladen, Cumberland, Harnett, Hoke, Johnston*, Jones, Lee*, Moore, Onslow, Pender, Richmond, Robeson, Sampson, Scotland, Wayne)				
Hyla versicolor	**SC**		**S2S3**	**G5**
Gray Treefrog				
P: deciduous or mixed forests, often near water; primarily near VA border (Caswell, Person, Warren*)				
Necturus lewisi	**SC**		**S2**	**G2**
Neuse River Waterdog				
PC: rivers and large streams in Neuse and Tar drainages (endemic to North Carolina) (Beaufort*, Craven, Durham, Edgecombe, Franklin, Granville, Greene, Halifax, Johnston, Jones, Lenoir, Nash, Orange, Person, Pitt, Vance, Wake, Warren, Wayne, Wilson)				

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Necturus maculosus	**SC**		**S1**	**G5**
Mudpuppy				
M: rivers and large streams in New, French Broad, and Little Tennessee drainages (Alleghany, Ashe, Buncombe*, Henderson, Macon, Madison, Transylvania)				
Plethodon amplus	**SR**		**S2**	**G2**
Blue Ridge Gray-cheeked Salamander				
M: mesic forests in the Hickorynut Gorge vicinity (endemic to this area) (Buncombe, Henderson, Rutherford)				
Plethodon aureolus	**SR**		**S2?**	**G2G3**
Tellico Salamander				
M: forests in the Unicoi Mountains (Cherokee, Graham)				
Plethodon chattahoochee	**SR**		**S1**	**G3**
Chattahoochee Slimy Salamander				
M: moist forests in the southwestern counties, close to the Georgia border (Cherokee, Clay)				
Plethodon cheoah	**SR**		**S1S2**	**G1G2**
Cheoah Bald Salamander				
M: mesic forests on Cheoah Bald (endemic to this area) (Graham, Swain)				
Plethodon meridianus	**SR**		**S2**	**G2**
South Mountain Gray-cheeked Salamander				
P: mesic forests of the South Mountains (endemic to this area) (Burke, Cleveland, McDowell, Rutherford)				
Plethodon ventralis	**SC**		**S1**	**G4**
Southern Zigzag Salamander				
M: moist areas of talus slopes or rock outcrops in hardwood forests (Buncombe, Haywood, Henderson*, Madison, Yancey)				
Plethodon wehrlei	**T**		**S1S2**	**G4**
Wehrle's Salamander				
P: upland forests (low mountains near Virginia border) (Alleghany, Stokes, Surry, Wilkes)				
Plethodon welleri	**SC**		**S2**	**G3**
Weller's Salamander				
M: high elevation forests in northern mountains, mainly in spruce-fir and to a lesser degree, northern hardwood forests (Ashe, Avery, Caldwell, Mitchell, Watauga, Yancey)				
Plethodon yonahlossee pop. 1	**SC**		**S2**	**G4T1T2Q**
Crevice Salamander				
M: Hickorynut Gorge area (endemic to this area); crevices in moist shaded rocks (Buncombe, Henderson, McDowell, Rutherford)				

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Pseudacris brachyphona	**SC**		**S2**	**G5**
Mountain Chorus Frog				
M: ditches, pools, and other small wet areas near forests, in extreme southwestern mountains (Cherokee, Clay)				
Pseudacris nigrita	**SR**		**S2**	**G5**
Southern Chorus Frog				
SC: ditches, Carolina bays, and other temporary shallow pools and ponds (Beaufort*, Brunswick*, Carteret*, Columbus*, Cumberland, Hoke, Onslow*, Pender, Pitt*, Robeson, Sampson*, Scotland)				
Pseudacris ornata	**E**		**S2**	**G4**
Ornate Chorus Frog				
SC: swamps, savannas, wooded ponds and pools (Beaufort*, Bladen, Brunswick*, Carteret, Craven, Cumberland, Hoke, New Hanover*, Onslow, Robeson, Sampson, Scotland)				
Rana capito	**E**		**S2**	**G3**
Carolina Gopher Frog				
SC: breeds in temporary fish-free pools; forages in sandy woods, especially pine-oak sandhills (Beaufort*, Bladen*, Brunswick, Carteret, Cumberland, Hoke, Jones*, New Hanover*, Onslow, Pender, Robeson, Sampson, Scotland)				
Rana heckscheri	**E**		**SH**	**G5**
River Frog				
SC: river floodplains, floodplain pools or borrow pit ponds (Cumberland*, Moore*, Robeson*, Sampson*, Scotland*)				
Rana sylvatica pop. 3	**SR**		**S1**	**G5TNR**
Wood Frog - Coastal Plain population				
C: mesic to moist hardwood forests (Hyde, Tyrrell)				

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Freshwater Fishes				
Acipenser brevirostrum	**E**	**E**	**S1**	**G3**
Shortnose Sturgeon				
CT: brackish water of large rivers and estuaries; spawns in freshwater areas (Anson*, Beaufort*, Bertie, Bladen, Brunswick, Camden, Carteret, Chowan, Columbus, Craven*, Currituck, Dare, Hyde, New Hanover, Onslow*, Pamlico*, Pasquotank, Pender, Perquimans, Pitt*, Richmond*, Tyrrell, Washington)				
Acipenser fulvescens	**SC**		**S1**	**G3G4**
Lake Sturgeon				
M: large rivers of Tennessee drainages (Madison)				
Acipenser oxyrinchus oxyrinchus	**E**	**E**	**S2**	**G3T3**
Atlantic Sturgeon				
CT: coastal waters, estuaries, large rivers (Beaufort, Bertie, Brunswick, Camden, Carteret, Chowan, Craven, Currituck, Dare, Gates, Halifax, Hertford, Hyde, Martin, New Hanover, Northampton, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Pitt, Tyrrell, Washington)				
Ambloplites cavifrons	**SR**		**S2**	**G3**
Roanoke Bass				
PC: streams in Neuse and Tar systems (Chatham, Durham, Edgecombe*, Franklin, Granville, Halifax, Johnston*, Lee, Montgomery, Moore, Nash, Orange, Person, Pitt*, Randolph, Richmond, Rockingham, Vance, Warren, Wilson)				
Aplodinotus grunniens	**SC**		**S1**	**G5**
Freshwater Drum				
M: French Broad River (Madison)				
Carpiodes carpio	**SC**		**S1**	**G5**
River Carpsucker				
M: French Broad and Cane rivers (Madison, Mitchell, Yancey)				
Carpiodes cyprinus	**SR**		**S2**	**G5**
Quillback				
M: native to French Broad and Roanoke drainages (Halifax, Madison, Mitchell, Northampton, Rockingham, Stokes, Yancey)				
Carpiodes sp. cf. cyprinus	**SR**		**S2**	**GNR**
"Carolina" Quillback				
P: Yadkin-Pee Dee, Catawba, and Broad drainages (Anson, Burke, Catawba*, Cleveland, Davidson, Davie, Forsyth, Iredell*, McDowell, Mecklenburg*, Montgomery, Polk, Richmond, Rowan, Rutherford, Stanly, Yadkin)				
Carpiodes sp. cf. velifer	**SC**		**S1**	**GNR**
Atlantic Highfin Carpsucker				
PC: Catawba, Pee Dee, and Cape Fear rivers (Anson*, Bladen, Catawba*, Gaston*, Iredell*, Mecklenburg*, Richmond*)				

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Clinostomus sp. 1	**SC**		**S2**	**G5T3Q**
Smoky Dace				
M: Little Tennessee and Hiwassee drainages (Cherokee, Clay, Graham, Jackson, Macon, Swain)				
Cottus caeruleomentum	**SC**		**S1**	**G4**
Blue Ridge Sculpin				
P: Dan drainage (Stokes)				
Cottus carolinae	**SC**		**S1**	**G5**
Banded Sculpin				
M: French Broad and Pigeon drainages (Cherokee, Clay, Haywood, Madison)				
Cyprinella sp. 1	**SC**		**S2**	**G2Q**
Thinlip Chub				
SC: Cape Fear, Lumber, and Pee Dee drainages (Anson, Bladen, Columbus, Cumberland, Hoke, Moore, Richmond, Robeson, Sampson, Scotland)				
Elassoma boehlkei	**T**		**S2**	**G2**
Carolina Pygmy Sunfish				
C: streams and canals in Waccamaw drainage (Brunswick, Columbus)				
Enneacanthus chaetodon	**SR**		**S3**	**G3G4**
Blackbanded Sunfish				
SC: many drainages, particularly Lumber and Waccamaw (Bertie*, Bladen, Brunswick, Columbus, Craven*, Cumberland, Duplin*, Gates, Harnett*, Hoke, Johnston*, Lenoir*, Martin*, Montgomery*, Moore, Nash*, New Hanover, Pender, Richmond, Robeson, Sampson, Scotland, Wayne*)				
Enneacanthus obesus	**SR**		**S3**	**G5**
Banded Sunfish				
C: most Atlantic drainages (Beaufort, Bertie, Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Dare*, Duplin*, Gates, Harnett*, Hertford, Hyde*, Johnston, Jones, New Hanover, Northampton, Onslow, Pender, Pitt, Robeson, Sampson*, Tyrrell*, Washington)				
Erimonax monachus	**T**	**T**	**S1**	**G2**
Spotfin Chub				
M: Little Tennessee River; formerly in French Broad drainage (Buncombe*, Graham, Macon, Madison*, Swain)				
Erimystax insignis	**SR**		**S2**	**G4**
Blotched Chub				
M: primarily French Broad drainage (Buncombe, Cherokee, Clay, Henderson, Madison, Mitchell, Transylvania, Yancey)				
Etheostoma acuticeps	**T**		**S1**	**G3**
Sharphead Darter				
M: Toe and Cane drainages (Mitchell, Yancey)				

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Etheostoma collis	**SC**		**S3**	**G3**
Carolina Darter				
P: Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, and Catawba drainages (Alamance, Anson, Cabarrus, Chatham, Davidson, Durham*, Granville, Guilford, Mecklenburg, Montgomery, Moore, Orange*, Person, Randolph, Richmond, Stanly, Union, Vance)				
Etheostoma inscriptum	**T**		**S1**	**G4**
Turquoise Darter				
M: streams of Savannah drainage (Jackson, Macon, Transylvania)				
Etheostoma jessiae	**SC**		**SX**	**G4**
Blueside Darter				
M: streams in Mills River system (Henderson*)				
Etheostoma kanawhae	**SR**		**S3**	**G4**
Kanawha Darter				
M: New drainage (Alleghany, Ashe, Watauga)				
Etheostoma mariae	**SC**		**S2**	**G3**
Pinewoods Darter				
SC: streams of Lumber drainage, mainly in the sandhills; and Little Pee Dee drainage (Bladen, Hoke, Montgomery, Moore, Richmond, Robeson*, Scotland)				
Etheostoma perlongum	**T**		**S1**	**G1Q**
Waccamaw Darter				
C: Lake Waccamaw, and sparingly in the Waccamaw River (endemic to North Carolina) (Columbus)				
Etheostoma podostemone	**SR**		**S2**	**G4**
Riverweed Darter				
P: large streams in Dan River system (Caswell, Rockingham, Stokes)				
Etheostoma simoterum	**SC**		**S1**	**G3G4**
Tennessee Snubnose Darter				
M: streams of French Broad drainage (Madison)				
Etheostoma thalassinum	**SR**		**S3**	**G4**
Seagreen Darter				
MP: Catawba and Broad drainages (Alexander, Avery, Buncombe*, Burke, Caldwell, Catawba, Cleveland, Gaston, Lincoln, McDowell, Polk, Rutherford)				
Etheostoma vulneratum	**SC**		**S2**	**G3**
Wounded Darter				
M: streams of Little Tennessee and French Broad drainages (Graham, Jackson, Macon, Madison*, Swain, Transylvania)				

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Exoglossum laurae	**SR**		**S2**	**G4**
Tonguetied Minnow				
M: New drainage (Alleghany, Ashe, Watauga)				
Exoglossum maxillingua	**SC**		**S1**	**G5**
Cutlip Minnow				
P: streams of Dan River system (Rockingham, Stokes)				
Fundulus cf. diaphanus	**SR**		**S1**	**G1Q**
Lake Phelps Killifish				
C: Lake Phelps (endemic to this lake) (Tyrrell, Washington)				
Fundulus waccamensis	**SC**		**S1**	**G1**
Waccamaw Killifish				
C: Lake Waccamaw (endemic to North Carolina) (Columbus)				
Heterandria formosa	**SC**		**S2**	**G5**
Least Killifish				
C: streams and lakes near Wilmington (Brunswick, New Hanover, Pender)				
Hiodon tergisus	**SC**		**S1**	**G5**
Mooneye				
M: French Broad River (Henderson*, Madison)				
Hybopsis rubrifrons	**T**		**S1**	**G4**
Rosyface Chub				
M: Savannah drainage (Transylvania)				
Ichthyomyzon bdellium	**SC**		**S1**	**G3G4**
Ohio Lamprey				
M: French Broad and Cane drainages (Henderson, Madison, Mitchell, Yancey)				
Ictiobus bubalus	**SR**		**S1**	**G5**
Smallmouth Buffalo				
M: French Broad drainage [populations in Atlantic Slope are not tracked] (Anson, Davidson, Davie, Madison, Mitchell, Montgomery, Richmond, Stanly, Yancey)				
Ictiobus niger	**SR**		**S1**	**G5**
Black Buffalo				
M: French Broad River (Madison)				
Lampetra aepyptera	**T**		**S2**	**G5**
Least Brook Lamprey				
PC: Tar and Neuse drainages (Edgecombe, Franklin, Halifax, Johnston, Jones*, Lenoir, Pitt*, Wake, Warren)				

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Lethenteron appendix	**SC**		**S1**	**G4**
American Brook Lamprey				
M: French Broad drainage (Madison)				
Luxilus chrysocephalus	**SC**		**S1**	**G5**
Striped Shiner				
M: French Broad and Hiwassee drainages (Buncombe, Cherokee, Macon, Mitchell, Yancey)				
Menidia extensa	**T**	**T**	**S1**	**G1**
Waccamaw Silverside				
C: Lake Waccamaw (endemic to North Carolina) (Columbus)				
Micropterus coosae	**SR**		**S1**	**G5**
Redeye Bass				
M: Savannah and Broad drainages (Burke*, Henderson, Transylvania)				
Moxostoma ariommum	**T**		**S2**	**G4**
Bigeye Jumprock				
P: Dan drainage (Caswell, Forsyth, Rockingham, Stokes)				
Moxostoma breviceps	**SR**		**S2**	**G5**
Smallmouth Redhorse				
M: Tennessee drainages (Cherokee, Jackson, Macon, Madison, Mitchell, Swain, Yancey)				
Moxostoma robustum	**E**		**S1**	**G1**
Robust Redhorse				
P: Pee Dee River; formerly in tributaries of this river (Anson, Burke*, Davidson*, Davie*, Iredell*, Richmond, Stanly*, Union*)				
Moxostoma sp. 2	**T**		**S2**	**G1G2**
Sicklefin Redhorse				
M: Hiwassee and Little Tennessee drainages (Cherokee, Clay, Graham, Jackson, Macon, Swain)				
Moxostoma sp. 3	**T**		**S2**	**G1G2Q**
Carolina Redhorse				
P: Cape Fear and Pee Dee drainages (Anson, Chatham, Harnett*, Lee, Montgomery, Moore, Randolph, Richmond, Stanly)				
Notropis bifrenatus	**E**		**S1**	**G3**
Bridle Shiner				
C: streams in lower Neuse and Chowan drainages (Craven, Hertford, Jones)				
Notropis chalybaeus	**SR**		**S2S3**	**G4**
Ironcolor Shiner				
C: coastal plain rivers and creeks (Bertie*, Bladen, Brunswick, Carteret, Columbus, Craven*, Cumberland*, Duplin, Edgecombe*, Greene*, Halifax*, Harnett, Hertford, Hoke, Johnston, Jones, Lenoir, Martin, Nash*, New Hanover*, Northampton, Onslow, Pender*, Perquimans*, Pitt*, Richmond, Robeson, Sampson, Scotland, Wake, Wayne*, Wilson*)				

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Notropis lutipinnis	**SC**		**S2**	**G4Q**
Yellowfin Shiner				
MP: Savannah, Little Tennessee, and Broad drainages [only the Savannah drainage is listed as SC] (Cleveland, Jackson, Macon, Transylvania)				
Notropis mekistocholas	**E**	**E**	**S1**	**G1**
Cape Fear Shiner				
P: Cape Fear drainage (endemic to North Carolina) (Chatham, Harnett, Lee, Moore, Randolph)				
Notropis micropteryx	**SR**		**S2**	**G5**
Highland Shiner				
M: French Broad, Little Tennessee, and Hiwassee drainages (Buncombe, Cherokee, Clay, Haywood, Jackson, Macon, Madison, Mitchell, Swain, Transylvania*, Yancey)				
Notropis sp. 1	**SR**		**S2**	**GNR**
Kanawha Rosyface Shiner				
M: New drainage (Alleghany, Ashe, Watauga)				
Notropis volucellus	**T**		**S2**	**G5**
Mimic Shiner				
MPC: New, French Broad, Little Tennessee, Tar, and Neuse drainages (Alleghany, Ashe, Avery, Durham*, Franklin, Granville, Greene*, Halifax, Johnston*, Jones, Lenoir, Madison, Mitchell, Nash*, Orange*, Person, Pitt*, Swain, Vance, Wake*, Warren, Yancey)				
Noturus eleutherus	**SC**		**S1**	**G4**
Mountain Madtom				
M: French Broad drainage (Madison)				
Noturus flavus	**E**		**S1**	**G5**
Stonecat				
M: Nolichucky, French Broad, and Little Tennessee drainages (Macon, Madison, Swain, Yancey)				
Noturus furiosus	**T**		**S2**	**G2**
Carolina Madtom				
PC: Tar and Neuse drainages (endemic to North Carolina) (Craven*, Durham*, Edgecombe, Franklin, Granville, Greene*, Halifax, Johnston, Jones*, Lenoir*, Nash, Pitt*, Vance, Wake*, Warren, Wayne*, Wilson)				
Noturus gilberti	**E**		**S1**	**G2**
Orangefin Madtom				
P: Dan drainage (Stokes)				
Noturus sp. 2	**SC**		**S1**	**G2**
Broadtail Madtom				
C: Cape Fear, Waccamaw, and Lumber drainages (Bladen, Brunswick*, Columbus, Cumberland, Duplin*, Hoke, Moore*, Pender*, Richmond*, Robeson, Sampson, Scotland)				

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Percina burtoni	**E**		**S1**	**G2G3**
Blotchside Logperch				
M: South Toe drainage; formerly in French Broad drainage (Buncombe*, Yancey)				
Percina caprodes	**T**		**S1**	**G5**
Logperch				
M: Tennessee drainages (Alleghany, Ashe, Haywood, Madison)				
Percina gymnocephala	**SR**		**S2**	**G4**
Appalachia Darter				
M: New drainage (Alleghany, Ashe, Watauga)				
Percina nigrofasciata	**SC**		**S1**	**G5**
Blackbanded Darter				
M: Savannah drainage (Transylvania)				
Percina oxyrhynchus	**E**		**S1**	**G4**
Sharpnose Darter				
M: New drainage (Alleghany, Ashe)				
Percina rex	**E**	**E**	**S1**	**G1G2**
Roanoke Logperch				
P: Dan drainage (Caswell, Rockingham)				
Percina squamata	**SC**		**S2**	**G3**
Olive Darter				
M: Tennessee drainages (Cherokee, Haywood, Henderson, Jackson, Macon, Madison, Mitchell, Swain, Yancey)				
Percina williamsi	**SC**		**SX**	**G2**
Sickle Darter				
M: formerly in French Broad River (Buncombe*)				
Phenacobius teretulus	**SC**		**S3**	**G3G4**
Kanawha Minnow				
M: New drainage (Alleghany, Ashe, Watauga)				
Polyodon spathula	**E**		**SH**	**G4**
Paddlefish				
M: French Broad River (Buncombe*, Henderson*, Madison*, Transylvania*)				
Sander canadensis	**SR**		**S1**	**G5**
Sauger				
M: French Broad and Hiwassee drainages (Cherokee*, Haywood*, Madison)				

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Semotilus lumbee	**SC**		**S2**	**G3G4**
Sandhills Chub				
S: Sandhills streams in the Cape Fear, Lumber, and Yadkin-Pee Dee drainages (Cumberland, Harnett, Hoke, Lee, Montgomery, Moore, Richmond, Scotland)				
Thoburnia hamiltoni	**E**		**S1**	**G3**
Rustyside Sucker				
P: Dan drainage (Stokes)				

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Mollusks: Freshwater Bivalves				
Alasmidonta heterodon **Dwarf Wedgemussel** PC: Tar and Neuse drainages, mainly near Fall Line (Franklin, Granville, Halifax, Johnston, Nash, Orange*, Pitt*, Vance, Wake, Warren, Wilson)	**E**	**E**	**S1**	**G1G2**
Alasmidonta raveneliana **Appalachian Elktoe** M: Tennessee drainages (Buncombe, Graham, Haywood, Henderson, Jackson, Macon, Mitchell, Swain, Transylvania, Yancey)	**E**	**E**	**S1**	**G1**
Alasmidonta undulata **Triangle Floater** PC: Roanoke, Chowan, Tar, Neuse, Cape Fear drainages (Caswell, Chatham, Durham, Edgecombe, Franklin, Gates, Granville, Guilford, Halifax, Harnett, Hertford, Johnston, Jones, Lee, Montgomery, Moore, Nash, Northampton, Orange, Person, Pitt, Randolph, Vance, Wake, Warren, Wayne, Wilson)	**T**		**S3**	**G4**
Alasmidonta varicosa **Brook Floater** MP: Cape Fear drainage, also along Blue Ridge escarpment of Catawba and Yadkin-Pee Dee drainages (Anson*, Burke, Caldwell, Chatham, Forsyth, Granville, McDowell, Montgomery, Moore, Orange, Randolph, Surry, Wilkes, Yadkin)	**E**		**S3**	**G3**
Alasmidonta viridis **Slippershell Mussel** M: Little Tennessee and French Broad drainages (Henderson, Macon, Swain, Transylvania)	**E**		**S1**	**G4G5**
Anodonta couperiana **Barrel Floater** C: Cape Fear drainage (Bladen, New Hanover*)	**E**		**S1**	**G4**
Anodonta implicata **Alewife Floater** C: Chowan, Roanoke, Cape Fear, and Pee Dee drainages (Anson, Bertie, Chowan*, Gates, Halifax, Hertford, Montgomery, Northampton, Richmond, Sampson, Stanly, Washington)	**T**		**S2**	**G5**
Cyclonaias tuberculata **Purple Wartyback** M: New River (Alleghany)	**E**		**S1**	**G5**
Elliptio dilatata **Spike** M: New, Little Tennessee, and Hiwassee drainages (Alleghany, Ashe, Cherokee, Clay, Jackson, Macon, Swain, Watauga)	**SC**		**S2**	**G5**

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Elliptio fisheriana	**SR**		**S3**	**G4**
Northern Lance				
PC: Atlantic Slope drainages (Columbus, Edgecombe, Franklin, Gates, Granville, Halifax, Harnett, Hertford, Johnston, Martin, Nash, Northampton, Pitt, Stokes, Wake, Warren, Wayne, Wilson)				
Elliptio folliculata	**SC**		**S2**	**G2G3Q**
Pod Lance				
C: Cape Fear, Lumber, and Yadkin-Pee Dee drainages (Anson, Bladen, Brunswick, Columbus, Cumberland, Duplin*, Harnett, Montgomery, Pender*, Richmond, Sampson, Stanly)				
Elliptio lanceolata	**E**	**T**	**S2**	**G2G3**
Yellow Lance				
PC: Tar and Neuse drainages (Edgecombe, Franklin, Granville, Halifax, Johnston, Nash, Vance, Wake, Warren, Wayne)				
Elliptio marsupiobesa	**SC**		**S2**	**G3Q**
Cape Fear Spike				
C: Cape Fear and Neuse drainages (endemic to North Carolina) (Bladen, Craven, Cumberland, Duplin, Johnston, New Hanover, Pender, Pitt, Robeson, Sampson, Wayne)				
Elliptio roanokensis	**SC**		**S3**	**G3**
Roanoke Slabshell				
PC: Roanoke, Tar, Neuse, White Oak, Cape Fear, Lumber, and Yadkin-Pee Dee drainages (Anson, Bladen, Chatham, Craven, Cumberland, Durham, Edgecombe, Franklin, Granville, Halifax, Harnett, Johnston, Jones, Lee, Lenoir, Montgomery, Moore, Nash, Northampton, Onslow, Pitt, Randolph, Richmond, Stanly, Wake, Warren, Wayne, Wilkes, Wilson)				
Elliptio steinstansana	**E**	**E**	**S1**	**G1**
Tar River Spinymussel				
PC: Tar drainage, very rare in Neuse drainage (endemic to North Carolina) (Edgecombe, Franklin, Halifax, Johnston, Nash, Pitt*, Warren, Wayne*)				
Elliptio waccamawensis	**T**		**S1**	**G2G3Q**
Waccamaw Spike				
C: Lake Waccamaw and vicinity (endemic to North Carolina; possibly in adjacent South Carolina) (Brunswick, Columbus)				
Fusconaia masoni	**E**	**PT**	**S3**	**G2**
Atlantic Pigtoe				
PC: Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages (Beaufort*, Bladen, Caswell, Chatham, Cumberland*, Durham, Edgecombe, Franklin, Granville, Halifax, Harnett*, Johnston, Montgomery, Moore, Nash, Northampton*, Orange, Pender, Person, Pitt, Randolph, Sampson, Union, Vance, Wake, Warren, Wayne*, Wilson)				
Fusconaia subrotunda	**E**		**S1**	**G3**
Longsolid				
M: Hiwassee and French Broad drainages (Buncombe, Cherokee, Clay, Transylvania)				

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Lampsilis cariosa	**E**		**S3**	**G3G4**
Yellow Lampmussel				
PC: Chowan, Roanoke, Neuse, Tar, Cape Fear, Lumber, Yadkin-Pee Dee drainages (Alamance, Anson, Bladen*, Chatham, Columbus, Cumberland, Davie, Durham, Edgecombe, Franklin, Gates, Granville, Halifax, Harnett, Hertford, Johnston, Lee, Montgomery, Moore, Nash, Northampton, Orange, Pender*, Person, Pitt, Randolph, Richmond, Rockingham, Rowan, Sampson*, Stanly, Vance)				
Lampsilis fasciola	**SC**		**S2**	**G5**
Wavyrayed Lampmussel				
M: French Broad, Pigeon, Hiwassee, and Little Tennessee drainages (Cherokee, Clay, Graham, Haywood, Jackson, Macon, Mitchell, Swain, Yancey)				
Lampsilis fullerkati	**T**		**S1**	**G1Q**
Waccamaw Fatmucket				
C: Lake Waccamaw and vicinity (endemic to North Carolina and adjacent South Carolina) (Columbus)				
Lampsilis radiata	**T**		**S3**	**G5**
Eastern Lampmussel				
PC: Chowan, Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee drainages (Alamance, Anson, Bertie, Bladen, Cabarrus, Chatham, Chowan*, Columbus, Craven, Davidson, Durham, Edgecombe, Franklin, Gates, Granville, Halifax, Hertford, Johnston, Jones, Lee, Martin, Montgomery, Nash, Northampton, Orange, Pender, Person, Pitt, Randolph, Richmond, Rowan, Sampson*, Stanly, Union, Wake, Warren, Wayne, Wilson)				
Lampsilis sp. 2	**SR**		**S2**	**G1**
Chameleon Lampmussel				
PC: Tar, Neuse, Cape Fear, and Yadkin-Pee Dee drainages (Anson, Chatham, Cumberland, Durham, Franklin, Granville, Nash, Orange, Person, Vance, Warren)				
Lampsilis splendida	**SR**		**S1**	**G3**
Rayed Pink Fatmucket				
PC: Lake Waccamaw and Waccamaw River, Yadkin-Pee Dee River (Anson, Burke, Caldwell, Catawba, Chatham, Columbus, Richmond)				
Lasmigona decorata	**E**	**E**	**S1**	**G1**
Carolina Heelsplitter				
P: Catawba and Pee Dee drainages (endemic to this area in North Carolina and adjacent South Carolina) (Cabarrus*, Mecklenburg, Union)				
Lasmigona holstonia	**E**		**SH**	**G3**
Tennessee Heelsplitter				
M: formerly in Valley Creek in Cherokee County (Cherokee*)				

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Lasmigona subviridis	**E**		**S2**	**G3**
Green Floater				
MPC: New, Watauga, Roanoke, Tar, Neuse and Yadkin-Pee Dee drainages (Alleghany, Ashe, Durham, Edgecombe, Franklin, Granville, Halifax, Johnston, Montgomery, Nash, Northampton, Orange, Person, Pitt, Randolph, Rockingham, Stokes, Wake, Watauga)				
Leptodea ochracea	**T**		**S2**	**G3G4**
Tidewater Mucket				
PC: Chowan, Roanoke, and Tar drainages, and abundant in Lake Waccamaw (Bertie, Chowan, Columbus, Edgecombe, Gates, Halifax, Hertford, Martin, Northampton, Pitt, Vance, Warren, Washington)				
Ligumia nasuta	**T**		**S2**	**G4**
Eastern Pondmussel				
C: Chowan, Roanoke, Neuse, Tar, Cape Fear, and Yadkin-Pee Dee drainages (Anson, Bertie, Brunswick*, Chatham, Chowan, Columbus, Gates, Halifax, Hertford, Martin, Montgomery, Nash*, Northampton, Pitt, Richmond, Stanly, Washington)				
Pegias fabula	**E**	**E**	**S1**	**G1**
Littlewing Pearlymussel				
M: Little Tennessee River; formerly in Valley River in Cherokee County (Cherokee*, Macon, Swain)				
Pleurobema collina	**E**	**E**	**S1**	**G1**
James Spinymussel				
P: Dan and Mayo rivers (Rockingham, Stokes)				
Pleurobema oviforme	**E**		**S1**	**G2G3**
Tennessee Clubshell				
M: French Broad, Little Tennessee, and Hiwassee drainages (Cherokee, Clay, Macon, Swain, Transylvania)				
Pleuronaia barnesiana	**E**		**S1**	**G2G3**
Tennessee Pigtoe				
M: Little Tennessee and Hiwassee rivers (Cherokee, Macon)				
Potamilus alatus	**SR**		**S1**	**G5**
Pink Heelsplitter				
M: French Broad River (Madison)				
Strophitus undulatus	**T**		**S3**	**G5**
Creeper				
MPC: Roanoke, Tar, Neuse, Cape Fear, Yadkin-Pee Dee, Catawba, Broad, and French Broad drainages (Alamance, Alexander, Anson, Buncombe, Burke, Cabarrus, Caldwell, Caswell, Catawba, Chatham, Davidson*, Durham, Edgecombe, Forsyth, Franklin, Gaston, Granville, Halifax, Harnett*, Henderson, Johnston, Jones, Lee, Mecklenburg, Montgomery, Moore, Nash, Orange, Person, Pitt, Polk*, Randolph, Richmond, Rockingham, Stanly, Surry, Transylvania, Union, Vance, Wake, Warren, Wilkes, Wilson, Yadkin)				

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Toxolasma pullus	**E**		**S2**	**G2**
Savannah Lilliput				
PC: Cape Fear, Lumber, and Yadkin-Pee Dee drainages (Chatham, Columbus, Lee, Montgomery, Moore, Orange, Randolph, Stanly, Union)				
Villosa constricta	**T**		**S3**	**G3**
Notched Rainbow				
PC: Roanoke, Tar, Neuse, Yadkin-Pee Dee, and Catawba drainages (Alamance, Alexander, Anson, Burke, Cabarrus, Caswell, Catawba, Chatham, Davidson*, Duplin, Durham, Edgecombe, Franklin, Granville, Guilford, Halifax, Harnett, Johnston, Lee*, McDowell, Mecklenburg, Montgomery, Moore, Nash, Orange, Person, Randolph, Richmond, Rockingham, Rowan*, Stanly, Stokes, Union, Vance, Wake, Warren, Wilson)				
Villosa delumbis	**SR**		**S4**	**G4**
Eastern Creekshell				
PC: Cape Fear, Lumber, Yadkin-Pee Dee, and Catawba drainages (Alamance, Anson, Bladen, Brunswick*, Burke, Cabarrus, Caldwell, Chatham, Columbus, Cumberland, Davidson*, Duplin, Gaston, Guilford, Harnett, Iredell, Lee, Mecklenburg, Montgomery, Moore, Orange, Pender, Randolph, Richmond, Rockingham, Sampson, Stanly, Union, Wilkes, Yadkin)				
Villosa iris	**T**		**S2**	**G5**
Rainbow				
M: Hiwassee and Little Tennessee drainages; formerly in French Broad drainage (Cherokee, Clay, Jackson, Macon, Swain)				
Villosa trabalis	**SR**	**E**	**SH**	**G1**
Cumberland Bean				
M: Hiwassee River (Cherokee)				
Villosa vanuxemensis	**T**		**S1?**	**G4**
Mountain Creekshell				
M: Hiwassee River; documented from Hiwassee and French Broad drainages in Tennessee (Cherokee, Clay)				
Villosa vaughaniana	**E**		**S3**	**G2**
Carolina Creekshell				
P: Cape Fear, Yadkin-Pee Dee, and Catawba drainages (endemic to North Carolina and adjacent South Carolina) (Alamance, Anson, Cabarrus, Chatham, Guilford, Lee, Mecklenburg, Montgomery, Moore, Orange, Randolph, Richmond, Rowan, Stanly, Union)				

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Mollusks: Freshwater and Terrestrial Gastropods				
Allogona profunda **Broad-banded Forestsnail** M: mixed hardwood forests (Avery, Mitchell)	**SR**		**S2S3**	**G5**
Amnicola sp. 1 **Waccamaw Amnicola** C: Lake Waccamaw and adjacent Big Creek (endemic to North Carolina) (Columbus)	**SC**		**S1**	**G1**
Anguispira knoxensis **Rustic Tigersnail** M: around large rotting logs near limestone outcrops (Swain*)	**SR**		**SH**	**G1G2**
Anguispira strongylodes **Southeastern Tigersnail** MP: forested areas with high pH soils (Clay, Graham, McDowell, Rutherford, Swain)	**SR**		**S2S3**	**G5**
Appalachina chilhoweensis **Queen Crater** M: cove hardwoods (Graham, Haywood, Madison, Swain)	**SC**		**S2**	**G4**
Appalachina sayana **Spike-lip Crater** M: rich upland hardwood forests (Ashe, Avery, Madison, Watauga, Yancey*)	**SR**		**S2S3**	**G5T5**
Carychium arboreum **Tree Thorn** M: mixed hardwood forests just north of Fontana Lake (endemic to this area) (Swain)	**SR**		**S1?**	**G1**
Catinella pugilator **Weedpatch Ambersnail** C: marsh ecotones (Currituck)	**SR**		**S1?**	**G1G2**
Catinella waccamawensis **Waccamaw Ambersnail** C: shoreline of Lake Waccamaw (endemic to this area) (Columbus*)	**T**		**SH**	**G1Q**
Cincinnatia sp. 1 **Waccamaw Siltsnail** C: Lake Waccamaw and adjacent Big Creek (endemic to North Carolina) (Columbus)	**SC**		**S1**	**G1**
Daedalochila sp. 1 nr. auriformis **a Liptooth** C: very wet clay savannas? (Brunswick)	**SR**		**S1S2**	**GNR**

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Discus bryanti	**SC**		**S2**	**G3**
Sawtooth Disc				
M: cove hardwoods (Avery, Buncombe, Madison, Mitchell, Watauga)				
Discus nigrimontanus	**SR**		**S2S3**	**G4**
Black Mountain Disc				
M: talus slopes in hardwood forests (Ashe, Graham, Swain, Watauga, Yancey)				
Discus whitneyi	**SR**		**S1S2**	**G5**
Forest Disc				
M?: Mesic to slightly drier forests, no specific locality information available				
Elimia christyi	**E**		**S1**	**G2**
Christy's Elimia				
M: Hiwassee River and tributaries (Cherokee)				
Euchemotrema fraternum	**SR**		**S2S3**	**G5**
Upland Pillsnail				
M: under forest litter in upland hardwood forests (Swain)				
Fumonelix cherohalaensis	**SR**		**S1**	**G1**
Rock-loving Covert				
M: undersides of rock ledges in northern hardwood forests (endemic to Huckleberry Knob area) (Graham)				
Fumonelix jonesiana	**T**		**S1?**	**G1**
Big-tooth Covert				
M: spruce-fir and northern hardwood forests; Newfound Gap area of Great Smoky Mountains National Park (endemic to this area) (Swain)				
Fumonelix langdoni	**SR**		**S1**	**GNR**
Talus Covert				
M: in talus and under leaf litter in high elevation hardwood forests (endemic to the NC-TN state line in Great Smoky Mountains National Park) (Swain)				
Fumonelix orestes	**T**		**S1**	**G1**
Engraved Covert				
M: spruce-fir and northern hardwood forests; Plott Balsam mountains (endemic to this area) (Haywood, Jackson)				
Fumonelix roanensis	**SR**		**S1**	**G1**
Roan Mountain Covert				
M: high elevation hardwood and coniferous forests (endemic to Roan Mountain along the NC-TN state line) (Mitchell)				

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Fumonelix wheatleyi clingmanicus	**SC**		**S1**	**G4T2T3**
Clingman Covert				
M: highest summits with spruce-fir and northern hardwood forests in Great Smoky Mountains National Park (endemic to the park) (Swain)				
Gastrocopta corticaria	**SR**		**S2S3**	**G5**
Bark Snaggletooth				
MC: rich cove forests and other forests over high pH soils (Swain)				
Glyphyalinia clingmani	**E**		**S1**	**G1**
Fragile Glyph				
M: wet leaf litter associated with seepage runs; Black Mountains (endemic to North Carolina) (Buncombe, Yancey)				
Glyphyalinia cryptomphala	**SR**		**S1S2**	**G5**
Thin Glyph				
MP: hardwood forests, mainly along river bluffs or in ravines (Haywood)				
Glyphyalinia junaluskana	**SC**		**S2**	**G2**
Dark Glyph				
M: cove hardwoods; southwestern mountains (Cherokee*, Graham, Macon, Swain)				
Glyphyalinia pentadelphia	**SC**		**S2**	**G2G3**
Pink Glyph				
M: cove hardwoods; southwestern mountains (Cherokee, Clay, Graham, Macon, Swain)				
Glyphyalinia vanattai	**SC**		**S1**	**G2G3**
Honey Glyph				
M: wet leaf litter next to seeps or streams (Avery*, Mitchell*, Yancey*)				
Haplotrema kendeighi	**SC**		**S1S2**	**G2**
Blue-footed Lancetooth				
M: southwestern mountains (Graham, Macon, Swain)				
Helicodiscus bonamicus	**SC**		**S1**	**G1**
Spiral Coil				
M: Nantahala Gorge vicinity (endemic to this area) (Graham, Macon, Swain)				
Helicodiscus fimbriatus	**SC**		**S2**	**G4**
Fringed Coil				
M: rocky soils; extreme southwestern corner of the state (Caldwell, Cherokee, Graham)				
Helicodiscus inermis	**SR**		**S1?**	**G4**
Oldfield Coil				
M: open, grassy areas (Haywood, Swain)				

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Helicodiscus multidens	**SR**		**S1**	**G3**
Twilight Coil				
M: river bluffs or caves, in calcium-rich soils (Macon, Madison)				
Helicodiscus saludensis	**SR**		**S1?**	**G1**
Corncob Snail				
P: no habitat information; apparently restricted to NC and SC, known in the state only from South Mountains State Park (Burke)				
Helisoma eucosmium	**E**		**S1**	**G1Q**
Greenfield Rams-horn				
C: Greenfield Lake (formerly), Town Creek in Brunswick County (endemic to North Carolina) (Brunswick*, New Hanover*)				
Hendersonia occulta	**SR**		**S2S3**	**G4**
Cherrystone Drop				
M: river bluffs, talus slopes, and other forested areas with high pH soils (Caldwell, Madison, Swain, Watauga, Yancey)				
Inflectarius downieanus	**SR**		**S1S2**	**G3**
Dwarf Globelet				
M: montane forests, but habitats not well known; reported also from Graham and Cherokee counties (Watauga)				
Inflectarius ferrissi	**T**		**S2**	**G2**
Smokey Mountain Covert				
M: spruce-fir and northern hardwood forests; Great Smoky Mountains and Plott Balsams (endemic to these ranges) (Haywood, Jackson, Swain)				
Inflectarius subpalliatus	**SC**		**S2S3**	**G2**
Velvet Covert				
M: central mountains (Watauga to Haywood counties) (Avery, Haywood, Madison, Mitchell, Watauga)				
Inflectarius verus	**SR**		**S1?**	**G1**
Fuzzy Covert				
M: rich forests, known only from both the NC and TN sides of Great Smoky Mountains National Park (Haywood, Swain)				
Leptoxis dilatata	**SC**		**S3**	**G3**
Seep Mudalia				
M: New drainage (Alleghany, Ashe, Watauga)				
Lioplax subcarinata	**SC**		**S3**	**G4G5**
Ridged Lioplax				
PC: streams and rivers, well documented in Lake Waccamaw, possibly in decline there (Columbus, Duplin*, Edgecombe, Franklin*, Gates, Granville, Halifax, Hertford, Johnston*, Nash, Pender*, Surry, Warren)				

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Mesodon altivagus	**SR**		**S1?**	**G2G3**
Wandering Globe				
M: spruce-fir and northern hardwood forests, known only from both the NC and TN sides of Great Smoky Mountains National Park (Haywood, Swain)				
Mesodon andrewsae	**SR**		**S2S3**	**G3**
Balsam Globe				
M: high elevation forests, from Madison County to southwestern Virginia (Avery, Caldwell, Jackson, Swain*, Transylvania, Watauga, Yancey)				
Mesomphix latior	**SR**		**S2S3**	**G3G4**
Broad Button				
M: low elevation hardwood forests (Haywood, Swain)				
Mesomphix pilsbryi	**SR**		**S2S3**	**G4**
Striate Button				
PC: no habitat information (Bladen, Brunswick, Craven, Gaston, Harnett, Sampson, Stanly, Union)				
Mesomphix vulgatus	**SR**		**S2?**	**G4**
Common Button				
M: a variety of forested slopes, often where steep or in ravines (Henderson, McDowell, Swain*, Watauga*)				
Novisuccinea ovalis	**SR**		**S2S3**	**G5**
Oval Ambersnail				
M: a variety of montane forests, at all elevations (Avery, Madison, Mitchell, Swain, Watauga, Yancey)				
Pallifera hemphilli	**SC**		**S2S3**	**G4**
Black Mantleslug				
M: high elevation forests, mainly spruce-fir (Avery, Jackson, Mitchell, Swain, Watauga, Yancey*)				
Pallifera ohioensis	**SR**		**S1**	**G5**
Redfoot Mantleslug				
M: under bark, logs, or leaf litter in spruce-fir forests, known from Roan Mountain (Mitchell)				
Paravitrea andrewsae	**SC**		**S2**	**G2**
High Mountain Supercoil				
M: cove forests with rocky slopes; northern half of the mountains (Avery, Buncombe, Madison, Mitchell, Watauga, Yancey)				
Paravitrea clappi	**SC**		**S1S2**	**G2G3**
Mirey Ridge Supercoil				
M: high elevations in Great Smoky Mountains National Park (endemic to this park) (Swain)				

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Paravitrea lacteodens	**SC**		**SH**	**G1**
Ramp Cove Supercoil				
M: Graham County, possibly Cherokee County (endemic to this area) (Graham*)				
Paravitrea lamellidens	**SC**		**S2S3**	**G2**
Lamellate Supercoil				
M: forested hillsides, especially near talus slopes (Cherokee, Graham, Haywood, Macon, Swain, Watauga, Yancey)				
Paravitrea multidentata	**SR**		**S2S3**	**G5**
Dentate Supercoil				
MP: hillsides, especially near seeps, in hardwood forests (Avery, Burke, Haywood)				
Paravitrea petrophila	**SR**		**S1**	**G4**
Cherokee Supercoil				
M: a variety of hardwood forests (Macon)				
Paravitrea placentula	**SC**		**S2S3**	**G3**
Glossy Supercoil				
MP: a variety of mesic to rich hardwood forests (Avery, Madison, Mitchell, Swain)				
Paravitrea reesei	**SR**		**S2?**	**G3**
Round Supercoil				
M: hillsides and ravines in hardwood forests (Madison, Watauga, Wilkes)				
Paravitrea ternaria	**T**		**S1**	**G1G2**
Sculpted Supercoil				
M: under moist leaf litter on wooded hillsides and slopes (endemic to Madison County and Unicoi County, Tennessee) (Madison)				
Paravitrea umbilicaris	**SC**		**S2**	**G2**
Open Supercoil				
M: cove forests with rocky slopes (Avery, Cherokee, Graham, Macon, Swain)				
Paravitrea varidens	**T**		**S1S2**	**G1G2**
Roan Supercoil				
M: high elevation forests (endemic to northwestern North Carolina and adjacent Tennessee) (Mitchell, Yancey)				
Patera clarki clarki	**SC**		**S3**	**G3T3**
Dwarf Proud Globe				
M: forested mountainsides (Cherokee, Clay, Graham, Haywood, Jackson, Macon, Swain)				
Patera clarki nantahala	**T**	**T**	**S1**	**G3T1**
Noonday Globe				
M: Nantahala Gorge (endemic to this site) (Graham*, Macon*, Swain)				

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Philomycus virginicus	**SR**		**S1S2**	**G3**
Virginia Mantleslug				
M: wooded hillsides at high elevations in the northern mountains (Ashe, Avery)				
Pilsbryna nodopalma	**SR**		**S1**	**G1G2**
Oar Tooth Bud				
M: rock outcrops and rocky hillsides (Buncombe, Haywood, Madison)				
Planorbella magnifica	**E**	**C**	**S1**	**G1**
Magnificent Rams-horn				
C: Orton Pond and pond on Sand Hill Creek; formerly Greenfield Lake (endemic to North Carolina) (Brunswick, New Hanover*)				
Praticolella lawae	**SR**		**S1**	**G3**
Appalachian Scrubsnail				
M: mainly in sandy soil of dry pine woods and glades (Clay)				
Somatogyrus virginicus	**SR**		**S2S3**	**G2G3**
Panhandle Pebblesnail				
P: Eno River (Chatham, Durham)				
Stenotrema depilatum	**SC**		**S2**	**G2**
Great Smoky Slitmouth				
M: Great Smoky Mountains National Park (essentially endemic to this area) (Graham, Haywood, Swain)				
Stenotrema sp. 1	**SR**		**S1?**	**GNR**
Cove Slitmouth				
M: cove hardwoods at lower elevations (endemic to the Great Smoky Mountains National Park and immediate vicinity) (Haywood, Swain)				
Striatura exigua	**SR**		**S1**	**G5**
Ribbed Striate				
M: swampy woods and bog margins; disjunct south from West Virginia (Swain)				
Succinea unicolor	**SR**		**S1S2**	**G3G4**
Squatty Ambersnail				
C: marshy areas near streams and lakes (Bertie)				
Triodopsis fulciden	**SC**		**S2S3**	**G1G2**
Dwarf Threetooth				
P: southwestern Piedmont (endemic to North Carolina) (Burke, Catawba, Cleveland, Lincoln)				
Triodopsis soelneri	**T**		**S2S3**	**G2**
Cape Fear Threetooth				
C: swampy habitats in the southeastern portion of the state (endemic to North Carolina) (Brunswick, Columbus, New Hanover, Onslow)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Triodopsis tennesseensis	**SR**		**S1**	**G4**
Budded Threetooth				
M: mixed hardwoods on hillsides (Madison)				
Vallonia pulchella	**SR**		**S1S2**	**G5**
Lovely Vallonia				
no locality or habitat information; at southern edge of species' range				
Ventridens coelaxis	**SC**		**S3?**	**G3**
Bidentate Dome				
M: cove forests and northern hardwood forests (Alleghany, Avery, Caldwell, Madison, McDowell, Watauga)				
Ventridens collisella	**SR**		**S2?**	**G4**
Sculptured Dome				
M: wooded hilllsides in hardwood forests, on high pH soils (Alleghany, Ashe, Avery, Caldwell, Mitchell, Watauga)				
Ventridens decussatus	**SR**		**S3?**	**G3**
Crossed Dome				
MP: montane oak-hickory forests (Avery, Graham, Haywood)				
Ventridens lasmodon	**SR**		**S1?**	**G4**
Hollow Dome				
M: wooded hillsides and ravines (Madison)				
Ventridens lawae	**SR**		**S2S3**	**G4**
Rounded Dome				
MP: hillsides and ravines in hardwood forests (Avery, Burke, Caldwell, Catawba, Clay, Haywood, Henderson, Macon, Madison*, Swain, Transylvania)				
Ventridens suppressus	**SR**		**S1S2**	**G5**
Flat Dome				
no locality or habitat information; at southern edge of species' range (Avery)				
Vertigo alabamensis	**SR**		**S2S3**	**G3**
Alabama Vertigo				
C: pocosins (Bladen, Brunswick, Carteret, Craven, Greene, Moore, Pamlico, Pender, Scotland, Tyrrell)				
Vertigo bollesiana	**SR**		**S1S2**	**G4G5**
Delicate Vertigo				
M: wooded hillsides and marshes; however, records south of PA are suspected of being *Vertigo gouldii* (Haywood)				
Vertigo oralis	**SR**		**S2S3**	**G5**
Palmetto Vertigo				
C: swamps and other wetland forests in the lower Coastal Plain (Beaufort, Pender)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Vertigo parvula	**SR**		**S1**	**G3**
Smallmouth Vertigo				
M: cove forests and rich slopes, at low elevations (Burke)				
Vertigo sp. 3	**SR**		**S2S3**	**GNR**
a new Vertigo				
C: pocosins (Bladen, Brunswick, Craven, Jones, Pamlico, Pender, Tyrrell)				
Vertigo tridentata	**SR**		**S1S2**	**G5**
Honey Vertigo				
PM: often around species of mints close to rock outcrops or talus slopes (Ashe, Burke, Gaston)				
Viviparus intertextus	**SR**		**S2?**	**G4**
Rotund Mysterysnail				
C: swamps in Lumber and Waccamaw drainages (Bladen, Columbus, Robeson)				
Zonitoides patuloides	**SC**		**S2**	**G3**
Appalachian Gloss				
M: cove hardwoods in deep leaf litter; southwestern mountains (Haywood, Macon, Swain, Wilkes)				

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Arachnids

Hypochilus coylei **SR** **S3?** **G3?**

a Lampshade Weaver

M: rock outcrops (endemic to southern mountains of North Carolina) (Buncombe, Henderson, McDowell, Polk, Rutherford)

Hypochilus sheari **SR** **S2S3** **G2G3**

a Lampshade Weaver

M: rock outcrops (endemic to North Carolina) (Buncombe, McDowell, Yancey)

Microhexura montivaga **SR** **E** **S1** **G1**

Spruce-fir Moss Spider

M: in moss of spruce-fir forests (endemic to North Carolina and adjacent Tennessee) (Avery, Buncombe, Caldwell, Haywood, Jackson, Mitchell, Swain, Watauga, Yancey)

Nesticus brimleyi **SR** **S1?** **G1G2**

a Cave Cobweb Spider

M: caves (endemic to the vicinity of Bat Cave) (Polk)

Nesticus carolinensis **SR** **S1** **G1?**

Linville Caverns Spider

M: caves (endemic to Linville Caverns) (McDowell)

Nesticus cooperi **SR** **S1** **G1**

Lost Nantahala Cave Spider

M: caves and along Nantahala River (endemic to this area) (Macon, Swain)

Nesticus crosbyi **SR** **S1?** **G1?**

a Cave Cobweb Spider

M: spruce-fir forests (endemic to Mount Mitchell) (Yancey)

Nesticus gertschi **SR** **S1?** **G1G2**

a Cave Cobweb Spider

M: caves (Buncombe*)

Nesticus mimus **SR** **S2?** **G2**

a Cave Cobweb Spider

M: rocky areas; known from Grandfather Mountain and Table Rock; also in Virginia (Avery, Burke)

Nesticus sheari **SR** **S2?** **G2?**

a Cave Cobweb Spider

M: on ground in moist or rich forests (apparently endemic to Graham County) (Graham)

Nesticus silvanus **SR** **S2?** **G2?**

a Cave Cobweb Spider

M: habitat not indicated (apparently endemic to southern mountains of North Carolina)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Nesticus sp. 1	**SR**		**S2?**	**G2?**
a Cave Cobweb Spider				
M: habitat not indicated (Jackson, Transylvania)				
Nesticus sp. 2	**SR**		**S1S3**	**G1G3**
a Cave Cobweb Spider				
M: on ground in forests (Clay)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Crustaceans				
Caecidotea carolinensis **Bennett's Mill Cave Water Slater** P: caves (endemic to North Carolina) (McDowell*)	**E**		**SH**	**G2G3**
Cambarus acanthura **Thornytail Crayfish** M: pools and small creeks in the Hiwassee drainage (Cherokee)	**SR**		**S1**	**G4G5**
Cambarus brimleyorum **Valley River Crayfish** M: streams in the Hiwassee drainage (endemic to North Carolina) (Cherokee, Clay)	**SR**		**S2**	**G3G4**
Cambarus catagius **Greensboro Burrowing Crayfish** P: Cape Fear and Yadkin-Pee Dee drainages; Greensboro area to the Uwharries (endemic to North Carolina) (Davidson, Guilford, Montgomery, Randolph)	**SC**		**S1**	**G2**
Cambarus chaugaensis **Chauga Crayfish** M: streams in Savannah drainage (endemic to northwest South Carolina and adjacent North Carolina and Georgia) (Jackson, Macon, Transylvania)	**SC**		**S2**	**G2**
Cambarus davidi **Carolina Ladle Crayfish** P: Neuse and Cape Fear drainages (endemic to North Carolina) (Alamance, Caswell, Chatham, Durham, Granville, Guilford, Harnett*, Orange, Person, Rockingham, Stokes, Wake)	**SR**		**S3**	**G3**
Cambarus eeseeohensis **Grandfather Mountain Crayfish** M: Linville River above Linville Falls (endemic to this area) (Avery, Burke)	**SR**		**S2S3**	**G1**
Cambarus georgiae **Little Tennessee Crayfish** M: streams in Little Tennessee drainage (Jackson, Macon, Swain)	**SC**		**S2**	**G2G3**
Cambarus hystricosus **Sandhills Spiny Crayfish** S: streams in the Sandhills portion of the Cape Fear drainage (endemic to North Carolina) (Cumberland, Hoke, Moore)	**SR**		**S2**	**G2**
Cambarus johni **Carolina Foothills Crayfish** MP: headwater streams in the Yadkin-Pee Dee, Catawba, and Broad drainages (Alexander, Burke, Caldwell, Cleveland, Henderson, Iredell, Lincoln, McDowell, Polk, Rutherford, Wilkes)	**SR**		**S3**	**G3**

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Cambarus lenati	**SR**		**S2**	**G2**
Broad River Stream Crayfish				
P: streams in the Broad River drainage (endemic to North Carolina) (Buncombe, Cleveland, Polk, Rutherford)				
Cambarus nodosus	**SR**		**S1**	**G4**
Knotty Burrowing Crayfish				
M: seepages and other mucky areas in the Hiwassee drainage (Cherokee, Clay)				
Cambarus parrishi	**SC**		**S1**	**G2**
Hiwassee Headwaters Crayfish				
M: streams in Hiwassee drainage (Clay)				
Cambarus reburrus	**SR**		**S2**	**G3**
French Broad River Crayfish				
M: streams in the French Broad, Little Tennessee, and Savannah drainages (endemic to North Carolina) (Buncombe, Henderson, Jackson, Madison, Transylvania)				
Cambarus spicatus	**SC**		**S2**	**G3**
Broad River Spiny Crayfish				
P: streams in Broad River drainage (Cleveland, Polk, Rutherford)				
Cambarus tuckasegee	**SR**		**S1S2**	**G1G2**
Tuckasegee Stream Crayfish				
M: streams in the Tuckasegee subdrainage of the Little Tennessee drainage (endemic to North Carolina) (Jackson, Macon, Swain)				
Diacyclops jeanneli putei	**SC**		**SH**	**G3G4T1T2**
Carolina Well Diacyclops				
P: well in Orange County (endemic to North Carolina) (Orange*)				
Lynceus gracilicornis	**SC**		**S2**	**G5**
Graceful Clam Shrimp				
C: temporary ponds, pools, and ditches (Craven, New Hanover*, Scotland)				
Orconectes carolinensis	**SC**		**S3**	**G3**
North Carolina Spiny Crayfish				
PC: rivers and streams in the Chowan, Roanoke, Neuse, and Tar drainages (Craven*, Edgecombe, Franklin, Gates, Granville, Greene*, Halifax, Hertford, Johnston, Jones, Lenoir*, Nash, Northampton, Pitt, Stokes, Vance, Wake, Warren, Wayne, Wilson)				
Orconectes virginiensis	**SC**		**S3**	**G3**
Chowanoke Crayfish				
C: streams and rivers in the Chowan and Roanoke drainages (Bertie, Chowan, Gates, Granville, Halifax, Hertford, Martin, Northampton, Washington)				

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Procambarus braswelli	**SC**		**S2**	**G3**
Waccamaw Crayfish				
C: Waccamaw and Lumber drainages (endemic to North Carolina and adjacent South Carolina) (Brunswick, Columbus, Robeson, Scotland)				
Skistodiaptomus carolinensis	**SC**		**SH**	**GNR**
Carolina Skistodiaptomus				
M: Lake Ravenel in Macon County (endemic to North Carolina) (Macon*)				
Stygobromus carolinensis	**SR**		**SH**	**G1**
Yancey Sideswimmer				
M: seeps at Mount Mitchell (endemic to North Carolina) (Yancey*)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global

Insects: Mayflies

Ameletus tertius **SR** **S2** **G4**

a mayfly

M: Wilson Creek, Panthertown Creek; also in Great Smoky Mountains National Park (Swain)

Amercaenis cusabo **SR** **S1** **G3**

a mayfly

C: Black River, Pee Dee River (Anson, Bladen, Pender, Richmond)

Asioplax dolani **SR** **S2** **G4**

a mayfly

P: Neuse River (Edgecombe, Johnston, Montgomery, Polk, Union)

Attenella margarita **SR** **S1** **G5**

a mayfly

M: Eagle Creek (Swain)

Baetisca becki **SR** **S1** **G2G3**

a mayfly

PC: sand-bottomed streams (Catawba, Edgecombe*, Halifax*, Nash)

Baetisca obesa **SR** **S1** **G5**

a mayfly

C: rivers and streams in the Tar drainage (Edgecombe*, Pitt*)

Baetopus trishae **SR** **S1** **G1G2**

a mayfly

M: Panthertown Creek (Jackson)

Barbaetis benfieldi **SR** **S1** **G2G4**

Benfield's Bearded Small Minnow Mayfly

M: Jacob Fork, French Broad River, Caney Fork (Buncombe, Burke*, Jackson, Transylvania)

Cercobrachys etowah **SR** **S2** **G4**

a caenid mayfly

P: Yadkin, Broad, Hiwassee, and Tar River basins (Cherokee, Cleveland, Polk, Rowan)

Choroterpes basalis **SR** **S2** **G5**

a mayfly

PSC: Waccamaw River, Drowning Creek, Bear Creek, Lanes Creek, UT Laurens Creek, Dutchmans Creek (Brunswick*, Chatham*, Columbus, Moore*, Richmond*, Union*)

Dolania americana **SR** **SH** **G4**

American Sand Burrowing Mayfly

C: only known NC occurrence is from the Black River (Sampson*)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Epeorus punctatus	**SR**		**S1**	**G2G3**
Dotted Flatheaded Mayfly				
M: Wilson Creek, Johns River, and South Fork New River (Ashe, Burke, Caldwell)				
Ephemerella floripara	**SR**		**S2**	**G3Q**
a mayfly				
M: Wilson Creek, Linville River, and North and South Forks of New River (Alleghany, Ashe, Burke*, Caldwell, Watauga*)				
Heterocloeon berneri	**SR**		**S1**	**G2G3**
Berner's Two-winged Mayfly				
M: French Broad River and West Fork French Broad River (Transylvania)				
Homoeoneuria cahabensis	**SR**		**S2**	**G2G3**
Cahaba Sand-filtering Mayfly				
P: South Fork Yadkin River (Davie), South Fork Catawba River, Hunting Creek, Third Creek, Second Broad River (Catawba, Iredell*, Rowan*, Rutherford)				
Maccaffertium wudigeum	**SR**		**S1**	**G1**
Wilson Creek "Stenonema"				
M: Wilson Creek vicinity (endemic to this area) (Burke, Caldwell)				
Macdunnoa brunnea	**SR**		**S2**	**G3G4**
a mayfly				
MP: French Broad River, Mills River, Hunting Creek, Leepers Creek, Yadkin River, Swift Creek (Buncombe, Davie*, Gaston, Henderson, Iredell*, Nash*, Wilkes)				
Neoephemera eatoni	**SR**		**S1**	**GNR**
a mayfly				
P: Dan and Mayo River basins				
Pseudiron centralis	**SR**		**S2**	**G5**
White Sand-river Mayfly				
P: Iredell County (Iredell*)				
Tortopsis puella	**SR**		**S1**	**G5**
a mayfly				
P: only one NC specimen known, from Tar River (Franklin*)				
Tsalia berneri	**SR**		**S3**	**G4**
a mayfly				
MP: probably widespread in clean streams and rivers with riverweed (*Podostemum*) (Ashe*, Buncombe*, Burke*, Caldwell, Durham, Haywood, Henderson, Iredell, McDowell*, Rockingham)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Insects: Stoneflies				
Alloperla lenati **Sandhill Sallfly** SC: Lumber River at Wagram and Upper Rockfish Creek (Scotland)	**SR**		**S1**	**G2G3**
Attaneuria ruralis **Giant Stone** MSC: Cataloochee Creek, West Fork Pigeon River, South Fork New River; Naked Creek (Ashe, Haywood, Richmond*)	**SR**		**S2S3**	**G4**
Bolotoperla rossi **Smoky Willowfly** M: known from eight streams and rivers in the mountains, from Ashe County to Transylvania County (Alleghany*, Ashe*, Caldwell*, McDowell, Transylvania, Watauga*)	**SR**		**S3**	**G4**
Haploperla fleeki **Piedmont Sallfly** S: Little River (Moore) (endemic to this area) (Moore)	**SR**		**S1**	**G1**
Hydroperla phormidia **Brownwater Springfly** PSC: Lumber River drainage (Columbus, Robeson)	**SR**		**S2**	**G3**
Megaleuctra williamsae **Williams' Rare Winter Stonefly** M: UT Cullasaja River, Cove Creek, Mull Creek (Swain)	**SR**		**S1**	**G2**
Nemocapnia carolina **Southern Snowfly** M: Whitewater River, Jackson Creek, and Silver Creek (Burke, Jackson, Moore*, Transylvania)	**SR**		**S1**	**G5**
Pteronarcys comstocki **Spiny Salmonfly** M: medium to large cold streams in French Broad and Catawba drainages (Buncombe, Madison)	**SR**		**S2**	**G3**
Rasvena terna **Vermont Sallfly** M: small streams in the French Broad drainage (Cherokee, Transylvania)	**SR**		**S2**	**G4**
Remenus daniellae **Danielle's Stripetail** M: Yellowstone Prong of East Fork Pigeon River, Right Fork Cove Creek, Ball Branch, Gunna Creek, Collins Creek (Haywood, Swain)	**SR**		**S2**	**GNR**

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Remenus duffieldi	**SR**		**S2**	**G2**
Georgia Springfly				
M: Yellowstone Prong of East Fork Pigeon River, Pigeon Branch of South Fork Mills River, Tellico Creek, Collins Creek, Kanatai Fork (Haywood, Macon, Swain, Transylvania*)				
Remenus kirchneri	**SR**		**S1**	**G2**
Blueridge Springfly				
M: Jones Creek in the Little Tennessee basin and Garden Creek in the Yadkin basin (Avery, Wilkes)				
Zapada chila	**SR**		**S1S2**	**G2**
Smokies Forestfly				
M: small streams in Little Tennessee and New drainages (Ashe*, Swain)				

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Insects: Caddisflies				
Brachycentrus etowahensis	**SR**		**SH**	**G3**
a caddisfly				
M: Hiwassee River (Cherokee*)				
Ceraclea cancellata	**SR**		**S2**	**G5**
a longhorned caddisfly				
PSC: Naked Creek, Roanoke River, Eliis Creek, Turnbull Creek (Bertie, Richmond*)				
Ceraclea joannae	**SR**		**S1**	**G1**
Lenat's Ceraclea				
P: Little River (Montgomery) (endemic to this area) (Montgomery)				
Ceraclea slossonae	**SR**		**S2**	**G4**
a caddisfly				
M: larger stream and rivers in New and Catawba drainages (Ashe, Burke*)				
Dibusa angata	**SR**		**S2**	**G5**
a caddisfly				
P: larger streams and rivers in Tar, Neuse, and Yadkin-Pee Dee drainages (Davie*, Durham, Rowan*, Wake*)				
Diplectrona metaqui	**SR**		**S3**	**G4G5**
a diplectronan caddisfly				
P: very small streams (Harnett, Stokes)				
Goerita flinti	**SR**		**S1**	**G2G3**
a caddisfly				
M: known only from Great Smoky Mountains National Park (Swain)				
Homoplectra monticola	**SR**		**S1**	**G2G3**
a caddisfly				
M: scattered sites in central and southern mountains (Buncombe, Jackson, Macon)				
Hydropsyche carolina	**SR**		**S1**	**G2G3**
a caddisfly				
M: rivers and streams in Savannah, French Broad, and New drainages (Jackson, Macon*, Swain*, Transylvania)				
Hydropsyche walkeri	**SR**		**S2**	**G5**
a caddisfly				
M: Beech Creek (Watauga)				
Manophylax altus	**SR**		**S1**	**G2G3**
Mount Mitchell Caddisfly				
M: moist vertical rockfaces (Buncombe, Yancey)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Nectopsyche waccamawensis	**SR**		**S1**	**G1**
Waccamaw White Miller				
C: Lake Waccamaw (endemic to this area) (Columbus)				
Oecetis sp. D	**SR**		**S1**	**G1**
a caddisfly				
C: Lake Waccamaw and additional sites (endemic to North Carolina) (Brunswick, Columbus)				
Oropsyche howellae	**SR**		**S2**	**G2**
a caddisfly				
M: streams (Jackson*, Macon*)				
Palaeagapetus celsus	**SR**		**S2**	**G5**
a caddisfly				
M: small streams in headwaters of Watauga and Catawba drainages (Avery*, Watauga)				
Polycentropus colei	**SR**		**S1**	**G3G4**
a caddisfly				
M: high elevation streams in Great Smoky Mountains National Park (Haywood, Swain)				
Rhyacophila accola	**SR**		**S1S2**	**G1G2**
a caddisfly				
M: small streams and springs (endemic to North Carolina) (Haywood, Swain)				
Rhyacophila appalachia	**SR**		**S2**	**G3**
a rhyacophilan caddisfly				
M: mountain streams (Cherokee, Macon, Transylvania)				
Rhyacophila celadon	**SR**		**S2**	**G2G3**
Celadon Caddisfly				
M: seeps and streams (Avery, Haywood, Swain, Watauga)				
Rhyacophila sp. 1	**SR**		**S2**	**G2G3**
a caddisfly				
C: streams and swamps (Columbus, Moore, Pender, Robeson)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C	Rank Global
Insects: Dragonflies and Damselflies				
Aeshna tuberculifera	**SR**		**S1**	**G5**
Black-tipped Darner				
M: boggy or marshy ponds (Avery, Burke, Wilkes*)				
Aeshna verticalis	**SR**		**S1**	**G5**
Green-striped Darner				
M: marshy ponds (Burke, Henderson)				
Arigomphus pallidus	**SR**		**S1**	**G5**
Gray-green Clubtail				
C: ponds, lakes, and streams (Pender)				
Boyeria grafiana	**SR**		**S2?**	**G5**
Ocellated Darner				
M: rocky forest streams (Avery*, Burke, Macon, McDowell, Swain*, Watauga, Wilkes)				
Calopteryx amata	**SR**		**S1S2**	**G5**
Superb Jewelwing				
M: cold, shallow, rocky rivers (Buncombe*, Graham, Haywood, Henderson*, Jackson, Macon*, Mitchell*, Swain, Transylvania*, Yancey)				
Cordulia shurtleffii	**SR**		**S1**	**G5**
American Emerald				
M: ponds, lakes, bogs (Burke)				
Coryphaeschna ingens	**SR**		**S2?**	**G5**
Regal Darner				
C: lakes and ponds (Bladen, Carteret*, Columbus, Craven*, Durham, Gates, Granville, Jones, Martin*, Onslow, Pamlico*, Pender, Tyrrell, Wake*)				
Dromogomphus spoliatus	**SR**		**S1**	**G4G5**
Flag-tailed Spinyleg				
M: slow-moving rivers, or sometimes ponds, often in sunny places (Graham)				
Gomphurus fraternus	**SR**		**S1**	**G5**
Midland Clubtail				
P: rocky rivers (Anson, Stanly)				
Gomphurus lineatifrons	**SR**		**S2**	**G4**
Splendid Clubtail				
MP: rocky rivers (Alleghany, Ashe, Avery, Durham, Haywood, Orange, Watauga)				
Gomphurus septima	**SR**		**S3**	**G2**
Septima's Clubtail				
PC: rocky rivers (Alamance, Anson, Chatham, Cumberland, Durham, Halifax, Harnett, Lee, Montgomery, Moore, Nash, Northampton, Orange, Richmond, Stanly, Union, Wake)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Gomphurus ventricosus	**SR**		**S1S2**	**G3**
Skillet Clubtail				
P: rivers (Caswell, Franklin, Vance, Wake)				
Hylogomphus adelphus	**SR**		**S1S2**	**G5**
Mustached Clubtail				
M: small rivers with rapids (Ashe, Avery, Buncombe, Haywood, Madison, Watauga, Yancey*)				
Hylogomphus viridifrons	**SR**		**S1**	**G3G4**
Green-faced Clubtail				
M: rivers (Alleghany*, Ashe, Macon, Madison)				
Ladona julia	**SR**		**S1**	**G5**
Chalk-fronted Corporal				
M: bogs, marshes (Jackson)				
Lestes congener	**SR**		**S1**	**G5**
Spotted Spreadwing				
M: ponds and small lakes with emergent vegetation along the margins (Alleghany, Watauga)				
Macromia margarita	**SR**		**S2?**	**G3**
Mountain River Cruiser				
MP: rivers (Burke, Caldwell, Cleveland, Davie, Franklin, Granville*, Iredell, Macon, Rockingham, Transylvania*, Watauga)				
Neurocordulia yamaskanensis	**SR**		**S1?**	**G5**
Stygian Shadowdragon				
M: rivers (Alleghany*, Macon, Madison)				
Ophiogomphus aspersus	**SR**		**S1**	**G4**
Brook Snaketail				
M: rapids of rivers and streams (Alleghany, Ashe, Haywood*)				
Ophiogomphus edmundo	**SR**		**S1**	**G2**
Edmund's Snaketail				
P: rocky rivers and streams in the upper Piedmont and foothills (Burke, Caldwell, Rockingham, Stokes)				
Ophiogomphus howei	**SR**		**S1**	**G3**
Pygmy Snaketail				
M: rivers (Alleghany, Ashe, Burke)				
Ophiogomphus rupinsulensis	**SR**		**S1**	**G5**
Rusty Snaketail				
M: rivers (Alleghany)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Phanogomphus australis	**SR**		**S2**	**G4**
Clearlake Clubtail				
C: lakes and ponds (Bladen, Brunswick, New Hanover*, Richmond, Scotland)				
Phanogomphus borealis	**SR**		**SH**	**G5**
Beaverpond Clubtail				
M: lakes, ponds, streams (Mitchell*)				
Phanogomphus cavillaris	**SR**		**S1**	**G4**
Sandhill Clubtail				
SC: sand-bottomed lakes and streams (Bladen, Brunswick)				
Phanogomphus descriptus	**SR**		**S1**	**G4G5**
Harpoon Clubtail				
M: large streams and rivers (Avery*, Haywood*, Madison)				
Phanogomphus quadricolor	**SR**		**S1S2**	**G3G4**
Rapids Clubtail				
MP: rocky rivers (Buncombe, Chatham, Madison, Moore)				
Progomphus bellei	**SR**		**S1**	**G3**
Belle's Sanddragon				
C: sand-bottomed lakes (Bladen)				
Somatochlora elongata	**SR**		**S2S3**	**G5**
Ski-tipped Emerald				
M: bogs, marshes, and other open wetlands with slow-moving water (Ashe, Avery, Burke, Clay*, Jackson*, Macon, Watauga)				
Somatochlora georgiana	**SR**		**S2?**	**G3G4**
Coppery Emerald				
PSC: creeks and other slow-moving acidic streams, in forested areas (Anson*, Beaufort*, Bladen*, Brunswick*, Chatham, Columbus*, Cumberland*, Duplin*, Durham, Edgecombe, Franklin*, Greene*, Harnett*, Hoke, Johnston*, Lee*, Martin*, Moore, Nash, Northampton*, Orange*, Pender*, Pitt*, Richmond*, Robeson*, Rockingham*, Sampson*, Scotland*)				
Stenogomphurus consanguis	**SR**		**S1?**	**G3**
Cherokee Clubtail				
MP: small spring-fed streams (Burke*, Davie)				
Stylogomphus sigmastylus	**SR**		**SH**	**G5**
Interior Least Clubtail				
S: small, clear streams in wooded areas (Moore*)				
Stylurus ivae	**SR**		**S2S3**	**G4**
Shining Clubtail				
SC: sandy creeks or small rivers, where waters are clean (Bladen*, Columbus*, Cumberland*, Duplin, Jones, Moore*, Pender*, Robeson, Sampson*, Scotland)				

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Stylurus scudderi	**SR**		**S2?**	**G5**
Zebra Clubtail				
M: streams and rivers (Ashe, Avery*, Jackson*, Macon*, Swain*, Watauga, Wilkes)				
Stylurus townesi	**SR**		**SH**	**G3**
Townes' Clubtail				
C: sand-bottomed small streams and rivers (Columbus*, Robeson*)				
Sympetrum obtrusum	**SR**		**S1**	**G5**
White-faced Meadowhawk				
M: boggy or marshy ponds and lakes (Ashe, Avery, Watauga)				
Triacanthagyna trifida	**SR**		**S1?**	**G5**
Phantom Darner				
C: slow-flowing streams (Carteret*, Craven*, Pender, Robeson*)				

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Insects: Butterflies

Amblyscirtes alternata **SR** **S2** **G2G3**

Dusky Roadside-Skipper

SC: open pine woods, savannas; host plants -- unknown, but presumably grasses (Brunswick, Craven, Cumberland, Hoke, Jones, Moore, New Hanover, Onslow, Pender, Richmond, Scotland)

Amblyscirtes reversa **SR** **S3** **G3G4**

Reversed Roadside-Skipper

MPSC: flatwoods, savannas, pocosin borders, near cane; host plant -- cane (*Arundinaria*) (Beaufort, Bertie, Brunswick, Carteret, Craven, Cumberland, Dare, Franklin, Gaston, Hoke, Macon, Martin, Moore, Onslow, Pender, Pitt, Polk, Richmond, Robeson*, Scotland, Swain, Washington)

Atrytone arogos arogos **SR** **SH** **G3T1T2**

Eastern Arogos Skipper

SC: savannas, open pinewoods, and other relatively undisturbed grasslands; host plants -- grasses, mainly pinebarrens sandreed (*Calamovilfa brevipilis*) (Brunswick*, Carteret, Moore*, New Hanover*, Richmond*)

Atrytonopsis loammi **SR** **SH** **G1**

Loammi Skipper

CT: grassy areas near the coast; host plants presumed to be *Andropogon* grasses (Brunswick*, New Hanover*)

Atrytonopsis quinteri **SR** **S1** **G1**

Crystal Skipper

T: dunes and sandy flats; host plant -- seaside little bluestem (*Schizachyrium littorale*) (endemic to North Carolina) (Carteret, Onslow)

Autochton cellus **SR** **S2** **G4**

Golden Banded-Skipper

MP: moist woods near streams; host plant -- wild bean (*Phaseolus polystachios*) (Alleghany, Buncombe, Burke, Caldwell, Caswell, Cherokee, Cleveland, Gaston, Graham, Haywood, Henderson, Macon, Madison, Mitchell, Orange*, Pitt*, Polk, Rutherford, Swain)

Calephelis virginiensis **SR** **S2** **G4**

Little Metalmark

C: savannas and pine flatwoods; host plants -- vanilla-plant (*Trilisa odoratissima*), thistles (*Cirsium*) (Brunswick, Carteret, Craven, Cumberland, Dare, Moore, New Hanover, Onslow, Pender)

Callophrys hesseli **SR** **S3** **G3G4**

Hessel's Hairstreak

SC: Atlantic white cedar swamps; host plant -- white cedar (*Chamaecyparis thyoides*) (Bladen, Brunswick, Camden, Columbus, Craven, Cumberland, Dare, Gates, Harnett*, Hoke*, Moore, Pender, Richmond, Sampson, Scotland, Tyrrell, Washington)

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Callophrys irus	**SR**		**S2**	**G3**
Frosted Elfin				
MPSC: open woods and borders, usually in dry situations; host plants -- lupines (*Lupinus*) and wild indigos (*Baptisia*) (Brunswick, Buncombe*, Cherokee*, Craven*, Cumberland, Franklin, Gates, Harnett, Hoke, Jones, Moore, Pender, Polk*, Richmond*, Scotland, Transylvania*)				
Celastrina nigra	**SR**		**S2**	**G4**
Dusky Azure				
M: rich, moist deciduous forests; host plant -- goat's-beard (*Aruncus dioicus*) (Buncombe, Clay, Graham, Haywood, Jackson, Macon, Mitchell, Polk, Swain*, Transylvania)				
Chlosyne gorgone	**SR**		**S1?**	**G5**
Gorgone Checkerspot				
M: woodland openings and borders; host plants -- sunflowers, rosinweeds, and other tall composites (Clay, Macon)				
Erora laeta	**SR**		**S2S3**	**GU**
Early Hairstreak				
M: deciduous forests, especially along edges of rich forests; host plants -- mainly American beech (*Fagus grandifolia*) (Alleghany, Ashe, Avery, Buncombe, Burke, Clay, Graham, Haywood, Jackson, Macon, Madison, Mitchell, Swain, Transylvania, Watauga, Wilkes)				
Erynnis martialis	**SR**		**S2**	**G3**
Mottled Duskywing				
MPSC: upland woods and wooded edges; host plant -- New Jersey tea (*Ceanothus americanus*) (Alleghany, Ashe, Brunswick*, Buncombe, Caswell, Clay, Cleveland, Craven*, Cumberland, Durham, Franklin, Gaston*, Graham, Granville, Henderson, Jones*, Macon*, Madison, Montgomery, Moore, Orange*, Polk, Richmond*, Rutherford, Surry, Swain, Wake*, Warren, Wayne, Yadkin)				
Euchloe olympia	**SR**		**S1**	**G5**
Olympia Marble				
M: dry, open wooded slopes, mainly on circumneutral soils; host plants -- cresses (*Arabis*) (Alleghany, Madison, Swain, Wilkes)				
Euphydryas phaeton	**SR**		**S2**	**G5**
Baltimore Checkerspot				
M: bogs, marshes, wet meadows; rarely in upland woods; host plants -- turtlehead (*Chelone*) and false foxglove (*Aureolaria*) (Alleghany, Ashe, Avery, Buncombe, Graham, Haywood, Henderson, Jackson, Macon, Madison, Mitchell, Polk, Transylvania*, Watauga)				
Euphyes berryi	**SR**		**S1**	**G2**
Berry's Skipper				
C: wet areas near ponds, canals, or marshes; host plants -- sedges (*Carex*) (Carteret, Columbus, Craven, Dare, Hyde, Washington)				

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Euphyes bimacula	**SR**		**S2**	**G4**
Two-spotted Skipper				
MPSC: wet savannas, bogs, sedgy areas near wet woods; host plants -- sedges (*Carex*) (Alleghany, Ashe, Brunswick, Carteret, Craven, Gates, Harnett, Johnston, Jones*, Moore*, Northampton, Pender, Pitt, Vance)				
Euphyes dukesi	**SR**		**S1S2**	**G3**
Dukes' Skipper				
CT: ecotones of brackish or fresh marshes with swamps; host plants -- sedges (*Carex*) (Beaufort, Brunswick, Craven, Currituck, Dare, New Hanover)				
Hesperia attalus	**SR**		**S2S3**	**G3G4**
Dotted Skipper				
SC: pine/oak sandhills, flatwoods, mainly in Sandhills; host plants -- grasses (Brunswick*, Craven*, Cumberland, Hoke, Moore, Pender*, Richmond, Scotland)				
Hesperia meskei	**SR**		**S3**	**G3G4**
Meske's Skipper				
SC: open pine woods, especially in Sandhills; host plants -- grasses (Bladen, Brunswick, Cumberland, Hoke, Moore, Onslow*, Richmond, Sampson, Scotland)				
Hesperia metea	**SR**		**S2**	**G4**
Cobweb Skipper				
MPS: dry barren sites, such as powerline clearings and pine/oak sandhills; host plants -- mainly broomsedge (*Andropogon*)				
Megathymus cofaqui	**SR**		**S1**	**G3G4**
Cofaqui Giant-Skipper				
P: monadnocks with yucca; host plant -- *Yucca filamentosa* (Alexander, Polk*)				
Neonympha areolatus	**SR**		**S2**	**G3G4**
Georgia Satyr				
C: savannas, wet powerline clearings, other damp grassy places; host plants -- sedges (Brunswick, Carteret, Columbus, Craven, Durham*, Hoke*, Jones*, Moore*, New Hanover, Onslow, Pender)				
Neonympha helicta	**SR**		**S1?**	**G3G4**
Helicta Satyr				
PSC: sedgy wetlands, including sandhill seeps, pocosin ecotones, and drained beaver ponds in the Sandhills, low pocosins in the northeast Coastal Plain, and wet open swales in the Piedmont; host plants -- sedges (Alamance*, Anson*, Beaufort, Bertie*, Chatham, Cumberland, Dare, Durham*, Gaston*, Gates*, Granville*, Halifax*, Harnett, Hoke, Hyde, Martin*, Moore, Pitt, Richmond*, Scotland, Washington)				
Neonympha mitchellii francisci	**SR**	**E**	**S1**	**G2T1**
Saint Francis' Satyr				
S: boggy areas, overgrown beaver ponds, and pocosin margins with sedges in sandhills; host plants -- sedges (taxon endemic to North Carolina) (Cumberland, Hoke)				

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Papilio cresphontes	**SR**		**S2S3**	**G5**
Giant Swallowtail				
MPCT: primarily coastal in maritime forests or thickets; also in foothills and mountains near hoptree; host plants -- prickly-ash (*Zanthoxylum*), hoptree (*Ptelea*) (Alexander, Alleghany, Ashe, Brunswick, Buncombe, Caldwell, Carteret, Cherokee*, Currituck, Dare, Hyde, Madison, New Hanover, Onslow, Orange*, Pender, Wake, Yancey)				
Phyciodes batesii maconensis	**SR**		**S2**	**G5T3**
Appalachian Tawny Crescent				
M: woodland openings, glades, and road banks at higher elevations; host plants -- asters, mainly *Symphyotrichum undulatum* (Buncombe*, Clay, Graham, Haywood, Jackson, Macon, Swain)				
Poanes aaroni	**SR**		**S1S2**	**G4**
Aaron's Skipper				
T: brackish marshes along the northern coast and sounds; host plants -- grasses, perhaps saltgrass (*Distichlis spicata*) (Currituck, Dare, Hyde)				
Polites mystic	**SR**		**S1**	**G5**
Long Dash				
M: bogs, wet meadows; host plants -- grasses (Alleghany, Ashe, Watauga)				
Polygonia faunus	**SR**		**S1S2**	**G5**
Green Comma				
M: spruce, fir, or hemlock forests, where mixed with hardwoods; host plants -- mainly birches (*Betula*) (Avery*, Buncombe, Caldwell*, Graham, Haywood, Henderson, Macon, Swain, Transylvania*, Watauga, Yancey)				
Polygonia progne	**SR**		**S1**	**G5**
Gray Comma				
M: rich deciduous forests; host plants -- mainly gooseberries (*Ribes*) (Avery, Buncombe, Clay, Madison*, Mitchell*, Swain*, Watauga)				
Pontia protodice	**SR**		**S1S2**	**G5**
Checkered White				
MPSC: fields, pastures; host plants -- mustard species (Family *Brassicaceae*) (Buncombe, Burke, Cabarrus, Chatham, Durham, Forsyth, Gates, Granville, Harnett, Mecklenburg, Richmond, Wake, Wayne)				
Problema bulenta	**SR**		**S1**	**G2G3**
Rare Skipper				
T: fresh to brackish marshes with tall grasses in Wilmington area; host plant -- wild rice (*Zizania aquatica*), possibly other tall grasses (Brunswick, New Hanover)				
Pyrgus wyandot	**SR**		**S1**	**G1G2Q**
Appalachian Grizzled Skipper				
M: openings and edges near wooded hilltops; host plants -- mainly cinquefoil (*Potentilla*) (Alleghany, Ashe, Polk*)				

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Satyrium caryaevorus	**SR**		**S1**	**G4**
Hickory Hairstreak				
M: mid elevation to high elevation deciduous forests; host plants -- primarily hickories (*Carya*) (Ashe, Buncombe, Macon, Madison, McDowell, Watauga)				
Satyrium edwardsii	**SR**		**S2**	**G5**
Edwards' Hairstreak				
MS: scrubby or xeric oak woods; host plants -- mainly oaks (*Quercus*) (Cumberland, Harnett, Hoke, Macon, Moore, Polk*, Sampson, Scotland, Transylvania*, Watauga*)				
Satyrium favonius favonius	**SR**		**S1**	**G4G5T4**
Southern Oak Hairstreak				
T: maritime forests along southern coast; host plant -- oaks, especially live oak (*Quercus virginiana*) (Brunswick, New Hanover)				
Satyrium favonius ontario	**SR**		**S2S3**	**G4G5T4**
Northern Oak Hairstreak				
MPSCT: oak-dominated woods, usually in dry sites; host plants -- oaks (*Quercus*) (Alleghany, Brunswick, Camden*, Carteret, Caswell, Cleveland, Cumberland*, Currituck, Dare, Durham, Hoke, Hyde*, Iredell, Mecklenburg, Montgomery, Moore, Orange, Pender*, Richmond, Wilkes)				
Speyeria idalia	**SR**		**SX**	**G3**
Regal Fritillary				
M: wet or dry meadows, bogs, open hilltops; host plants -- violets (*Viola*) (Alleghany*, Ashe*, Avery*, Wilkes*)				

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Insects: Moths				
Acronicta albarufa **Barrens Dagger Moth** S: oak glades and barrens (Cumberland, Moore, Wake*)	**SR**		**S1S2**	**G3G4**
Acronicta dolli **Doll's Dagger** M: dry oak woodlands (Macon)	**SR**		**S1S2**	**G3G4**
Acronicta perblanda **Cypress Daggermoth** C: cypress swamps (Craven*)	**SR**		**SH**	**G3G4**
Acronicta sinescripta **a Dagger Moth** C: savannas and flatwoods (Brunswick, Pender)	**SR**		**S1S2**	**G3G4**
Agrotis carolina **a Dart Moth** SC: flatwoods with pyxie-moss (*Pyxidanthera*) (endemic to North Carolina) (Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Harnett, Onslow, Pender)	**SR**		**S2S3**	**G2G3Q**
Apamea inebriata **Drunk Apamea** S: sedge meadows (Cumberland, Harnett, Moore)	**SR**		**S1S2**	**G3G4**
Apameine new genus 2 sp. 1 **a Cane Borer** MC: woodland canebrakes (Brunswick, Swain)	**SR**		**S2S3**	**GNR**
Apameine new genus 2 sp. 3 **a Canebrake Moth** SC: woodland canebrakes (Cumberland, Hoke, Martin, Northampton, Washington)	**SR**		**S2S3**	**GNR**
Apameine new genus 2 sp. 4 **a Cane Borer** M: woodland canebrakes (Swain)	**SR**		**S1S2**	**GNR**
Aplectoides condita **A Noctuid Moth** M: high mountain habitats (>4,000'), in association with northern hardwood forests, spruce-fir forests, or rock outcrop communities	**SR**		**S2S3**	**G5**
Arctia caja **Great Tiger Moth** M: high elevation hardwood forests (Watauga, Yancey)	**SR**		**S1**	**G5**

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Argyrostrotis quadrifilaris	**SR**		**S3**	**G4**
Four-lined Chocolate Moth				
SC: pocosins and flatwoods (Bladen, Brunswick, Carteret, Columbus, Cumberland, Harnett, Hoke, Moore, New Hanover, Onslow, Pender)				
Bleptina sangamonia	**SR**		**S1S2**	**GU**
a Litter Moth				
MPC: habitats not known (Bladen, Macon, Montgomery, Onslow, Randolph)				
Catocala consors	**SR**		**SH**	**G4**
Consort Underwing				
P: oak-hickory forests (Gaston*)				
Catocala dulciola	**SR**		**S2S3**	**G3**
Sweet Underwing				
M: forests with hawthorns (Alleghany*, Ashe)				
Catocala grisatra	**SR**		**S1S2**	**G1G3**
Grisatra Underwing				
C: sandhills and dry woods with hawthorns (Bladen)				
Catocala herodias	**SR**		**S1**	**G3**
Herodias Underwing				
P: oak forests, particularly with bear oak (*Quercus ilicifolia*) (Stokes)				
Catocala jair	**SR**		**S2**	**G4?**
Jair Underwing				
SC: xeric pine-oak sandhills (Bladen, Moore, New Hanover)				
Catocala lincolnana	**SR**		**S2S3**	**G3G4**
Lincoln Underwing				
C: wooded areas with hawthorns (Brunswick, Martin, Pender)				
Catocala louiseae	**SR**		**S1S2**	**G4**
Louise's Underwing				
C: flatwoods and other habitats with blueberries (Bladen)				
Catocala marmorata	**SR**		**S1S3**	**G3G4**
Marbled Underwing				
MPC: forests with cottonwoods or willows, especially with swamp cottonwood (Alleghany, Ashe, Brunswick, Martin, New Hanover, Wake)				
Catocala messalina	**SR**		**S2?**	**G4?**
Messalina Underwing				
CT: maritime forests and xeric sandhills (Dare*, New Hanover)				

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Catocala myristica	**SR**		**S1**	**G3G4**
Nutmeg Underwing				
C: Marl outcrop with Nutmeg Hickory (*Carya myristiciformis*) (Pender)				
Catocala orba	**SR**		**S2S3**	**G4**
Orba Underwing				
C: levee forests with hawthorn (Martin, Northampton)				
Cerma cora	**SR**		**S2S3**	**G3G4**
Owl-eyed Bird-dropping Moth				
MC: levee forests with hawthorn (Ashe, Martin, New Hanover)				
Chaetaglaea fergusoni	**SR**		**S1S2**	**G3G4**
Ferguson's Sallow				
SC: sandhills (Brunswick, Moore, New Hanover)				
Cherokeea attakullakulla	**SR**		**S2**	**G2?**
Cherokee Moth				
M: forests with stands of cane (*Arundinaria*) in the southwestern mountains (records not yet entered)				
Cyclophora sp. 1 (culicaria of authors)	**SR**		**S1**	**G3**
Sand-myrtle Geometer				
C: flatwoods with sand-myrtle (*Kalmia buxifolia*) (Brunswick, New Hanover)				
Cycnia inopinatus	**SR**		**S2S3**	**G4**
Unexpected Cycnia Moth				
SC: on milkweeds (*Asclepias*) (Harnett, Onslow, Pender, Stanly)				
Dargida aleada	**SR**		**S1S2**	**GNR**
an Armyworm Moth				
T: maritime grasslands (Carteret)				
Dargida rubripennis	**SR**		**S2S3**	**G3G4**
Pink Streak				
SC: beach grasslands and sandy fields (Carteret, Dare)				
Dasychira leucophaea	**SR**		**S2S3**	**G4**
a Tussock Moth				
SC: habitat not known (Moore, New Hanover)				
Datana ranaeceps	**SR**		**S2S3**	**G3G4**
Post-burn Datana Moth				
SC: recently burned flatwoods and sandhills (Bladen, Brunswick, Columbus, Cumberland, New Hanover, Onslow)				

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Datana robusta	**SR**		**S1S2**	**G2G4**
a Prominent Moth				
C: savannas, flatwoods, and sandhills (Onslow)				
Derrima stellata	**SR**		**SH**	**G4**
Pink Star Moth				
M: habitat not known (Avery*, Transylvania*)				
Digrammia ordinata	**SR**		**S2S3**	**GNR**
Amorpha Angle				
SC: sandhills, mainly near the coast (Cumberland, Harnett, Mecklenburg, Pender)				
Drasteria graphica	**SR**		**S1S2**	**G4**
Graphic Moth				
T: maritime shrub thickets (Brunswick, New Hanover)				
Dysstroma hersiliata	**SR**		**S2S3**	**G5**
Orange-barred Carpet Moth				
M: high elevation (>3,000 ft) mesic forests, host plant *Ribes spp*. (Ashe, Yancey)				
Eilema bicolor	**SR**		**S1S2**	**G5**
Bicolored Moth				
M: spruce-fir forests (Swain)				
Elaphria cyanympha	**SR**		**S2S3**	**G4**
a Midget Moth				
C: sandhills (Onslow, Pender)				
Entephria separata	**SR**		**SH**	**G4**
a Geometrid Moth				
M: high elevation forests or heath balds (Yancey)				
Erastria coloraria	**SR**		**S2S3**	**G3G4**
Broad-lined Erastria Moth				
PS: open woodlands with New Jersey tea (*Ceanothus americanus*) (Cumberland, Moore, Richmond, Wake)				
Eubaphe meridiana	**SR**		**S2S3**	**G4**
Little Beggar Moth				
SC: savannas (Brunswick, Pender)				
Euchlaena milnei	**SR**		**S1S3**	**G2G4**
Milne's Euchlaena				
M: hardwood forests, perhaps in riparian areas (Swain, Watauga)				
Eucoptocnemis dapsilis	**SR**		**S2S3**	**G4**
a Dart Moth				
SC: habitat not known (Bladen, New Hanover)				

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Eulithis propulsata	**SR**		**S2S3**	**G5**
Currant Eulithis Moth				
M: high elevation forests (Ashe)				
Euxoa campestris	**SR**		**S1S2**	**G5**
Flat Dart Moth				
M: high elevation forests of spruce-fir and northern hardwoods				
Euxoa declarata	**SR**		**S2?**	**G5**
Clear Dart Moth				
M: habitat not known (Ashe, Avery, Haywood, Watauga)				
Euxoa violaris	**SR**		**S1S2**	**G4**
Violet Dart				
T: beach dunes				
Exyra fax	**SR**		**S2S3**	**G4**
Epauletted Pitcher-plant Moth				
PC: wetlands with purple pitcher-plants (Brunswick, Carteret, Cumberland, Dare, Hoke, Montgomery, Moore, Pender, Richmond)				
Exyra ridingsii	**SR**		**S2**	**G2G4**
a Pitcher-plant Moth				
PC: wetlands with yellow pitcher-plants (Craven, Moore, Pender)				
Exyra semicrocea	**SR**		**S2S3**	**G3G4**
a Pitcher-plant Moth				
C: wetlands with pitcher-plants (Bladen, Brunswick, Moore, Onslow, Pender)				
Franclemontia interrogans	**SR**		**S3?**	**G3G4**
Franclemont's Cane Moth				
C: canebrakes (Camden, Carteret)				
Gabara sp. 1	**SR**		**S1S2**	**G1G3**
a Noctuid Moth				
C: savannas and flatwoods (Brunswick, Onslow, Pender)				
Gazoryctra sciophanes	**SR**		**S1?**	**GU**
a Ghost Moth				
M: spruce-fir forests (Jackson)				
Grammia doris	**SR**		**S1S3**	**G4?**
Doris Tiger Moth				
MP: rich forests? (Wake)				
Grammia placentia	**SR**		**S2S3**	**G3G4**
Placentia Tiger Moth				
PS: sandhills and dry forests (Cumberland, Harnett, Hoke, Moore, Warren)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Hadena ectypa	**SR**		**S1S2**	**G3G4**
Campion Coronet				
M: forests or forest edges with *Silene* (Haywood, Swain)				
Hemaris gracilis	**SR**		**S1S2**	**G3G4**
Slender Clearwing				
C: sandhills, barrens, and other dry heathlands; no locality data (Onslow)				
Hemeroplanis sp. 1 nr. obliqualis	**SR**		**S2S3**	**GNR**
an Owlet Moth				
PS: dry woodlands with dwarf locusts (Cumberland, Hoke, Moore, Stokes)				
Hemipachnobia monochromatea	**SR**		**S1?**	**G4**
Sundew Cutworm Moth				
C: cranberry bogs and northern low pocosins (Dare)				
Hemipachnobia subporphyrea	**SR**		**S1?**	**G1**
Venus Flytrap Cutworm Moth				
C: savannas with Venus flytraps (endemic to North Carolina) (Bladen*, Brunswick, Carteret, Columbus, Pender)				
Heterocampa varia	**SR**		**S1S2**	**G3G4**
a Prominent Moth				
PS: xeric pine-oak sandhills and other dry, scrub oak habitats (Cumberland, Hoke, Moore, Richmond)				
Hydriomena exculpata	**SR**		**SH**	**G5**
a Geometrid Moth				
M: spruce-fir forests (Yancey*)				
Hypagyrtis brendae	**SR**		**S2S3**	**G4**
Brenda's Hypagyrtis Moth				
SC: Atlantic white cedar forests (Brunswick, Dare, Pender, Scotland)				
Hypomecis buchholzaria	**SR**		**S1S2**	**G3G4**
Buchholz's Gray				
SC: fire-maintained glades and barrens (Carteret, Moore)				
Idaea ostentaria	**SR**		**S2S3**	**GNR**
Showy Wave				
SC: sandhills (Carteret, New Hanover, Northampton)				
Idia majoralis	**SR**		**S1S3**	**GNR**
Greater Idia Moth				
P: associated with woodrat nests (Ashe, Cherokee)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Iridopsis cypressaria	**SR**		**S2S3**	**GU**
Small Cypress Looper				
C: cypress swamps (Beaufort, Brunswick, Camden, Dare, Martin, New Hanover, Onslow, Pender)				
Korscheltellus gracilis	**SR**		**S1S2**	**GNR**
Conifer Swift Moth				
M: spruce-fir forests; no locality data				
Lacanobia grandis	**SR**		**S1S2**	**G5**
Grand Arches Moth				
M: documented from high elevation forests and a mountain bog (Ashe, Watauga)				
Lagoa pyxidifera	**SR**		**S2S3**	**G4G5**
Yellow Flannel Moth				
SC: savannas, flatwoods, and sandhills (Brunswick, Cumberland, Harnett, Moore, Pender)				
Lemmeria digitalis	**SR**		**S1S3**	**G4**
Fingered Lemmeria Moth				
S: sedge meadows (Cumberland)				
Leptostales laevitaria	**SR**		**S2S3**	**G4**
Raspberry Wave				
C: habitat not known (Brunswick, Onslow, Pender)				
Leucania calidior	**SR**		**S1S2**	**G2G4**
Cane Wainscot				
C: canebrakes (Halifax, Harnett, Northampton)				
Lithophane georgii	**SR**		**S1S2**	**G5**
Large Grey Pinion				
M: spruce-fir forests (Ashe, Yancey)				
Lithophane oriunda	**SR**		**S1?**	**G4**
Immigrant Pinion				
M: no habitat data (Ashe)				
Loscopia roblei	**SR**		**S2S3**	**G3G4**
Roble's Cane Borer				
SC: woodland canebrakes (Martin)				
Lytrosis permagnaria	**SR**		**S2S3**	**G3G4**
A Geometrid Moth				
M: apparently in mixed forests (Chatham, McDowell, Orange)				
Macrochilo sp. 1 nr. absorptalis	**SR**		**S1**	**G3**
a Noctuid Moth				
S: sedge meadows (Cumberland, Hoke)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Melanapamea mixta	**SR**		**S2S3**	**GU**
a Borer Moth				
MPSC: savannas, wet meadows (Ashe, Transylvania)				
Meropleon cinnamicolor	**SR**		**S1?**	**GU**
a Borer Moth				
T: coastal marshes (Carteret)				
Meropleon diversicolor sullivani	**SR**		**S1S2**	**G5T1T3**
an Owlet Moth				
T: coastal marshes (Brunswick, Craven)				
Metalectra albilinea	**SR**		**S2S3**	**GNR**
White-lined Fungus Moth				
C: no habitat information (New Hanover)				
Nematocampa baggettaria	**SR**		**S1S2**	**G2G4**
Baggett's Nematocampa				
CS: unknown habitat (Brunswick, Onslow, Pender)				
Nemoria tuscarora	**SR**		**S1S3**	**GU**
Tuscarora Emerald				
M: unknown habitat (Alleghany)				
Orgyia antiqua	**SR**		**S1S2**	**G5**
Rusty Tussock Moth				
M: unknown habitat (Haywood)				
Pachypolia atricornis	**SR**		**S2S3**	**G3G4**
Three-horned Sallow				
M: northern hardwoods and rich cove forests? (Ashe)				
Papaipema appassionata	**SR**		**S2S3**	**G4**
Pitcher-plant Borer Moth				
SC: wetlands with pitcher-plants (Brunswick, Pender)				
Papaipema astuta	**SR**		**S1S2**	**G2G4**
Yellow Stoneroot Borer Moth				
M: rich cove forests? (Swain)				
Papaipema cerina	**SR**		**S1S2**	**G2G4**
Golden Borer Moth				
M: northern hardwood forests (Ashe)				
Papaipema eryngii	**SR**	**C**	**SH**	**G1G2**
Rattlesnake-master Borer Moth				
C: savannas with *Eryngium yuccifolium* (known from the entire Atlantic Slope only from a single site) (Pender*)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Petrophora subaequaria	**SR**		**SH**	**G5**
Northern Petrophora Moth				
M: unknown habitat (Haywood*)				
Photedes carterae	**SR**		**S2S3**	**G2G3**
Carter's Noctuid Moth				
SC: savannas and sandhills with pinebarrens sandreed (*Calamovilfa brevipilis*) (Bladen, Brunswick, Carteret*, Onslow, Pender)				
Platarctia parthenos	**SR**		**S1S2**	**G5**
St. Lawrence Tiger Moth				
M: northern hardwood forests? (Swain)				
Polychrysia morigera	**SR**		**S2S3**	**G4**
A Looper Moth				
M: documented from Rich Cove Forest, possibly wooded riparian zones, larval host *Delphinium* species (Ashe)				
Protapamea louisae	**SR**		**S1**	**GNR**
Louisa's Cane Borer				
M: canebrakes (Macon*, Madison)				
Pygarctia abdominalis	**SR**		**S2S3**	**G3**
Yellow-edged Pygarctia				
SC: xeric sandhills (Brunswick, Moore, Onslow, Pender)				
Pyreferra ceromatica	**SR**		**S1S2**	**GU**
Annointed Sallow Moth				
C: flatwoods and pocosins, probably with *Fothergilla* (Craven, Jones)				
Pyrrhia aurantiago	**SR**		**S1S3**	**G3G4**
Orange Sallow Moth				
MSC: dry woods with false-foxgloves (*Aureolaria*) (New Hanover)				
Schinia bina	**SR**		**SH**	**G4**
Bina Flower Moth				
SC: sandhills (Brunswick*, Moore*)				
Schinia carolinensis	**SR**		**S2S3**	**G3**
Carolina Schinia Moth				
SC: savannas and sandhill seeps (Pender)				
Schinia jaguarina	**SR**		**S1S3**	**G4**
Jaguar Flower Moth				
SC: savannas and sandhills (Pender)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Schinia septentrionalis	**SR**		**SH**	**G3G4**
Northern Flower Moth				
SC: sandhills (Brunswick*, New Hanover*)				
Schizura apicalis	**SR**		**S1S2**	**G3G4**
Plain Schizura				
MSC: dry woodland and scrub habitats (Ashe, New Hanover)				
Schizura sp. 1	**SR**		**S1S2**	**GU**
a new Prominent Moth				
PC: unknown (Brunswick, Onslow, Wake)				
Speranza subcessaria	**SR**		**S2S3**	**G5**
Barred Angle				
M: high elevation forests with gooseberries (*Ribes*) (Ashe)				
Sphingicampa bisecta	**SR**		**S1?**	**G5**
Bisected Honey Locust Moth				
P: habitats with honey locust (*Gleditsia*) (Chatham)				
Stenoporpia polygrammaria	**SR**		**S1S2**	**GU**
Faded Gray Geometer				
P: Hanging Rock State Park (Stokes)				
Syngrapha alias	**SR**		**S2?**	**G5**
Hooked Silver Y Moth				
M: spruce-fir forests (Avery, Swain)				
Tolype minta	**SR**		**S2S3**	**G4**
Southern Tolype Moth				
SC: longleaf pine stands (Bladen, Columbus)				
Xestia perquiritata	**SR**		**S1**	**G5**
Boomerang Dart				
M: spruce-fir forests (Swain)				
Zale declarans	**SR**		**S2S3**	**G5**
Dixie Zale				
T: maritime forests with live oak (Brunswick, Carteret, Dare, New Hanover, Onslow)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Insects: Grasshoppers and Katydids				
Arphia granulata	**SR**		**S2S3**	**G5**
Southern Yellow-winged Grasshopper				
C: flatwoods, sandhills (Bladen, Onslow, Pender)				
Booneacris variegata	**SR**		**S2?**	**G5**
Variegated Wingless Locust				
M: a variety of high elevation habitats (Avery, Transylvania)				
Dendrotettix zimmermanni	**SR**		**S1?**	**GU**
Carolina Oak Grasshopper				
M: oak woodlands (endemic to the southern end of the Appalachian Mountains) (Transylvania)				
Eotettix pusillus	**SR**		**S2?**	**G2G3**
Little Eastern Grasshopper				
SC: sandhill seeps and wet pine savannas (Moore*, Onslow, Pender)				
Melanoplus attenuatus	**SR**		**SH**	**G2G3**
Slender-bodied Short-wing Grasshopper				
C: wet swales in pinewoods (Brunswick*)				
Melanoplus carnegiei	**SR**		**SH**	**GU**
Carnegie Short-wing Grasshopper				
M: open pine and oak forests (Buncombe*)				
Melanoplus cherokee	**SR**		**S2?**	**G1G3**
Cherokee Melanoplus				
M: woodlands, 1800' - 5100' (Buncombe, Haywood, Madison, Swain)				
Melanoplus coreyi	**SR**		**S1**	**GNR**
a Spur-throat Grasshopper				
S: flatwoods, savannas, sandhill seeps (endemic to North Carolina) (Cumberland, Moore, Richmond, Scotland)				
Melanoplus deceptus	**SR**		**S2S3**	**G2G4**
Deceptive Melanoplus				
M: mountain slopes and tops, 4000'-5700' (Haywood, Jackson, Macon, Madison)				
Melanoplus decoratus	**SR**		**S1S2**	**GU**
Decorated Melanoplus				
M: dry woodlands (records not yet entered)				
Melanoplus decorus	**SR**		**S2S3**	**G2G3**
Decorated Spur-throat Grasshopper				
C: savannas, flatwoods, low pocosins (endemic to North Carolina) (Carteret, Dare, Onslow, Pender)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Melanoplus divergens	**SR**		**SH**	**G2G3**
Lobecercus Short-wing Grasshopper				
M: glades and balds, mainly at high elevations (Haywood*, Henderson*, Jackson*, Macon*, Swain*)				
Melanoplus eurycercus	**SR**		**S1**	**G4**
a Spur-throat Grasshopper				
M: no habitat information (Avery, Mitchell)				
Melanoplus mirus	**SR**		**S1?**	**GH**
Weldon Short-wing Grasshopper				
PC: open woodlands (endemic to North Carolina) (Bladen, Halifax*, Surry*)				
Melanoplus nossi	**SR**		**S1S2**	**GNR**
Noss' Short-winged Grasshopper				
C: wet to mesic hardwood forests with rich soils (Martin, Northampton, Pender)				
Melanoplus nubilus	**SR**		**S2**	**G2G3**
Nubile Short-wing Grasshopper				
SC: flatwoods, savannas, sandhill seeps (endemic to North Carolina) (Brunswick, Cumberland, Harnett, Robeson)				
Melanoplus pachycercus	**SR**		**S1S2**	**G2G3**
a Spur-throat Grasshopper				
M: grassy balds and woodland openings and margins (Avery, Macon, Mitchell, Yancey)				
Melanoplus serrulatus	**SR**		**SH**	**G1G3**
Nantahala Short-wing Grasshopper				
M: valleys and lower slopes in the Nantahala Mountains (endemic to North Carolina) (records not yet entered)				
Melanoplus similis	**SR**		**SH**	**G5**
a Spur-throat Grasshopper				
M: open woodlands (Cherokee*, Haywood*)				
Mermiria bivittata	**SR**		**S2S3**	**G5**
Two-striped Mermiria				
CT: dune grasslands and other grassy areas in or near coastal forests (Brunswick, Carteret, Dare, New Hanover)				
Scudderia septentrionalis	**W3**		**S2S3**	**G3?**
Northern Bush Katydid				
M: forests (Alleghany, Ashe)				
Stethophyma celatum	**SR**		**S1S2**	**G4**
Broad-winged Sedge Grasshopper				
SC: wet savannas, seepage bogs (Brunswick, Onslow, Pender)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Trimerotropis saxatilis	**SR**		**S2?**	**G3**
Lichen Grasshopper				
MP: lichen-covered rock outcrops, mainly granitic domes (Alexander, Transylvania, Wilkes)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global

Insects: Beetles

Cicindela ancocisconensis **SR** **S1S2** **G3**

Appalachian Tiger Beetle

M: mainly sand bars or other sandy areas near rocky streams or small rivers (Haywood, Jackson)

Cicindela nigrior **SR** **S1** **G2G3**

Autumn Tiger Beetle

P: hard-packed sandy uplands (Anson, Moore*, Scotland)

Cicindela patruela **SR** **S2?** **G3**

Northern Barrens Tiger Beetle

MP: sandy soil in open pine or pine-oak woods (Avery, Haywood, Macon, Mitchell, Transylvania, Wake, Watauga, Yancey)

Ellipsoptera lepida **SR** **S1?** **G3G4**

Ghost Tiger Beetle

T: sand dunes along northern coast (Dare)

Nicrophorus americanus **SR** **E** **SH** **G2G3**

American Burying Beetle

M: sites with abundance of small vertebrate carrion (Buncombe*, Yancey*)

Stenelmis gammoni **SR** **S2** **G1G3**

Gammon's Stenelmis Riffle Beetle

MP: South Fork New River, upper Yadkin River basin (Alleghany, Ashe, Iredell, Surry, Yancey)

Stenelmis hollandi **SR** **S1** **G1**

a riffle beetle

P: Little River (Cumberland, Harnett)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Insects: True Bugs				
Chlorochroa dismalia **Dismal Swamp Green Stink Bug** C: canebrakes (Craven, Harnett*, Hyde*, Onslow*)	**SR**		**S1?**	**G1G3**

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global

Insects: Bees

Bombus affinis	**SR**	**E**	**S1**	**G2**
Rusty-patched Bumble Bee				
MP: nests in abandoned mammal burrows, gathers nectar and pollen from a variety of flowering plants found in or near woodlands (Avery*, Buncombe*, Catawba*, Clay*, Durham*, Graham*, Haywood*, Henderson*, Jackson*, Macon*, McDowell*, Mecklenburg*, Mitchell*, Moore*, Rowan*, Swain, Transylvania*, Wake, Watauga*, Wayne*, Wilkes, Wilson*, Yancey*)				

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NORTH CAROLINA ANIMAL LIST – WATCH

INTRODUCTION

The North Carolina Animal Watch List includes species that are rare or uncommon, are not well studied, or are otherwise threatened with serious decline but for which current information does not justify placement on the Rare List by the NCNHP. Watch List species can be indicators of significant habitats, and their presence should be considered in planning natural area protection efforts, though obviously with less weight than higher priority rare species and natural communities. The NCNHP maintains digital files on these species but does not include them in its GIS maps or database. Animals placed on this list fall into a number of categories, discussed below. The NCNHP requests additional information about these species in order to clarify their status and reclassify them into other appropriate and more specific categories. Counties of known occurrence are listed for most groups. A few groups, such as birds, are migratory, and thus counties of occurrence will be misleading.

Reasons for the current placement of species on the Watch List rather than at a high rarity status (Endangered, Threatened, Special Concern, or Significantly Rare) vary. The taxonomic validity of some of these species is currently in doubt. For many of them, the NCNHP lacks adequate documentation of their historic or present extent in North Carolina; this is especially true for invertebrates. Others are known to be rare or uncommon in North Carolina but may not be native to the state, and they may or may not be declining. Some others may not necessarily be rare yet, but they are undergoing significant losses of or disturbances to their habitats. For most species, however, their actual rarity is poorly known and we are **requesting more data for every Watch List category** before such species receive a higher, and more formal, rarity status. A field survey form is provided online at www.ncnhp.org. We request that people fill out this survey form and mail it to NCNHP after visiting occurrences of these species.

The Watch List has been divided into categories, which have been devised to indicate the reasons for each species' current placement. These categories and their descriptions have been developed by the NCNHP. A number of species have been placed in two Watch categories because it is believed they may be at risk for at least two reasons.

CATEGORY	DESIGNATION	DESCRIPTION
W1	Population Decline in NC	Species that are known to be **declining in North Carolina**. The distribution or population sizes of such species in the state are fairly well known; loss of habitat is not necessarily a factor.
W2	Rare but Relatively Secure	Species whose status in N.C. is relatively well known and appear to be relatively secure at this time. While still notably rare, these species do not currently require site-specific monitoring and so are not on the Rare List. Many of these species were formerly on the Rare List; they are retained in this category because they require a lower level of monitoring to ensure their long-term security.
W3	Poorly Known in NC	Species with inadequate information about their distribution and rarity in N.C. These are generally species which appear to be rare based on museum records and field experience of NCNHP staff, consultants, and cooperating scientists. Further information is needed to determine the true status of these species in N.C.

CATEGORY	DESIGNATION	DESCRIPTION
W4	Rare but Questionable Documentation	Species that have been reported from N.C. without adequate documentation. These species should be listed at a higher level when their reported occurrence in N.C. is verified. This category includes sight records, old and vague reports for which no documentation has appeared, and, in a few cases, more recent literature reports for which we have not yet received documentation.
W5	Threat to Habitat	Species with increasing amounts of threats to its habitat, whether or not populations are known to be declining. These threats can include loss of habitat (e.g., the dramatic loss of maritime forests), degradation of habitat (e.g., pollution and sedimentation of rivers and streams), and disturbance to the habitat (e.g., humans and vehicles on beaches), among other types of threats. Threats can also include use of pesticides, acid rain, fire suppression, over-collection by zoologists, and other factors.
W6	Rare but Believed Not Native	Species known to occur in N.C. that current data suggest are not native to N.C. but whose native occurrence is plausible. Some of these species were previously listed at a higher level, but field investigations suggest that all known N.C. occurrences are introductions.

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global

Mammals

Lasiurus cinereus **W2** **S3S4** **G3G4**

Hoary Bat

MP: mostly mid elevation to high elevation forests, sparingly into the Piedmont (breeding season only) (Avery, Buncombe, Burke, Cherokee, Clay, Gates, Graham, Haywood, Hoke, Jackson, Macon, McDowell, Mitchell, Polk, Rutherford, Stanly, Swain, Transylvania, Watauga, Wilkes, Yancey)

Lasiurus seminolus **W2** **S3** **G5**

Seminole Bat

MPSC: forages over open areas, often over water (summer); mainly in southern half of the state (Beaufort, Bladen, Brunswick, Buncombe, Carteret, Cherokee, Columbus, Craven, Gates, Halifax, Hertford, Hoke, Johnston, Jones, Lenoir, Mecklenburg, Montgomery, Moore, New Hanover, Pender, Robeson, Tyrrell, Wake)

Mustela frenata **W3** **S3** **G5**

Long-tailed Weasel

MPSC: forests, brushy areas (Alleghany, Ashe, Avery, Bertie, Bladen, Brunswick, Buncombe, Cabarrus, Catawba, Chatham, Cherokee, Clay, Craven, Currituck, Dare, Duplin, Durham, Forsyth, Gates, Guilford, Haywood, Henderson, Johnston, Jones, Lenoir, Macon, Madison, Martin, Mecklenburg, Mitchell, Montgomery, Moore, Nash, Orange, Pasquotank, Perquimans, Richmond, Robeson, Stanly, Swain, Transylvania, Union, Wake, Washington, Wilkes, Yancey)

Neotoma floridana haematoreia **W2** **S3S4** **G5T4Q**

Southern Appalachian Eastern Woodrat

MP: rocky places in deciduous or mixed forests, in southern mountains and adjacent Piedmont (Buncombe, Burke, Catawba, Cherokee, Graham, Haywood, Henderson, Iredell, Jackson, Macon, Madison, McDowell, Polk, Rutherford, Swain, Transylvania)

Puma concolor couguar **W4,E** **E** **SX** **G5TXQ**

Eastern Cougar

MPC: extensive forests, remote areas (Graham*, Haywood*, Swain*)

Sciurus niger **W2** **S3** **G5**

Eastern Fox Squirrel

MPSC: open forests, mainly longleaf pine/scrub oak (Alleghany, Anson, Ashe, Avery*, Beaufort, Bertie, Bladen, Brunswick, Buncombe*, Catawba, Chatham, Cherokee*, Clay*, Columbus, Craven, Cumberland, Davidson, Davie, Duplin, Edgecombe, Forsyth, Graham*, Halifax, Harnett, Hoke, Johnston, Lee, Macon*, Martin, Mecklenburg, Montgomery, Moore, New Hanover, Onslow, Pender, Pitt, Richmond, Robeson, Sampson, Scotland, Stokes, Surry, Swain*, Tyrrell, Union, Wake, Washington, Watauga, Wayne, Wilkes, Wilson)

Sorex hoyi **W2** **S3** **G5**

American Pygmy Shrew

MC: montane deciduous forests; old fields and forests in northeastern Coastal Plain (Buncombe, Burke, Camden, Cherokee, Clay, Gates, Graham, Haywood, Henderson, Jackson, Macon, Polk, Rutherford, Swain, Transylvania, Wilkes, Yancey)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Sorex sp. 1	**W3**		**S1S2**	**G2Q**
a shrew (Albemarle-Pamlico Peninsula)				
C: early succession fields, possibly low pocosins (endemic to eastern North Carolina) (Dare, Hyde)				
Sylvilagus aquaticus	**W4**		**SNA**	**G5**
Swamp Rabbit				
MP: swamps, floodplain forests close to the Georgia and South Carolina state lines; specimen unidentifiable to species due to poor condition (Clay*)				
Synaptomys cooperi stonei	**W2**		**S3**	**G5TNR**
Stone's Southern Bog Lemming				
M: bogs and wet meadows (Avery, Buncombe, Graham, Haywood, Macon, Madison, Mitchell, Swain, Watauga, Yancey)				
Zapus hudsonius	**W2**		**S3**	**G5**
Meadow Jumping Mouse				
MP: open moist fields and brushy places, usually near water (Alleghany, Buncombe, Clay, Durham, Forsyth, Haywood, Macon, Mecklenburg, Mitchell, Swain, Wake, Watauga)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C	Rank Global
Birds				
Ammodramus caudacutus	**W3**		**SUB,S4N**	**G4**
Saltmarsh Sparrow				
T: tidal marshes [breeding season only]				
Ammodramus savannarum	**W1,W5**		**S3B,S1N**	**G5**
Grasshopper Sparrow				
MPSC: pastures and other grasslands [breeding season only] (Alamance, Alexander, Alleghany, Anson, Ashe, Beaufort, Brunswick, Buncombe, Cabarrus, Carteret, Caswell, Catawba, Chatham, Cherokee, Cleveland, Cumberland, Davidson, Davie, Durham, Edgecombe, Forsyth, Franklin, Gaston, Granville, Guilford, Halifax, Harnett, Haywood, Henderson, Hoke, Iredell, Johnston, Lee, Lincoln, Macon, Madison, Martin, Mecklenburg, Montgomery, Moore, Nash, New Hanover, Northampton, Onslow, Orange, Person, Pitt, Randolph, Richmond, Robeson, Rockingham, Rowan, Rutherford, Sampson, Scotland, Stanly, Union, Vance, Wake, Warren, Washington, Watauga, Wayne, Wilson, Yadkin)				
Anas discors	**W3**		**SHB,S2N**	**G5**
Blue-winged Teal				
CT: fresh to slightly brackish marshes, usually at impoundments [breeding evidence only] (Dare*)				
Anhinga anhinga	**W2**		**S3B**	**G5**
Anhinga				
C: wooded lakes or ponds, or open swamps (for nesting) [breeding evidence only] (Bertie, Bladen, Brunswick, Carteret, Chatham, Columbus, Craven, Cumberland, Dare, Duplin, Halifax, Hoke, Jones, New Hanover, Robeson, Sampson)				
Antrostomus carolinensis	**W1**		**S4B**	**G5**
Chuck-will's-widow				
PSC: drier forest edges and open woods				
Antrostomus vociferus	**W1**		**S3B**	**G5**
Eastern Whip-poor-will				
MPSC: upland (dry to mesic) woodlands and forests for nesting, usually not far from fields or openings				
Asio flammeus	**W3**		**SUB,S3N**	**G5**
Short-eared Owl				
CT: coastal marshes [breeding season only]				
Chaetura pelagica	**W1**		**S4B**	**G4G5**
Chimney Swift				
MPSC: nest in chimneys or other anthropogenic structures, foraging over all types of habitats, including cities, farm fields, and over forests. After nesting, large groups of swifts may roost communally in tall chimneys				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Chordeiles minor	**W1**		**S2S3B**	**G5**
Common Nighthawk				
MPSCT: dunes, sandy open areas, sandhills, gravel rooftops for nest sites [breeding evidence only] (most counties in the Coastal Plain, and scattered counties in the Piedmont and low mountains)				
Contopus cooperi	**W3**		**SNA**	**G4**
Olive-sided Flycatcher				
M: montane conifer forests (mainly spruce-fir) with openings or dead trees [breeding evidence only]				
Corvus corax	**W2**		**S3**	**G5**
Common Raven				
MP: cliffs or ledges for nesting; forests or fields (mainly at high elevations) for foraging [breeding evidence only] (Ashe, Avery, Forsyth, Guilford, Haywood, Henderson, Jackson, Macon, Mecklenburg, Mitchell, Rutherford, Stokes*, Surry, Watauga, Yancey)				
Empidonax minimus	**W2**		**S3B**	**G5**
Least Flycatcher				
M: open hardwood forests, groves, streamside trees [breeding season only] (Alleghany, Ashe, Avery, Buncombe, Graham, Haywood, Henderson, Jackson, Macon, Madison, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Empidonax traillii	**W2**		**S3B**	**G5**
Willow Flycatcher				
MP: wet thickets in open country, often along streams in broad valleys [breeding season only] (Alleghany, Ashe, Avery, Buncombe, Burke, Cabarrus, Caldwell, Cherokee, Clay, Forsyth, Graham, Guilford, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Rockingham, Stokes, Surry, Swain, Transylvania, Wake*, Watauga, Wilkes, Yadkin, Yancey)				
Eudocimus albus	**W2**		**S3B,S3N**	**G5**
White Ibis				
CT: forests or thickets on maritime islands, rarely at ponds [breeding evidence only] (Brunswick, Carteret, Columbus, Currituck, Hyde, New Hanover, Onslow, Pender)				
Euphagus carolinus	**W1**		**S3N**	**G4**
Rusty Blackbird				
PSC: swamps and other moist hardwood forests, usually near fields [wintering habitat only] (most counties in the Coastal Plain, and many in the Piedmont)				
Gallinula galeata	**W2**		**S3B,S2N**	**G5**
Common Gallinule				
CT: freshwater ponds and impoundments with much emergent vegetation [breeding evidence only] (Brunswick, Carteret, Craven, Currituck, Dare, Hyde, New Hanover, Onslow, Pamlico, Pender, Robeson, Wayne)				
Geothlypis philadelphia	**W3**		**SUB, SZN**	**G5**
Mourning Warbler				
M: high elevation shrub thickets, especially of blackberries [breeding season only]				

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Helmitheros vermivorum pop. 1	**W5**		**S3B**	**G5TNR**
Worm-eating Warbler - Coastal Plain Population				
C: nonriverine wet hardwoods, pocosins [breeding evidence only] (Beaufort, Bladen, Brunswick, Camden, Carteret, Columbus, Craven, Currituck, Dare, Gates, Hyde, Jones, New Hanover, Onslow, Pamlico, Pasquotank, Pender, Pitt, Robeson, Tyrrell, Washington)				
Lanius ludovicianus	**SC, W2**		**S2S3B,S3N**	**G4**
Loggerhead Shrike				
PSC: fields and pastures [breeding season only] (Alamance, Alleghany*, Anson, Bladen, Brunswick, Cabarrus, Carteret*, Chatham, Cleveland, Columbus, Cumberland, Davidson, Davie, Duplin, Edgecombe, Forsyth, Franklin, Guilford, Halifax, Harnett, Hoke, Iredell, Johnston, Jones, Lee, Lenoir, Mecklenburg, Montgomery, Moore, Nash, New Hanover, Pitt, Richmond, Robeson, Rockingham*, Rutherford, Sampson, Scotland, Stanly, Transylvania*, Union, Vance*, Wake, Wayne, Wilson)				
Lophodytes cucullatus	**W3**		**S1B,S4N**	**G5**
Hooded Merganser				
MPC: lakes and ponds, with dead trees for nesting [breeding evidence only] (Bladen, Burke, Camden, Chatham, Durham, Edgecombe, Gaston, Granville, Guilford, Halifax, Hertford, Johnston, Jones, Martin, Mecklenburg, Montgomery, Orange, Perquimans, Richmond, Rockingham, Rowan, Sampson, Stanly, Union, Wake)				
Mergus merganser	**W3**		**S1B,S1N**	**G5**
Common Merganser				
M: forested rivers and reservoirs [breeding season only] (Jackson, possibly Swain and Yancey)				
Nycticorax nycticorax	**W1**		**S3B,S3N**	**G5**
Black-crowned Night-Heron				
T: maritime thickets or forests, almost always on small islands [nesting sites only] (Brunswick, Carteret, Columbus, Currituck, Dare, Hyde, New Hanover, Onslow, Pamlico, Pender)				
Onychoprion fuscatus	**W2**		**SHB,S3N**	**G5**
Sooty Tern				
T: sand flats on maritime islands [breeding sites only] (Dare*)				
Podilymbus podiceps	**W2**		**S3B,S5N**	**G5**
Pied-billed Grebe				
CT: fresh to slightly brackish ponds and impoundments, usually with fringing vegetation [breeding evidence only] (Beaufort, Brunswick, Carteret, Craven, Cumberland, Dare, Hyde, New Hanover, Onslow, Pamlico, Pender, Washington, Wayne)				
Rallus elegans	**W1,W3**		**S3B,S3N**	**G4**
King Rail				
PCT: fresh to slightly brackish marshes [breeding evidence only] (Brunswick, Carteret, Chatham, Cumberland, Currituck, Dare, Hyde, New Hanover, Onslow, Pamlico, Pender, Tyrrell, Wake, Washington, Wayne)				

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Rallus limicola	**W3**		**S3B,S5N**	**G5**
Virginia Rail				
T: brackish to nearly fresh marshes near coast [breeding season only] (Carteret, Currituck, Dare, Hyde, Pamlico)				
Regulus satrapa	**W2,W5**		**S3S4B,S5N**	**G5**
Golden-crowned Kinglet				
M: spruce-fir forests; hardwood forests mixed with spruce or hemlock [breeding season only] (Ashe, Avery, Buncombe, Burke, Caldwell, Graham, Haywood, Henderson, Jackson, Macon, McDowell, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Sitta canadensis	**W2,W5**		**S3B,S4N**	**G5**
Red-breasted Nuthatch				
M: high-elevation coniferous forests, preferably spruce-fir [breeding season only] (Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Graham, Haywood, Henderson, Jackson, Macon, McDowell, Mitchell, Swain, Transylvania, Watauga, Wilkes, Yancey)				
Spinus pinus	**W3**		**SUB,S3N**	**G5**
Pine Siskin				
M: spruce-fir forests [breeding evidence only] (Avery, Buncombe, Caldwell, Haywood, Jackson, McDowell, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Sterna forsteri	**W2**		**S3B,S5N**	**G5**
Forster's Tern				
T: salt or brackish marshes, nesting on wrack material or matted grasses [breeding sites only] (Carteret, Dare, Hyde, Pamlico)				
Troglodytes hiemalis	**W2,W5**		**S3B,S5N**	**G5**
Winter Wren				
M: cool, moist forests at mid elevations to high elevations [breeding evidence only] (Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Tyrannus forficatus	**W3**		**SUB**	**G5**
Scissor-tailed Flycatcher				
PS: extensive pastures and fields with scattered trees [breeding evidence only] (Gaston*, Moore*, Orange*, Union*)				

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Reptiles

Apalone spinifera aspera **W2** **S3** **G5T5**

Gulf Coast Spiny Softshell

PC: large streams, ponds, and lakes with sandy bottoms (Alamance, Anson, Catawba, Cleveland, Gaston, Iredell, Mecklenburg, Montgomery, Randolph, Richmond, Rutherford, Scotland, Union)

Cemophora coccinea **W1,W5** **S3** **G5**

Scarlet Snake

MPSC: sandhills, sandy woods, and other dry woods (Beaufort, Bladen, Brunswick, Burke, Cabarrus, Carteret, Clay, Cumberland, Dare, Duplin, Durham, Forsyth, Guilford, Harnett, Hoke, Iredell, Johnston, Mecklenburg, Montgomery, Nash, New Hanover, Onslow, Orange, Pamlico, Pender, Pitt, Polk, Randolph, Richmond, Robeson, Rockingham, Rowan, Rutherford, Sampson, Scotland, Stanly, Wake, Wayne, Wilson)

Clemmys guttata **W1** **S4** **G5**

Spotted Turtle

PSCT: shallow water of pools, marshes, wet pastures and other smaller wetlands (Anson, Beaufort, Bladen, Brunswick, Camden, Carteret, Chatham, Chowan, Columbus, Craven, Cumberland, Currituck, Dare, Duplin, Durham, Franklin, Gates, Halifax, Harnett, Hertford, Hyde, Johnston, Jones, Lee, Lenoir, Montgomery, Moore, Nash, New Hanover, Northampton, Onslow, Pamlico, Pasquotank, Pender, Perquimans, Pitt, Richmond, Robeson, Sampson, Scotland, Tyrrell, Wake, Warren, Washington, Wayne, Wilson)

Kinosternon baurii **W3** **S3S4** **G5**

Striped Mud Turtle

C: various shallow wet places; ponds, pools, ditches (Bladen, Brunswick, Chowan, Columbus, Craven, Dare, Duplin, Franklin, Gates, Hertford, Lenoir, New Hanover, Onslow, Pasquotank, Pender, Perquimans, Sampson, Wake)

Lampropeltis elapsoides **W1,W5** **S3** **G5**

Scarlet Kingsnake

MPSC: pine flatwoods, mesic pine-hardwood forests (Alamance, Beaufort, Bertie, Bladen, Brunswick, Carteret, Chowan, Columbus, Craven, Currituck, Dare, Harnett, Hoke, Hyde, Jones, Lenoir, Macon, Mecklenburg, Montgomery, New Hanover, Onslow, Orange, Pamlico, Pasquotank, Pender, Perquimans, Pitt, Polk, Randolph, Richmond, Rutherford, Sampson, Scotland, Stanly, Stokes, Tyrrell, Wake)

Lampropeltis triangulum **W2** **S3** **G5**

Milk Snake

MP: wooded slopes, pastures, meadows, especially in rocky areas (Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Rutherford, Surry, Swain, Transylvania, Watauga, Wilkes, Yancey)

Rhadinaea flavilata **W2** **S3** **G4**

Pine Woods Snake

C: pine flatwoods and other damp woodlands (Beaufort, Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Dare, Jones, New Hanover, Onslow, Pamlico, Pender, Sampson, Scotland)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Virginia valeriae	**W2**		**S3**	**G5**
Smooth Earthsnake				
MPSC: deciduous or mixed woods, usually in mesic soils (Bladen, Brunswick, Buncombe, Carteret, Chatham, Cherokee, Craven, Duplin, Durham, Franklin, Gaston, Gates, Granville, Guilford, Hoke, Iredell, Jackson, Macon, McDowell, Mecklenburg, Montgomery, Nash, New Hanover, Onslow, Orange, Pender, Pitt, Randolph, Sampson, Stanly, Swain, Union, Vance, Wake)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global

Amphibians

Desmognathus aeneus **W2** **S3** **G3G4**

Seepage Salamander

M: seeps, springs, or streams in forests in extreme southwestern counties (Cherokee, Clay, Graham, Macon)

Desmognathus imitator **W2** **S3** **G3G4**

Imitator Salamander

M: cool, moist high elevation hardwood or spruce-fir forests; confined to Great Smoky Mountains National Park (Haywood, Swain)

Desmognathus imitator pop. 1 **W3** **S1?** **G3G4TNR**

Imitator Salamander - Waterrock Knob population

M: cool, moist high elevation hardwood or spruce-fir forests; confined to Waterrock Knob vicinity (Haywood, Jackson)

Desmognathus santeetlah **W2** **S3S4** **G3G4Q**

Santeetlah Dusky Salamander

M: stream headwaters and seepage areas; southwestern mountains (Graham, Haywood, Jackson, Swain)

Eurycea bislineata **W4** **SNA** **G5**

Northern Two-lined Salamander

P: edges of creeks in forested areas; reported from Vance County, but no documentation available

Eurycea sp. 9 **W3** **S3** **G3?Q**

Sandhills Salamander

C: small streams in the Sandhills (Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)

Plethodon glutinosus **W4** **SU** **G5**

Northern Slimy Salamander

M: moist wooded slopes, ravines, and floodplains; presumed to occur in the northwestern mountains

Plethodon jordani **W3** **S3** **G4**

Red-cheeked Salamander

M: rich forests in the southwestern mountains, essentially restricted to Great Smoky Mountains National Park (Haywood, Swain)

Plethodon richmondi **W2** **S3** **G5**

Southern Ravine Salamander

M: moist, high-elevation forests, usually on slopes; northern mountains (Alleghany, Ashe, Avery, Caldwell, Watauga)

Plethodon shermani **W2** **S3S4** **G3**

Red-legged Salamander

M: moist forests in the southwestern counties (Cherokee, Clay, Graham, Macon)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Pseudacris brimleyi	**W5**		**S4**	**G5**
Brimley's Chorus Frog				
C: swamps, marshes, and other wetlands (Beaufort, Bertie, Carteret, Craven, Cumberland, Currituck, Dare, Duplin, Edgecombe, Gates, Harnett, Hyde, Johnston, Martin, Pender, Pitt, Sampson, Scotland, Washington)				
Rana kauffeldi	**W3**		**S3**	**G3G4**
Atlantic Coast Leopard Frog				
C: freshwater wetlands, such as marshes and pond edges, in the northeastern portion of the province; recently described and range is poorly known (Bertie, Camden, Gates, Hertford, Martin)				
Siren lacertina	**W3**		**S3**	**G5**
Greater Siren				
SC: lakes, ponds, and streams, especially where muddy or with weedy vegetation (Bertie, Brunswick, Chowan, Columbus, Craven, Dare, Hyde, Johnston, New Hanover, Pitt, Richmond, Robeson, Scotland, Tyrrell, Wake, Wilson)				
Stereochilus marginatus	**W5**		**S3S4**	**G5**
Many-lined Salamander				
SC: swamps, shallow wooded ponds in savannas (Beaufort, Bladen, Brunswick, Columbus, Craven, Duplin, Harnett, Hertford, Johnston, New Hanover, Onslow, Pamlico, Pender, Robeson, Tyrrell, Wayne) (Beaufort, Bladen, Brunswick, Columbus, Craven, Duplin, Harnett, Hertford, Johnston, New Hanover, Onslow, Pamlico, Pender, Robeson, Tyrrell, Wayne)				

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Freshwater Fishes

Cyprinella labrosa **W5** **S3** **G4**

Thicklip Chub

P: Yadkin, Catawba, and Broad drainages (Anson, Burke, Caldwell, Catawba, Cleveland, Davidson, Iredell, Lincoln, McDowell, Polk, Richmond, Rowan, Rutherford, Stokes, Surry, Wilkes, Yadkin)

Cyprinella spiloptera **W5** **S2** **G5**

Spotfin Shiner

M: primarily New and French Broad drainages (Alleghany, Ashe, Buncombe, Cherokee, Haywood, Macon, Madison)

Cyprinella zanema **W5** **S3** **G4**

Santee Chub

P: Catawba and Broad drainages (Burke, Caldwell, Catawba, Cleveland, Gaston, Iredell, Lincoln, McDowell, Mecklenburg, Polk, Rutherford)

Elassoma evergladei **W3** **S3** **G5**

Everglades Pygmy Sunfish

C: southern Coastal Plain, mainly Waccamaw drainage (Bladen, Brunswick, Columbus, Cumberland, New Hanover, Robeson, Scotland)

Etheostoma flabellare **W5** **S3** **G5**

Fantail Darter

MP: Cape Fear, Neuse, and Tar drainage populations have limited distribution; Pee Dee, Roanoke, New, and French Broad populations stable (Alamance, Caswell, Chatham, Durham, Granville, Guilford, Harnett, Nash, Orange, Person, Rockingham, Vance, Wake, Warren)

Etheostoma gutselli **W2** **S3** **G3G4**

Tuckasegee Darter

M: Little Tennessee and Pigeon drainages (Graham, Haywood, Jackson, Macon, Swain)

Etheostoma rufilineatum **W5** **S3** **G5**

Redline Darter

M: French Broad, Little Tennessee, and Hiwassee drainages (Buncombe, Cherokee, Clay, Graham, Haywood, Henderson, Macon, Madison, Swain, Transylvania, Watauga)

Etheostoma vitreum **W5** **S3** **G4G5**

Glassy Darter

PC: Chowan, Roanoke, Tar, and Neuse drainages (Bertie, Durham, Edgecombe, Franklin, Granville, Greene, Halifax, Hertford, Johnston, Lenoir, Martin, Nash, Northampton, Pitt, Rockingham, Stokes, Vance, Wake, Warren, Washington, Wayne, Wilson)

Fundulus chrysotus **SR** **S3** **G5**

Golden Topminnow

C: Waccamaw drainage (Brunswick, Columbus)

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Fundulus confluentus	**W2**		**S3**	**G5**
Marsh Killifish				
T: fresh to brackish waters along coast (Carteret, Dare, Hyde, Onslow)				
Fundulus luciae	**W2**		**S3**	**G4**
Spotfin Killifish				
CT: ponds and pools along coast (Brunswick, Carteret, New Hanover, Onslow)				
Hypentelium roanokense	**W2**		**S3**	**G4**
Roanoke Hog Sucker				
P: Dan drainage (Caswell, Forsyth, Rockingham, Stokes, Surry)				
Lepomis marginatus	**W2**		**S3**	**G5**
Dollar Sunfish				
PC: streams and rivers of lower Piedmont and Coastal Plain (Bladen, Brunswick, Columbus, Craven, Duplin, Durham, Gaston, Greene, Hoke, Jones, Lenoir, Mecklenburg, Moore, Pitt, Richmond, Robeson, Sampson, Scotland)				
Lepomis punctatus	**W2**		**S3**	**G5**
Spotted Sunfish				
C: most drainages in southern Coastal Plain (Anson, Bladen, Brunswick, Columbus, Craven, Duplin, Hoke, Moore, New Hanover, Pender, Richmond, Robeson, Sampson, Scotland)				
Lythrurus matutinus	**W2**		**S3**	**G3G4**
Pinewoods Shiner				
PC: Tar and Neuse drainages (endemic to North Carolina) (Alamance, Durham, Edgecombe, Forsyth, Franklin, Granville, Greene, Halifax, Johnston, Nash, Orange, Person, Pitt, Vance, Wake, Warren, Wayne, Wilson)				
Moxostoma carinatum	**W2**		**S2**	**G4**
River Redhorse				
M: French Broad, Little Tennessee, and Hiwassee drainages (Cherokee, Graham, Macon, Madison, Swain)				
Nocomis platyrhynchus	**W2**		**S2**	**G4Q**
Bigmouth Chub				
M: New drainage (Alleghany, Ashe, Watauga)				
Notropis maculatus	**W2**		**S2**	**G5**
Taillight Shiner				
C: southern Coastal Plain drainages (Brunswick, Columbus, Duplin, Pender, Robeson, Sampson)				
Notropis photogenis	**W5**		**S3**	**G5**
Silver Shiner				
M: mountain drainages (except Pigeon) (Alleghany, Ashe, Avery, Buncombe, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Madison, Mitchell, Swain, Transylvania, Watauga, Yancey)				

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Notropis rubricroceus	**W5**		**S3**	**G4G5**
Saffron Shiner				
M: most mountain drainages, but mainly French Broad and Toe (Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Haywood, Henderson, Jackson, Madison, McDowell, Mitchell, Polk, Rutherford, Transylvania, Watauga, Yancey)				
Notropis scabriceps	**W2**		**S2**	**G4**
New River Shiner				
M: New drainage (Alleghany, Ashe, Watauga)				
Percina aurantiaca	**W2**		**S3**	**G4**
Tangerine Darter				
M: Tennessee drainages (Buncombe, Cherokee, Clay, Graham, Haywood, Jackson, Macon, Madison, Mitchell, Swain, Watauga, Yancey)				
Phenacobius crassilabrum	**W2**		**S3**	**G3G4**
Fatlips Minnow				
M: Little Tennessee, French Broad, and Toe drainages (Avery, Buncombe, Henderson, Jackson, Macon, Madison, Mitchell, Swain, Transylvania, Yancey)				
Pimephales notatus	**W3**		**S3**	**G5**
Bluntnose Minnow				
M: clear rocky streams as well as lakes, ponds, and rivers (Alleghany, Ashe, Avery, Cherokee, Watauga, Yancey)				

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Mollusks: Freshwater Bivalves

Elliptio cistellaeformis **W3,W5** **SU** **G4**

Box Spike

PC: Neuse, Lumber, Pee Dee drainages; Lake Waccamaw (Bertie, Bladen, Chatham, Duplin, Edgecombe, Franklin, Gates, Granville, Greene, Halifax, Hertford, Johnston, Martin, Nash, Pender, Person, Pitt, Robeson, Sampson, Wake, Warren, Wayne, Wilson)

Elliptio congaraea **W2,W5** **S3** **G3**

Carolina Slabshell

PSC: drainages north to the White Oak drainage (Anson, Bladen, Brunswick, Chatham, Columbus, Cumberland, Davidson, Duplin, Edgecombe, Franklin, Granville, Guilford, Halifax, Harnett, Hertford, Johnston, Lee, Lenoir, Montgomery, Moore, Nash, Onslow, Orange, Pender, Randolph, Richmond, Robeson, Sampson, Stanly, Union, Wake, Warren)

Elliptio producta **W3,W5** **SU** **G3Q**

Atlantic Spike

PSC: many Atlantic drainages; very difficult to identify (Anson, Bladen, Brunswick, Burke, Cabarrus, Caldwell, Chatham, Columbus, Duplin, Gaston, Gates, Granville, Halifax, Johnston, Jones, Lee, Mecklenburg, Montgomery, Moore, Nash, Orange, Richmond, Robeson, Stanly, Wake)

Elliptio raveneli **W3,W5** **SU** **G3G4Q**

Carolina Spike

PC: most rivers in southern part of state; taxonomic problems

Elliptio sp. 2 **W3** **SU** **GUQ**

File Spike

C: lakes and rivers in the southeastern part of state (endemic to North Carolina)

Lampsilis sp. 3 **W3** **S1?** **GU**

a bivalve (Deep River system)

P: Deep River drainage (endemic to North Carolina) (Anson, Montgomery)

Sphaerium simile **W3** **SU** **G5**

Grooved Fingernailclam

C: White Oak River (Franklin, Jones, Onslow, Vance)

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Mollusks: Freshwater and Terrestrial Gastropods

Anguispira alternata **W2** **S2S3** **G5**

Flamed Tigersnail

M: moist forested areas (Ashe, Caldwell, Cherokee, Haywood, Jackson, Madison, Watauga, Wilkes, Yancey)

Anguispira mordax **W3** **S3S4** **G4**

Appalachian Tigersnail

M: hardwood forests, especially around limestone outcrops (Avery, Buncombe, Burke, Graham, Henderson, Macon, McDowell, Rutherford, Swain, Yancey)

Carychium exiguum **W3** **S3?** **G5**

Obese Thorn

MC: mesic forests (Brunswick*, Duplin*, Franklin*, Gates*, Johnston*, Swain)

Euglandina rosea **W3** **S3?** **G5**

Rosy Wolfsnail

C: habitats poorly known (Gates, Harnett, New Hanover, Pamlico)

Gastrocopta armifera **W3** **S2S3** **G5**

Armed Snaggletooth

MP: calciphilic; sunny habitats including cedar glades and along railroads (Burke, Catawba, Gaston)

Gastrocopta procera **W3** **S3** **G5**

Wing Snaggletooth

C: calciphilic; dry ground with sparse vegetation

Glyphyalinia umbilicata **W2** **S2S3** **G5**

Texas Glyph

C: no habitat information; occurs in the southeastern part of the state

Glyphyalinia wheatleyi **W2** **S3** **G5**

Bright Glyph

M: a variety of hardwood forests (Avery, Cherokee, Graham, Haywood, Jackson, Macon, Madison, Swain, Yancey)

Gyraulus deflectus **W3** **S2?** **G5**

Flexed Gyro

C: eastern Coastal Plain; no habitat or locality information

Leptoxis virgata **W3** **SU** **G2**

Smooth Mudalia

M: Valley River (Cherokee)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Mesomphix andrewsae	**W2**		**S3S4**	**G3G4**
Mountain Button				
M: acidic upland hardwood forests (Buncombe, Burke, Caldwell, Catawba, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Madison, Rutherford, Swain, Transylvania, Yancey)				
Neohelix dentifera	**W3**		**S3S4**	**G5**
Big-tooth Whitelip				
M: wooded mountainsides, often where acidic (Ashe, Avery, Caldwell, Watauga, Yancey)				
Novisuccinea sp. 1 nr. chittenangoensis	**W4**		**SU**	**GNR**
an Ambersnail				
M: northern hardwoods?; uncertain taxonomy and identification (Graham*)				
Oxyloma effusum	**W3**		**SU**	**G3**
Coastal-plain Ambersnail				
C: wetlands with *Sagittaria*; very little locality information (Gates*, New Hanover*)				
Paravitrea bellona	**W4**		**SNA**	**G1**
Club Supercoil				
M: wooded river bluffs and ravines; of questionable occurrence in the state				
Promenetus exacuous	**W3**		**S2S3**	**G5**
Sharp Sprite				
C: ponds and streams (Craven, Gates, Martin, Perquimans, Washington)				
Stenotrema altispira	**W2**		**S3S4**	**G3**
Highland Slitmouth				
M: cove forests and northern hardwood forests (Alleghany, Ashe, Avery, Buncombe, Caldwell, Haywood, Jackson, Macon, Madison, McDowell, Swain, Transylvania, Watauga, Wilkes, Yancey)				
Stenotrema pilula	**W3**		**S3?**	**G3G4**
Pygmy Slitmouth				
M: rich hardwood forests, mostly at lower elevations (Graham, Haywood, Henderson, Macon, Madison, McDowell, Polk, Swain)				
Striatura ferrea	**W2**		**S3?**	**G5**
Black Striate				
M: ravines and hillsides in higher elevation hardwood forests (Ashe, Graham, Haywood, Macon, McDowell, Mitchell, Swain, Watauga)				
Triodopsis burchi	**W3**		**SU**	**G3**
Pittsylvania Threetooth				
P: forested habitats in the central and western Piedmont; no locality information				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Triodopsis vulgata	**W2**		**S3?**	**G5**
Dished Threetooth				
MP: hardwood forests, usually around high pH soil or rocks (Alexander, Ashe, Avery, Clay, Graham, Haywood, Macon, Madison, Polk, Swain, Watauga, Wilkes)				
Vertigo gouldii	**W3**		**S2S3**	**G5**
Variable Vertigo				
M: upland woods, especially near rock outcrops (Ashe, Haywood, Swain)				
Vertigo oscariana	**W3**		**S3?**	**G4**
Capital Vertigo				
MC: mixed woods in the Coastal Plain; ravines and talus slopes in the mountains (Columbus, Hyde, Jones, Pender, Swain, Tyrrell)				
Vertigo rugosula	**W3**		**S2S3**	**G4**
Striate Vertigo				
C: primarily in thatch of grasses and sedges in open areas (Columbus, New Hanover, Pender)				
Vertigo teskeyae	**W3**		**S3**	**G5**
Swamp Vertigo				
C: margins of swamps and ponds (Beaufort, Chowan, Columbus, Craven, Gates)				
Xolotrema caroliniense	**W3**		**S3?**	**G4**
Blunt Wedge				
PC: wooded floodplains and slopes, mainly near the Fall Line (Anson, Bertie, Bladen, Halifax, Harnett, Mecklenburg, Northampton, Stanly, Union)				
Xolotrema denotatum	**W3**		**SU**	**G5**
Velvet Wedge				
M: wooded hillsides, sometimes in floodplains (Cherokee*, Graham*, Madison*, Mitchell*, Swain, Watauga*)				

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Arachnids

Fumontana deprehendor **W3** **S3?** **G1G2**

a Harvestman

M: rich cove forests (Buncombe, Cherokee, Graham, Haywood, Jackson, Macon, Swain, Transylvania, Yancey)

Nesticus bishopi **W3** **S3?** **G3?**

a Cave Cobweb Spider

M: on ground in forests (endemic to North Carolina); no locality information

Nesticus nasicus **W3** **S3?** **G3?**

a Cave Cobweb Spider

M: boulderfields and cove forests (endemic to North Carolina) (Jackson)

Nesticus reclusus **W3** **S3?** **G3?**

a Cave Cobweb Spider

M: on ground in forests (apparently in Buncombe, McDowell, and Swain counties, NC, and in Tennessee)

Vaejovis carolinianus **W2,W3** **S2?** **G5**

Southern Unstriped Scorpion

MP: under shelter of rocks, leaves, and buildings, along southern border of state; the many records elsewhere in the state are likely accidental or intentional importations (Cherokee, Polk, Transylvania)

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Crustaceans

Ascetocythere cosmeta **W3** **S2?** **GNR**

Grayson Crayfish Ostracod

M: symbiotic on crayfish in subsurface waters of burrows (Alleghany, Avery)

Cambarus aldermanorum **W3** **S1?** **GNR**

Carolina Needlenose Crayfish

P: Johns River subbasin of the Catawba drainage (Burke, Caldwell)

Cambarus carolinus **W3** **S2** **G4**

Red Burrowing Crayfish

M: Little Tennessee and Hiwassee drainages (Cherokee, Clay, Graham, Jackson, Macon, Swain)

Cambarus hiwasseensis **W2** **S3S4** **G3G4**

Hiwassee Crayfish

M: streams in Hiwassee drainage (Cherokee, Clay)

Cambarus sp. A **W3** **S2S4** **G2G3**

a crayfish

MP: streams and rivers, species in Hiwassee and New drainages likely distinct from Catawba, Broad, Yadkin-Pee Dee drainages (Alexander, Alleghany, Ashe, Burke, Caldwell, Catawba, Cherokee, Clay, Cleveland, McDowell, Montgomery, Rowan, Rutherford, Surry, Watauga, Wilkes)

Canthocamptus vagus **W2,W3** **S3?** **GNR**

Swamp Canthocamptus

PC: in benthos of lakes and ponds within swampy environments; no locality information

Cymocythere clavata **W3** **S2?** **GNR**

Oconee Crayfish Ostracod

M: symbiotic on crayfish in mountain streams and rivers (Transylvania)

Cytheridella ilosvayi **W3** **S2?** **GNR**

Backwater Ostracod

C: quiet backwaters associated with large coastal rivers (Brunswick, New Hanover)

Dactylocythere chelomata **W2,W3** **S2?** **GNR**

Cherokee Crayfish Ostracod

M: symbiotic on crayfish in streams and rivers in southwestern mountains (Cherokee, Macon)

Dactylocythere isabelae **W3** **S1?** **GNR**

Catawba Crayfish Ostracod

P: symbiotic on crayfish in Lyle Creek in Catawba drainage (endemic to North Carolina) (Catawba)

Dactylocythere peedeensis **W3** **S2?** **GNR**

Pee Dee Crayfish Ostracod

P: symbiotic on crayfish in Pee Dee drainage (endemic to North Carolina, but likely occurs in South Carolina) (Cabarrus, Randolph, Union)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Dactylocythere prinsi	**W3**		**S1**	**GNR**
Whitewater Crayfish Ostracod				
M: cold streams of Savannah drainage (endemic to North Carolina, but possible in adjacent South Carolina and Georgia) (Jackson)				
Dactylocythere susanae	**W2,W3**		**S2?**	**G2G4**
Hiwassee Crayfish Ostracod				
M: symbiotic on crayfish in Hiwassee and Nolichucky drainages; no locality information				
Harpagocythere baileyi	**W3**		**S2?**	**GNR**
Highlands Crayfish Ostracod				
M: symbiotic on crayfish in Little Tennessee and Savannah drainages (endemic to North Carolina, but likely occurs in SC and GA); no locality information				
Hesperodiaptomus augustaensis	**W3**		**SH**	**GNR**
Augusta Hesperodiaptomus				
P: ephemeral ponds, such as floodplain pools; near Chapel Hill (Orange*)				
Lordocythere petersi	**W4**		**SNA**	**GNR**
Cumberland Crayfish Ostracod				
M: symbiotic on crayfish in the Hiwassee drainage (record based on a sketch only)				
Miktoniscus medcofi	**W3**		**S1?**	**GNR**
Small Alabama Sowbug				
M: Linville Caverns (McDowell)				
Procambarus ancylus	**W2**		**S3**	**G4G5**
Coastal Plain Crayfish				
SC: ditches, streams, and lakes in the southeastern portion of the state (Bladen, Brunswick, Columbus, Cumberland, Duplin, Harnett, Hoke, Johnston, Montgomery, Moore, New Hanover, Onslow, Pender, Richmond, Robeson, Sampson, Scotland, Wayne)				
Procambarus blandingii	**W3**		**S3S4**	**G4**
Santee Crayfish				
C: Lumber and Waccamaw drainages (Bladen, Brunswick, Columbus, Cumberland, Hoke, Montgomery, Moore, Richmond, Robeson, Scotland)				
Procambarus medialis	**W3**		**S3**	**G3**
Pamlico Crayfish				
PC: sluggish streams and ditches in the Tar and Neuse drainages (endemic to North Carolina) (Craven, Edgecombe, Halifax, Johnston, Lenoir)				
Procambarus pearsei	**W2**		**S3S4**	**G4**
Carolina Sandhills Crayfish				
SC: still-water habitats and burrows in the Cape Fear, Waccamaw, and Lumber drainages (Bladen, Brunswick, Columbus, Cumberland, Duplin, Harnett, Hoke, Johnston, Montgomery, Moore, New Hanover, Onslow, Pender, Richmond, Robeson, Sampson, Scotland, Wayne)				

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Stygobromus sp. 4	**W3**		**S1?**	**GNR**
Plott Balsam Sideswimmer				
M: seep below Jones Knob (endemic to North Carolina) (Jackson)				
Waltoncythere acuta	**W3**		**S2?**	**GNR**
Transylvania Crayfish Ostracod				
M: symbiotic on crayfish in high gradient rivers and streams (endemic to North Carolina, but likely occurs in SC) (Transylvania)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Insects: Mayflies				
Anthopotamus myops	**W3**		**S3**	**G5**
a mayfly				
M: First Broad River (Cleveland)				
Drunella longicornis	**W3**		**S3**	**G5**
a spiny crawler mayfly				
M: Watauga, French Broad, Little Tennessee, Savannah, Broad, and Catawba drainages				
Ephemerella argo	**W3**		**S3**	**G4**
Argo Ephemerellan Mayfly				
SC: Lower Little River (Hoke), Naked Creek (Richmond), Drowning Creek (Richmond), Lumber River (Robeson, Scotland)				
Eurylophella enoensis	**W5**		**S3**	**G4**
Eno River Spiny Crawler Mayfly				
MPC: wide-ranging but infrequently collected				
Eurylophella minimella	**W2**		**S3**	**G4**
Reduced Spiny Crawler Mayfly				
MPC: a widespread species, but rare in North Carolina				
Isonychia arida	**W3**		**S3**	**G5**
a mayfly				
C: Cape Fear River (Harnett), Tar River (Edgecombe)				
Isonychia sayi	**W3**		**S2**	**G4**
a mayfly				
C: Fishing Creek (Edgecombe)				
Iswaeon davidi	**W3**		**S2**	**G2**
a mayfly				
M: French Broad, Hiwassee, and Little Tennessee basins				
Leptophlebia bradleyi	**W5**		**S2**	**G5**
a mayfly				
no locality data				
Nixe spinosa	**W3**		**S3**	**G5**
a mayfly				
MP: mainly French Broad and Little Tennessee drainages; Deep Creek (Person)				
Paracloeodes fleeki	**W3**		**S3**	**G2G4**
a mayfly				
P: southern Piedmont streams				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Pseudocentroptiloides usa	**W3**		**S2**	**G4**
a mayfly				
PSC: large Piedmont and Coastal Plain rivers, including Lumber River				
Serratella spiculosa	**W2**		**S3**	**G2Q**
Spiculose Serratellan Mayfly				
M: New, Watauga, French Broad, Little Tennessee, Hiwassee, Broad, and Savannah drainages				
Siphloplecton speciosum	**W5**		**S2**	**G4**
a mayfly				
SC: Lumber River (Hoke, Scotland)				
Sparbarus maculatus	**W3**		**S2S3**	**G5**
a mayfly				
C: streams in the Coastal Plain				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Insects: Stoneflies				
Acroneuria evoluta **Constricted Stone** P: central slate belt streams (Chatham, Montgomery, Moore, Randolph, Stanly)	**W5**		**S2**	**G5**
Agnetina capitata **Northern Stone** M: upper Tuckasegee River (Jackson, Madison)	**W5**		**S3**	**G5**
Alloperla neglecta **Tennessee Sallfly** M: streams (Haywood, Swain)	**W2**		**S2**	**G3**
Beloneuria georgiana **Georgia Stone** M: high elevation rheocrenes [spring brooks]	**W3**		**S1S3**	**G2**
Haploperla parkeri **Parker Sallfly** M: Right Fork Cove Creek (Haywood), Shot Pouch Creek (Macon) (endemic to North Carolina)	**W3**		**SU**	**G1**
Helopicus bogaloosa **Masked Springfly** PSC: known from eleven streams and rivers in Piedmont, Sandhills, and Inner Coastal Plain	**W3**		**S3**	**G3G4**
Isogenoides varians **Rock Island Springfly** P: Yadkin River (Davie)	**W2**		**S2**	**G3G4**
Isoperla burksi **Banded Stripetail** P: slate belt streams (Chatham, Durham, Orange)	**W3**		**S2**	**G4**
Isoperla frisoni **Wisconsin Stripetail** MP: known from six streams and rivers in the mountains, from the New River (Ashe) to Whiteoak Creek (Macon); also found in the Dan River	**W3**		**S3**	**G5**
Isoperla lata **Dark Stripetail** M: recent state records from Fires Creek (Clay) and Big Creek (Haywood)	**W3**		**S3**	**G5**
Perlesta bjostadi **Anomalus Stone** SC: Little River near Lillington (Harnett), Lumber River (Hoke, Scotland) (endemic to North Carolina)	**W3**		**SU**	**G1**

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Perlesta leathermani	**W3**		**SU**	**G1**
Sandhills Stone				
SC: Little River (Hoke, Moore), Lumber River (Hoke, Scotland), Jordan Creek (Scotland) (endemic to North Carolina)				
Perlesta puttmanni	**W3**		**S2?**	**G3G4**
Anna Stone				
SC: Raft Swamp (Robeson), Little River (Cumberland, Harnett)				
Perlesta roblei	**W3**		**S2**	**G3**
Dragon Run Stone				
C: Swift Creek (Edgecombe)				
Perlinella ephyre	**W2**		**S3**	**G5**
Vernal Stone				
PSC: known from eight streams and rivers in the Sandhills and Inner Coastal Plain; also occurs in Flat River (Person) and Terrible Creek (Wake)				
Prostoia hallasi	**W3**		**SU**	**G3**
Swamp Forestfly				
C: recent state record from Great Dismal Swamp (Gates)				
Shipsa rotunda	**W3**		**S2S3**	**G5**
Intrepid Forestfly				
MPC: known from twelve streams in mountains, Piedmont, and Coastal Plain				
Sweltsa holstonensis	**W3**		**SU**	**G1**
Holston Sallfly				
M: Middle Fork Reddies River (Wilkes)				
Tallaperla elisa	**W3**		**SU**	**G3**
Highlands Roachfly				
M: Great Smoky Mountains National Park (Swain)				
Viehoperla ada	**W3**		**S2**	**G3**
Pallid Roachfly				
M: Panthertown Valley seeps (Jackson)				
Yugus arinus	**W3**		**S3**	**G3**
Highlands Springfly				
M: French Broad, Hiwassee, and Little Tennessee basins				

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Insects: Caddisflies				
Agapetus hessi	**W5**		**S2**	**G4G5**
a glossosomatid caddisfly				
P: Swift Creek (Nash)				
Agapetus jocassee	**W3**		**S2**	**G2G3**
a saddlecase caddisfly				
M: small streams (Burke, Cherokee, Graham)				
Agapetus minutus	**W3**		**S3**	**G4G5**
a saddlecase caddisfly				
M: Big Creek tributary (Haywood)				
Agapetus pinatus	**W3**		**S3**	**G5**
a caddisfly				
M: mountain streams (Cherokee, Graham, Haywood, Transylvania)				
Agapetus tomus	**W3**		**S2**	**G5**
a saddlecase caddisfly				
M: mountain streams (Cherokee)				
Agraylea multipunctata	**W3**		**S3**	**G5**
a caddisfly				
MP: Wilson Creek (Caldwell)				
Beraea gorteba	**W4**		**S1S2**	**G1G2**
a Caddisfly				
M: Twentymile Creek watershed (Swain)				
Ceraclea cama	**W3**		**S1S2**	**G1G2**
a longhorned caddisfly				
C: Lake Waccamaw vicinity (endemic to this area)				
Ceraclea diluta	**W3**		**S2**	**G5**
a caddisfly				
C: several Coastal Plain rivers				
Ceraclea mentiea	**W3**		**S3**	**G5**
a longhorned caddisfly				
MP: Big Horse Creek (Ashe), North and South Forks of New River (Ashe, Alleghany), Mayo River (Rockingham)				
Ceraclea punctata	**W3**		**S3**	**G5**
a ceraclean caddisfly				
C: several Coastal Plain rivers				

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Ceraclea sp. 2 nr. excisa	**W2**		**S3**	**GNR**
a caddisfly				
C: many Coastal Plain localities				
Ceraclea tarsipunctata	**W3**		**S3**	**G5**
a caddisfly				
P: Cane Creek, Yadkin River, Long Creek (Mecklenburg, Union)				
Cernotina calcea	**W3**		**S3**	**G5**
a caddisfly				
C: Lake Waccamaw (Columbus)				
Cheumatopsyche enigma	**W3**		**S3**	**G4G5**
a caddisfly				
M: streams in Great Smoky Mountains National Park (Haywood, Swain)				
Cheumatopsyche geora	**W3**		**S3**	**G5**
a caddisfly				
P: Hunting Creek (Wilkes)				
Cheumatopsyche halima	**W3**		**S3**	**G5**
a caddisfly				
M: Deep Creek (Swain)				
Cheumatopsyche helma	**W3**		**S3**	**G3**
Helma's Net-spinning Caddisfly				
MP: Henrys Fork (Burke), Cataloochee Creek (Haywood)				
Cheumatopsyche parentum	**W3**		**S3**	**G3**
a caddisfly				
P: Uwharrie River (Montgomery)				
Cheumatopsyche richardsoni	**W3**		**S1S2**	**G1G2**
Richardson's Cheumatopsyche Caddisfly				
S: Little River (Hoke, Moore)				
Chimarra florida	**W3**		**S3**	**G4**
Floridian Finger-net Caddisfly				
S: several sandhills streams				
Frenesia difficilis	**W3**		**S3**	**G5**
a caddisfly				
M: seeps (Haywood, Surry, Swain)				
Goera stylata	**W3**		**S3**	**G5**
a caddisfly				
M: Commissioners Creek (Macon)				

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Goerita betteni	**W3**		**S3**	**G4**
a caddisfly				
M: cold spring runs in mountainous areas				
Goerita semata	**W3**		**S3**	**G3**
a caddisfly				
M: cold spring runs in mountainous areas				
Helicopsyche paralimnella	**W5**		**SU**	**G2**
a snailcase caddisfly				
M: Fires Creek (Clay?), Bearwallow Creek (Transylvania) (confined to southwestern mountains in NC)				
Homoplectra flinti	**W3**		**S2**	**G2**
a caddisfly				
M: seeps (Haywood, Macon)				
Hydropsyche bassi	**W3**		**SU**	**G2**
a netspinning caddisfly				
S: Little River (Hoke, Moore)				
Hydropsyche fattigi	**W3**		**S3**	**G5**
a caddisfly				
C: Cape Fear River (Harnett)				
Hydropsyche opthalmica	**W3**		**S3**	**G3**
a caddisfly				
MPC: rivers (no locality data)				
Hydropsyche ventura	**W5**		**S3**	**G5**
a caddisfly				
M: northern and western mountain streams				
Hydroptila armata	**W3**		**S2**	**G5**
a caddisfly				
P: Uwharrie River (Montgomery)				
Hydroptila coweetensis	**W3**		**SU**	**G1G2**
a micro caddisfly				
M: Coweeta Creek (Macon)				
Hydroptila englishi	**W4**		**SNA**	**G2**
a caddisfly				
M: Thompson River, NC/SC border (Transylvania)				
Hydroptila lloganae	**W3**		**SU**	**G3**
Llogan's Vari-colored Microcaddisfly				
S: Lumber River (Hoke, Scotland)				

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Hydroptila maculata	**W3**		**S3**	**G3G4**
a caddisfly				
C: Lake Waccamaw (Columbus)				
Mayatrichia ayama	**W5**		**S2**	**G5**
a caddisfly				
MPS: mostly in mountain streams; Dan River (Stokes), Lumber River (Scotland)				
Micrasema burksi	**W2**		**S3**	**G4G5**
a caddisfly				
M: known from eleven streams in the mountains, from Avery County to Clay County				
Micrasema sprulesi	**W2**		**S3**	**G5**
a caddisfly				
MP: known from eight streams and rivers, primarily in the mountains but also in the Mayo River				
Molanna uniophila	**W3**		**S3**	**G5**
a caddisfly				
C: found in larger rivers and lakes from Chowan River (Hertford) to Drowning Creek (Richmond) and Lake Waccamaw (Columbus)				
Neophylax virginica	**W3**		**S1**	**GNR**
a Uenoid Casemaker				
P: streams and rivers, Deep River (Moore)				
Neureclipsis melco	**W3**		**S3**	**G4**
a caddisfly				
C: Shoe Heel Creek (Robeson)				
Ochrotrichia confusa	**W3**		**S3**	**G5**
a caddisfly				
M: Blue Ridge Parkway seeps (Watauga)				
Oecetis porteri	**W5**		**S2**	**G3G4**
Porter's Long-horn Sedge				
C: White Lake and Lake Waccamaw (Bladen, Columbus)				
Oecetis sp. B	**W5**		**S1**	**G1**
a caddisfly				
C: Lake Mattamuskeet and Perquimans River (Hyde, Perquimans)				
Oecetis sp. E	**W5**		**S2**	**G2**
a caddisfly				
SC: bay lakes and swamp streams of North and South Carolina				
Oxyethira glasa	**W1**		**S3**	**G5**
a caddisfly				
C: Lake Waccamaw (Columbus)				

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Oxyethira lumosa	**W3**		**S3**	**G4**
a caddisfly				
S: Little River (Hoke, Moore)				
Oxyethira verna	**W3**		**S3**	**G5**
an oxyethiran microcaddisfly				
C: Lake Waccamaw (Columbus)				
Padunia jeanae	**W2**		**S3**	**G4**
a Caddisfly				
MP: streams and rivers (Buncombe, Burke, Clay, Henderson, Johnston, Macon, Randolph, Transylvania, Watauga, Yancey)				
Phylocentropus auriceps	**W3**		**S3**	**G3G4**
a caddisfly				
M: described from Black Mountain (Buncombe); found in mountains of GA, SC, NC, VA				
Protoptila georgiana	**W3**		**S2**	**G3G4**
a caddisfly				
P: Uwharrie River (Montgomery), Cape Fear River (Harnett)				
Pseudogoera singularis	**W5**		**S2**	**G2G3**
a caddisfly				
M: Coweeta Creek and seep near upper Wilson Creek (Caldwell)				
Pseudostenophylax sparsus uniformis	**W5**		**S3**	**G5T5**
a caddisfly				
M: high elevation seeps along the Blue Ridge Parkway (Buncombe, Haywood, Jackson)				
Psilotreta amera	**W5**		**S2**	**G3G4**
a caddisfly				
M: mountain streams (Haywood, Macon, Swain)				
Psilotreta rossi	**W5**		**S2**	**G3**
a caddisfly				
M: seeps and springs (Macon, Transylvania)				
Psilotreta rufa	**W2**		**S3**	**G5**
a caddisfly				
M: mountain streams (Macon, Transylvania)				
Rhyacophila amicis	**W5**		**S3**	**G2**
a free-living caddisfly				
M: Cullasaja River (Macon), Nantahala River (Macon, Clay), Whiterock Creek (Jackson), Spainhour Creek (Caldwell), North Toe River, Deep Creek, Oconoluftee River (Swain)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Rhyacophila montana	**W5**		**SU**	**G2G3**
a free-living caddisfly				
M: high elevation seeps (Jackson, Swain)				
Rhyacophila mycta	**W5**		**S2S3**	**G3**
a free-living caddisfly				
M: only confirmed from Sweeten Creek (Buncombe)				
Rhyacophila vibox	**W2**		**S3**	**G5**
a rhyacophilan caddisfly				
M: Whiteoak Creek (Macon), Mitchell River (Surry)				
Setodes arenatus	**W5**		**S2**	**G2G3**
a caddisfly				
C: Lumber River (Scotland)				
Setodes stehri	**W5**		**S3**	**G4**
a caddisfly				
M: unknown locality				
Stactobiella delira	**W3**		**S3**	**G5**
a microcaddisfly				
M: reported from the Savannah basin				
Stactobiella martynovi	**W3**		**S3**	**G4**
a microcaddisfly				
M: reported from the Savannah basin				
Triaenodes helo	**W3**		**S3**	**G3**
Marsh Triaenode Caddisfly				
S: Little River (Hoke, Moore)				
Triaenodes marginatus	**W3**		**S3**	**G5**
a longhorned caddisfly				
PSC: Stewart Creek (Mecklenburg), Long Creek (Gaston), Whiteoak Creek (Polk); Lumber River (Robeson), UT Hitchcock Creek (Richmond), Mill Creek (Moore)				
Triaenodes melacus	**W3**		**S3**	**G5**
a caddisfly				
P: small Piedmont streams (Alamance, Caswell, Wake)				
Triaenodes sp. C	**W5**		**S1**	**G1G2**
a caddisfly				
S: Carolina bays (Scotland)				
Wormaldia thyria	**W3**		**S3**	**G3**
a caddisfly				
M: high elevation streams (Henderson, Yancey)				

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Insects: Dragonflies and Damselflies

Arigomphus villosipes **W3** **S3** **G5**

Unicorn Clubtail

MPC: ponds, lakes, slow-flowing streams (Ashe, Avery, Bertie, Bladen, Buncombe, Chowan, Clay, Gates, Halifax, Haywood, Henderson, Orange, Perquimans, Rockingham, Rutherford, Transylvania, Warren, Washington, Watauga)

Dromogomphus armatus **W3** **S3** **G4**

Southeastern Spinyleg

SC: pools in slow-flowing rivers (Bladen, Columbus, Cumberland, Hoke, Moore, Richmond, Robeson, Scotland)

Enallagma minusculum **W6** **SNA** **G4**

Little Bluet

C: lakes and ponds; known in the state only from White Lake (Bladen), but suspected of being an introduction

Enallagma sulcatum **W4** **SNA** **G4**

Golden Bluet

C: sand-bottomed lakes, with some shoreline vegetation; reported from Columbus County, but documentation is unknown

Gomphurus dilatatus **W3** **S3?** **G5**

Blackwater Clubtail

PC: rivers (Bertie, Caswell, Chatham, Columbus, Cumberland, Durham, Edgecombe, Harnett, Johnston, Lenoir, Martin, Mecklenburg, Montgomery, Pender, Pitt, Robeson, Wilson, Yadkin)

Gomphurus hybridus **W3** **S3** **G4**

Cocoa Clubtail

PSC: large or medium rivers with silty or sandy bottoms (Bladen, Columbus, Cumberland, Davidson, Duplin, Halifax, Johnston, Lenoir, Montgomery, Northampton, Pender, Scotland, Wayne)

Hylogomphus abbreviatus **W2** **S3S4** **G4**

Spine-crowned Clubtail

PC: rivers (Caswell, Chatham, Cumberland, Durham, Lee, Mecklenburg, Montgomery, Moore, Randolph, Union, Wake)

Hylogomphus apomyius **W3** **S3?** **G3G4**

Banner Clubtail

PC: spring-fed streams (Bladen, Cabarrus, Catawba, Chatham, Columbus, Cumberland, Gaston, Greene, Harnett, Lenoir, Moore, Richmond, Robeson, Sampson, Wake, Wayne, Wilson)

Hylogomphus parvidens **W2** **S3?** **G4**

Piedmont Clubtail

MPSC: small woodland streams with sandy bottoms (Bladen, Buncombe, Burke, Caldwell, Cleveland, Davie, Forsyth, Hoke, Macon, Madison, Montgomery, Moore, Richmond, Rutherford, Scotland, Surry, Swain, Transylvania, Wake, Wilkes)

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Lanthus parvulus	**W4**		**SNA**	**G4G5**
Northern Pygmy Clubtail				
M: reported from the state (Avery), but no conclusive records				
Lestes eurinus	**W2**		**S3**	**G5**
Amber-winged Spreadwing				
MP: lakes and ponds with emergent vegetation (Alleghany, Ashe, Buncombe, Burke, Caldwell, Durham, Graham, Guilford, Henderson, Jackson, Macon, Madison, Mecklenburg, Orange, Rockingham, Watauga, Yadkin)				
Lestes forcipatus	**W3**		**S1S2**	**G5**
Sweetflag Spreadwing				
MP: vegetated ponds (Ashe, Durham, Forsyth, Granville, Guilford, Orange, Person, Wilson)				
Lestes vidua	**W2**		**S3**	**G5**
Carolina Spreadwing				
C: ponds and pools (Bladen*, Brunswick*, Carteret, Hoke, New Hanover, Onslow, Pender, Sampson, Scotland)				
Macrodiplax balteata	**W3**		**S2S3**	**G5**
Marl Pennant				
CT: ponds and lakes near the coast, usually brackish or near marl (Brunswick, Carteret, Dare, Hyde, New Hanover, Pamlico)				
Nannothemis bella	**W3**		**S3S4**	**G4G5**
Elfin Skimmer				
SC: boggy swales (Anson, Bladen, Cumberland, Harnett, Hoke, Montgomery, Moore, Richmond, Scotland)				
Neurocordulia alabamensis	**W3**		**S3?**	**G5**
Alabama Shadowdragon				
SC: small creeks in forested regions, often where sandy and with low flow (Bladen, Brunswick, Cumberland, Duplin, Harnett, Hoke, Johnston, Jones, Lee, Montgomery, Moore, Pender, Richmond, Robeson, Sampson, Scotland, Wake)				
Neurocordulia molesta	**W3**		**S3?**	**G4**
Smoky Shadowdragon				
C: rivers (Bladen, Cumberland, Edgecombe, Harnett, Lenoir, Moore, Richmond, Sampson, Wake, Wayne)				
Neurocordulia virginiensis	**W3**		**S2?**	**G4**
Cinnamon Shadowdragon				
P: large rivers (Chatham, Durham, Halifax, Harnett, Nash, Northampton, Wake)				

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Ophiogomphus incurvatus	**W2**		**S3**	**G3**
Appalachian Snaketail				
MP: small to medium streams (Alexander, Buncombe, Burke, Cabarrus, Caldwell, Caswell, Catawba, Cleveland, Davidson, Forsyth, Gaston, Guilford, Iredell, Lincoln, McDowell, Mecklenburg, Richmond, Rockingham, Rutherford, Stokes, Union, Wilkes, Yadkin)				
Ophiogomphus mainensis	**W2**		**S3**	**G4G5**
Maine Snaketail				
M: rapids of rivers and streams (Ashe, Buncombe, Burke, Caldwell, Haywood, Jackson, Madison, Mitchell, Swain*, Watauga, Wilkes, Yancey*)				
Phanogomphus diminutus	**W2**		**S3S4**	**G3G4**
Diminutive Clubtail				
SC: sand bottom streams (Bladen, Brunswick, Cumberland, Harnett, Hoke, Montgomery, Moore, Richmond, Scotland)				
Somatochlora provocans	**W3**		**S3?**	**G4**
Treetop Emerald				
SC: small forested seeps and pools, perhaps very small streams (Beaufort, Bladen, Chowan, Cumberland, Edgecombe, Halifax, Harnett, Hoke, Johnston, Lee, Martin, Moore, Northampton, Pitt, Richmond, Sampson, Scotland, Wake, Washington, Wayne, Wilson)				
Stenogomphurus rogersi	**W2**		**S2S3**	**G4**
Sable Clubtail				
M: small spring-fed streams (Alleghany, Ashe, Avery, Buncombe, Macon, Madison, Polk, Swain, Watauga, Wilkes)				
Stylurus amnicola	**W3**		**S3**	**G4**
Riverine Clubtail				
MPC: rivers (Anson, Bertie, Buncombe, Caswell, Cumberland, Davie, Edgecombe, Greene, Harnett, Johnston, Lincoln, Northampton, Pitt, Rockingham, Transylvania, Wake, Wayne, Yadkin)				
Stylurus notatus	**W4**		**SNA**	**G3**
Elusive Clubtail				
reported from NC, but no conclusive records				
Sympetrum internum	**W4**		**SNA**	**G5**
Cherry-faced Meadowhawk				
M: reported from Macon County, but details not known; outside normal range				

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Insects: Flies

Eulonchus marialiciae	**W3**		**S3?**	**G1G3**
Mary Alice's Small-headed Fly				
M: high elevation hardwood-hemlock forests (endemic to North Carolina) (Haywood, Jackson, Macon, Swain, Transylvania)				

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Insects: Butterflies

Amblyscirtes carolina **W2** **S3S4** **G3G4**

Carolina Roadside-Skipper

PSC: moist woods (mainly hardwoods) near cane; host plant -- cane (*Arundinaria*) (Beaufort, Bertie*, Bladen, Brunswick, Carteret, Craven, Cumberland, Dare, Franklin, Gaston*, Gates, Halifax, Hoke, Hyde, Johnston, Jones, Lincoln, Martin*, Moore, New Hanover, Onslow, Pasquotank*, Pitt, Richmond, Sampson, Scotland, Wake, Washington, Wayne)

Celastrina neglectamajor **W2** **S3S4** **G4**

Appalachian Azure

M: rich deciduous forests; host plant -- black cohosh (*Cimicifuga*) (Alleghany, Ashe, Avery, Buncombe, Caldwell, Clay, Graham, Haywood, Macon, Madison, McDowell, Rutherford, Swain, Transylvania, Watauga, Yancey)

Glaucopsyche lygdamus **W2** **S2S3** **G5**

Silvery Blue

M: open upland woods, roadbanks, and borders; host plants -- primarily Carolina vetch (*Vicia caroliniana*), but also crown vetch (*Coronilla varia*) (Buncombe, Clay, Graham, Haywood, Macon, Madison, Mitchell, Swain)

Hermeuptychia intricata **W3** **SU** **GNR**

Intricate Satyr

C: mesic to moist hardwood forests; host plants -- grasses; newly described species, very difficult to identify; most NC records based on old specimens (Carteret*, Duplin*, Jones)

Hesperia leonardus **W2** **S3** **G5**

Leonard's Skipper

MP: wooded borders and openings, brushy fields; host plants -- grasses (Ashe, Avery*, Buncombe, Chatham, Clay*, Durham, Guilford*, Harnett, Madison, Montgomery, Moore, Randolph, Richmond*, Rowan, Stanly, Union, Wake, Watauga)

Hesperia sassacus **W2** **S3** **G5**

Indian Skipper

M: old fields, clearings, wood margins, mainly at high elevations; host plants -- grasses (Alleghany, Ashe, Avery, Burke, Clay, Haywood, Macon, Madison, Mitchell, Swain, Watauga, Wilkes, Yancey*)

Megathymus yuccae **W2** **S3S4** **G5**

Yucca Giant-Skipper

MPSC: dunes, flatwoods, old fields, and other places near yuccas; host plants -- *Yucca* species (Alexander, Bladen, Brunswick, Carteret*, Catawba*, Craven*, Cumberland, Dare*, Hoke, Johnston*, Jones, Mecklenburg, Moore, New Hanover, Onslow, Pender, Richmond, Robeson, Rutherford, Sampson, Scotland, Transylvania*)

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Phyciodes cocyta	**W3**		**S3?**	**G5**
Northern Crescent				
M: high to medium elevation openings in woodlands, road banks; host plants -- asters (Alleghany, Ashe, Buncombe, Clay, Graham, Haywood, Henderson, Macon, Madison, Swain, Watauga, Yancey)				
Phyciodes phaon	**W5**		**S2S3**	**G5**
Phaon Crescent				
T: open, often dry areas, mainly on barrier islands; host plants -- fogfruit (*Lippia*) (Brunswick*, Carteret, Dare, Hyde, New Hanover, Onslow, Pender)				
Pyrgus albescens	**W3**		**SU**	**G5**
White Checkered-Skipper				
PT: dry, open habitats, often where sandy, in the southern parts of the state; host plants -- mallows (*Sida*) (Brunswick, Carteret, Mecklenburg)				
Satyrium kingi	**W2**		**S3S4**	**G3G4**
King's Hairstreak				
MPSC: forests, often moist, usually near sweetleaf; host plant -- sweetleaf (*Symplocos tinctoria*) (Bladen, Brunswick, Carteret, Craven, Cumberland, Currituck, Dare*, Gaston, Hoke, Moore, Onslow*, Pender*, Pitt, Richmond, Robeson, Sampson, Scotland, Transylvania, Watauga)				
Speyeria diana	**W2**		**S3S4**	**G3G4**
Diana Fritillary				
MP: montane and foothill forest edges and openings; host plants -- violets (*Viola*) (Alexander*, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Catawba, Cherokee, Clay, Cleveland, Gaston, Graham, Haywood, Henderson, Iredell, Jackson, Macon, Madison, McDowell, Mecklenburg, Mitchell, Nash*, Polk, Rutherford, Stokes*, Surry, Swain, Transylvania, Wake*, Watauga, Wilkes, Yancey)				
Thorybes confusis	**W3**		**S3S4**	**G4**
Confused Cloudywing				
MPSC: dry woodland borders and openings, brushy fields; host plants -- legumes (Brunswick, Carteret, Caswell, Chatham, Clay, Columbus, Craven, Cumberland, Dare*, Davie, Durham, Forsyth, Gaston*, Granville, Harnett, Hoke, Montgomery, Moore, New Hanover, Onslow, Orange, Pender, Richmond, Sampson, Scotland, Wake, Warren)				

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Insects: Moths				
Abrostola ovalis **Oval Abrostola Moth** M: high elevation forests with nettles (Ashe, Haywood, Macon, Swain)	**W3**		**SU**	**G4**
Acrapex relicta **Relict Cane Moth** SC: canebrakes (Beaufort, Brunswick, Cumberland, Dare, Hoke, Martin, Montgomery, Moore, Northampton, Onslow, Richmond, Wake, Washington)	**W3**		**S3**	**G4**
Acronicta lanceolaria **Narrow-winged Dagger Moth** C: flatwoods (Brunswick, Onslow, Pender)	**W3**		**S3?**	**G4**
Afrida ydatodes **Dyar's Lichen Moth** C: maritime forest and scrub? (New Hanover)	**W3**		**S1S3**	**G5**
Anicla lubricans **Slippery Dart** PSC: savannas and flatwoods (Beaufort, Brunswick, Carteret, Cumberland, Granville, Harnett, Hoke, Moore, New Hanover, Onslow, Pender, Wake)	**W3**		**S3?**	**G4G5**
Anicla simplicius **Simplicius Dart** S: unknown habitats (Harnett, Hoke)	**W3**		**SU**	**G4**
Anicla sullivani **Sullivan's Anicla Moth** C: riparian habitats? (Hoke)	**W3**		**SU**	**G3G4**
Apantesis carlotta **Carlotta's Tiger Moth** MP: unknown habitats (Alleghany, Ashe, Haywood, Stokes, Swain, Watauga)	**W3**		**S3**	**G5**
Apoda rectilinea **Rectilinea Slug Moth** S: pine-oak sandhill woodlands (Hoke, Moore)	**W3**		**S1S3**	**GNR**
Argillophora furcilla **Silver Fork Cane Moth** MPC: canebrakes (Halifax, Martin, Northampton, Stokes, Swain, Washington)	**W3**		**S2S3**	**G3G4**
Arugisa latiorella **Watson's Arugisa Moth** PSC: sedgy glades (Dare, Moore, Wake, Washington)	**W3**		**S3?**	**G4**

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Cabera quadrifasciaria	**W3**		**SU**	**GNR**
Four-lined Cabera Moth				
C: unknown habitats (Brunswick, Carteret, New Hanover, Pender)				
Callosamia securifera	**W3**		**SU**	**G4**
Sweetbay Silkmoth				
SC: pocosins and other wetlands with sweetbay (Bladen, Brunswick, Camden, Carteret, Columbus, Gates, Harnett, Hoke, Moore, Pender, Richmond, Scotland, Washington)				
Caripeta aretaria	**W3**		**S3S4**	**G4**
Southern Pine Looper				
MPC: pine forests (Beaufort, Bladen, Brunswick, Carteret, Columbus, Dare, Gaston, Halifax, Macon, Moore, New Hanover, Onslow, Pender, Stokes, Washington)				
Catocala abbreviatella	**W3**		**SH**	**G4**
Abbreviated Underwing Moth				
S: sandhills habitats with host plants - *Amorpha* species. (Richmond*)				
Catocala alabamae	**W3**		**S2S3**	**G4**
Alabama Underwing				
SC: mesic sandhills (Bladen, Cumberland, Richmond)				
Catocala amestris	**W3**		**SU**	**G4**
Three-staff Underwing				
PC: sand ridges and flatwoods with leadplant (*Amorpha*) (New Hanover, Polk)				
Catocala blandula ssp. 1	**W3**		**S1S3**	**G5T3**
Southern Charming Underwing				
C: riparian hawthorns (Martin)				
Catocala illecta	**W3**		**SU**	**G5**
Magdalen Underwing				
P: habitats not known (Chatham)				
Catocala miranda	**W3**		**SU**	**G3G4**
Miranda Underwing				
M: forests with hawthorns (Swain)				
Catocala pretiosa	**W3**		**S2S3**	**G4**
Precious Underwing				
MSC: forests with shadbush or chokeberry (Cumberland, Dare, Hoke, Macon)				
Catocala sappho	**W3**		**SU**	**G4**
Sappho Underwing				
MP: bottomland hardwoods with hickories (Macon, Moore, Swain)				

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Cerastis fishii	**W3**		**SU**	**G4**
a Dart Moth				
MC: heath thickets (Macon, New Hanover)				
Ceratonyx satanaria	**W3**		**S2S4**	**G4**
a Geometrid Moth				
MC: swamps and bottomlands (Brunswick, Macon)				
Chytonix sensilis	**W3**		**S3?**	**G4**
Barrens Marvel				
MPSC: sandhills and flatwoods (Brunswick, Cumberland, Harnett, Hoke, Moore, New Hanover, Onslow, Pender, Stokes, Transylvania)				
Cisthene kentuckiensis	**W3**		**SU**	**G4**
Kentucky Lichen Moth				
SC: wet to mesic forests (Cumberland, Martin, Pender, Richmond, Wake)				
Dasychira atrivenosa	**W3**		**S3?**	**G4**
a Tussock Moth				
PSC: hardwood forests (Brunswick, Hoke, Onslow, Pender, Warren)				
Doryodes bistrialis	**W3**		**SU**	**G4**
Double-lined Doryodes				
SC: marshes (Brunswick, Carteret, Harnett, Hoke, Moore, New Hanover, Onslow, Pender)				
Doryodes sp. 1	**W3**		**S3S4**	**G3G4**
Wiregrass Doryodes				
SC: savannas, flatwoods, and sandhills (Brunswick, Carteret, Hoke, Moore, New Hanover, Onslow, Pender)				
Elaphria fuscimacula	**W3**		**SU**	**GNR**
a Noctuid Moth				
C: no habitat information (Columbus)				
Eulithis molliculata	**W3**		**SU**	**G4**
Dimorphic Eulithis Moth				
M: no habitat information (Ashe)				
Eupithecia absinthiata	**W3**		**SU**	**G5**
a Geometrid Moth				
M: unknown habitats (Ashe, Swain*, Watauga)				
Eupithecia affinata	**W3**		**SU**	**GNR**
a Geometrid Moth				
M: no habitat information (Watauga)				

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Eupithecia indistincta	**W3**		**SU**	**GNR**
a Pug Moth				
M: no habitat information (Haywood, Swain)				
Eupithecia mutata	**W5**		**SU**	**G5**
Spruce Cone Looper				
M: spruce-fir forests and possibly stands of hemlock (Haywood, Swain)				
Eupithecia peckorum	**W3**		**S3?**	**G4**
Peck's Pug Moth				
MSC: sandhills and flatwoods (Brunswick*, Macon, Montgomery, New Hanover, Onslow, Pender)				
Eupithecia satyrata	**W3**		**SU**	**G5**
Satyr Pug Moth				
M: no habitat information (Ashe, Watauga)				
Eupithecia strattonata	**W3**		**SU**	**GNR**
a Pug Moth				
no habitat or locality information				
Eusarca packardaria	**W3**		**SU**	**GNR**
Packard's Eusarca Moth				
MC: no habitat information (Cumberland, Macon, Martin)				
Feltia manifesta	**W2**		**S3S4**	**G4**
Adobe Dart				
MSC: xeric oak woodlands (Cumberland, Macon)				
Gabara pulverosalis	**W3**		**S3?**	**G4**
an Erebid Moth				
PSC: habitats poorly known (Brunswick, Cumberland, Harnett, Hoke, Montgomery, Moore, New Hanover, Onslow, Pender, Polk, Randolph, Richmond, Scotland)				
Gondysia similis	**W3**		**S2S3**	**G3G4**
Gordonia Darkwing				
C: pocosins and bay forests (Bladen, Brunswick, Carteret, Dare, Onslow, Pender, Washington)				
Gondysia telma	**W3**		**SU**	**GNR**
a Noctuid Moth				
C: swamp forests (Columbus, Craven, Cumberland, Robeson)				
Grammia phyllira	**W2**		**S3**	**G4**
Phyllira Tiger Moth				
PSC: sandhills (Bladen, Cumberland, Gaston, Moore, Onslow, Richmond, Wake)				
Grammia virguncula	**W3**		**SH**	**G5**
Little Virgin Tiger Moth				
M: no habitat information (Watauga*)				

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Heliomata infulata	**W3**		**S2S3**	**G3G4**
Rare Spring Moth				
MPSC: forests or woodlands with shrubby locusts (Bladen, Cumberland, Gates, Harnett, Haywood, Hoke, Moore, Stokes, Surry, Wake)				
Hydrelia condensata	**W3**		**SU**	**G4**
a Carpet Moth				
M: no habitat or locality information				
Hydriomena divisaria	**W3**		**S2S3**	**G5**
Black-dashed Hydriomena Moth				
MP: no habitat information (Haywood, Macon, Madison, Mitchell, Rutherford, Swain, Wake)				
Hypena appalachiensis	**W3**		**S2S3**	**G3G4**
Appalachian Bomolocha Moth				
M: unknown habitats (Ashe, Swain)				
Hyperstrotia aetheria	**W3**		**S3?**	**GNR**
a Graylet Moth				
S: pine-oak sandhill woodlands (Moore)				
Hypocala andremona	**W3**		**SU**	**GNR**
Hypocala Moth				
M: no habitat information (Swain)				
Hypomecis longipectinaria	**W3**		**S3S4**	**G3G4**
Broadly Pectinate Hypomecis Moth				
PC: hardwood stands (Brunswick, Halifax, Martin, Montgomery, Northampton, Onslow, Orange, Pender, Randolph)				
Idaea eremiata	**W3**		**S3S4**	**G4**
Straw Wave				
MSC: sandhills (Brunswick, Cumberland, Macon, Moore, Pender, Richmond)				
Idaea hilliata	**W3**		**SU**	**GNR**
Hill's Wave Moth				
C: no habitat information (Robeson)				
Idaea micropterata	**W3**		**S3?**	**GNR**
a Wave				
C: no habitat information (Dare, Onslow)				
Idaea productata	**W3**		**SU**	**G4**
a Wave				
MC: sandhills (Dare, New Hanover, Onslow, Pender, Swain)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Idaea scintillularia	**W3**		**SU**	**GNR**
Diminutive Wave				
PC: unknown habitats (Cabarrus, Martin, Montgomery, Wake)				
Ipimorpha pleonectusa	**W3**		**SU**	**G5**
Even-lined Sallow				
P: no habitat information (Cabarrus, Mecklenburg)				
Leucania incognita	**W3**		**S1S2**	**GNR**
a Wainscot Moth				
MC: habitats poorly known (Alleghany, Brunswick)				
Lithacodia sp. 2	**W3**		**S1S3**	**G1G3**
a Bird-dropping Moth				
C: unknown habitats (Cumberland, Halifax, Hoke, Northampton)				
Lithophane abita	**W3**		**SU**	**G4**
Cypress Pinion				
C: cypress swamps (Camden, Pender)				
Lithophane adipel	**W3**		**SU**	**G4**
a Pinion Moth				
C: unknown habitats (Moore)				
Lithophane joannis	**W3**		**SU**	**G4**
a Noctuid Moth				
M: rich cove forests? (Macon)				
Lithophane laceyi	**W3**		**SU**	**G4**
a Pinion Moth				
PC: sites dominated by xerophytic oaks (Brunswick, Moore, New Hanover, Warren)				
Lithophane lemmeri	**W3**		**S1S3**	**G3G4**
Lemmer's Pinion				
PC: cedar glades and Atlantic white cedar forests (Carteret, Craven, Wake)				
Lithophane scottae	**W3**		**SU**	**G2G4**
a Pinion Moth				
M: lower elevations (Ashe)				
Lithophane tepida	**W3**		**SU**	**G5**
White-eyed Pinion				
M: northern hardwood forests? (Macon)				
Litoprosopus futilis	**W3**		**SU**	**G4**
Palmetto Borer				
C: palmettos (Carteret, New Hanover)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Lytrosis heitzmanorum	**W3**		**SU**	**G5**
a Geometrid Moth				
MP: oak-hickory forests in lower elevation mountains and piedmont (Orange, Rutherford)				
Macrochilo louisiana	**W3**		**S3?**	**G4**
Louisiana Owlet Moth				
MPSC: sedgy wetlands (Alleghany, Brunswick, Cumberland, Hoke, Onslow, Orange, Pender, Richmond)				
Macrochilo santerivalis	**W3**		**SU**	**G3G4**
an Owlet Moth				
C: brackish marshes (Dare, New Hanover, Onslow)				
Metanema determinata	**W3**		**SU**	**G5**
Dark Metanema Moth				
M: northern hardwoods? (Alleghany, Ashe)				
Metarranthis lateritiaria	**W3**		**SU**	**G3G4**
a Geometrid Moth				
SC: flatwoods and pocosins (Brunswick, Cumberland, Dare, Onslow, Pender)				
Metarranthis mollicularia	**W3**		**SU**	**GNR**
a Geometrid Moth				
P: no habitat information (Rutherford)				
Metarranthis sp. 1	**W3**		**S3S4**	**G3G4**
Mid-Atlantic Metarranthis Moth				
C: pocosins (Brunswick, Dare, Moore, New Hanover, Pender, Richmond, Scotland, Washington)				
Nemoria bifilata	**W3**		**S3?**	**G4**
White-barred Emerald				
MPSC: sandhills and sandy forests (Bladen, Brunswick, Dare, Hoke, Moore, New Hanover, Onslow, Pender, Richmond, Swain, Warren)				
Nemoria outina	**W3**		**SU**	**GNR**
an Emerald Moth				
C: no habitat information (Carteret)				
Nemoria rubrifrontaria	**W3**		**SH**	**GNR**
Red-fronted Emerald				
MP: historical records for mountains and piedmont, habitat not known (Haywood*, Jackson*, Moore*, Swain*)				
Neoplynes eudora	**W3**		**S2S3**	**G5**
a Wasp Moth				
C: unknown (Carteret, New Hanover)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Notodontidae Genus 1 species 1	**W3**		**S2S3**	**G3G4**
a new Prominent Moth				
CP: bottomland hardwoods (Brunswick, Cumberland, Hoke, Moore, Pender, Randolph)				
Oligia chlorostigma	**W3**		**SU**	**G4**
a Brocade Moth				
MP: no habitat information (Alleghany, Ashe, Cabarrus, Haywood, Swain)				
Operophtera bruceata	**W3**		**SU**	**G5**
Bruce Spanworm Moth				
M: no habitat information (Watauga)				
Orgyia detrita	**W3**		**S2S3**	**G3G4**
a tussock moth				
MPSC: hardwood forests (Beaufort, Brunswick, Carteret, Dare, Halifax, Hoke, Onslow, Pender, Richmond, Swain, Warren, Washington)				
Paectes nubifera	**W3**		**SU**	**GNR**
Clouded Paectes Moth				
P: no habitat information (Chatham)				
Pangrapta sp. 1	**W3**		**S1S3**	**GU**
Whitish Pangrapta				
SC: pocosins? (Bladen, Columbus, Hoke)				
Papaipema araliae	**W3**		**S2S4**	**G3G4**
Aralia Shoot Borer Moth				
C: forests and woodlands (Halifax, Washington)				
Papaipema duplicatus	**W3**		**SH**	**G2G4**
Dark Stoneroot Borer Moth				
M: rich woods with *Collinsonia canadensis* (Swain)				
Papaipema furcata	**W3**		**SU**	**GU**
Ash Tip Borer Moth				
M: forests with ash (*Fraxinus*) (Ashe)				
Papaipema insulidens	**W3**		**SU**	**GU**
Umbellifer Borer Moth				
M: no habitat information (Ashe, Watauga)				
Papaipema lysimachiae	**W3**		**SU**	**G4G5**
Loosestrife Borer Moth				
M: on loosestrife (Haywood, Macon)				
Papaipema necopina	**W3**		**SU**	**G4?**
Sunflower Borer Moth				
MC: no habitat information (Macon, Northampton)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Papaipema nepheleptena	**W3**		**SU**	**G4**
Turtle Head Borer Moth				
M: wetland habitats with *Chelone glabra* (Watauga)				
Papaipema polymniae	**W3**		**SU**	**G4?**
Cup Plant Borer Moth				
MP: rich cove forests? (Buncombe, Haywood, Randolph, Swain)				
Papaipema sp. 3	**W3**		**S3S4**	**G4**
Southeastern Cane Borer Moth				
C: canebrakes (Beaufort, Cumberland, Dare, Hoke, Martin, Montgomery, Moore, Richmond)				
Parahypenodes quadralis	**W3**		**S1S2**	**G4**
Masked Parahypenodes Moth				
MC: possibly a wetland specialist (Dare, Macon)				
Photedes enervata	**W3**		**SU**	**G4**
a Borer Moth				
C: tidal marshes (Carteret, Onslow)				
Pimaphera percata	**W3**		**S1S2**	**GNR**
an Inchworm Moth				
C: unknown habitats (Brunswick)				
Ponometia parvula	**W3**		**S2S3**	**GNR**
a Bird-dropping Moth				
SC: cypress swamps? (Brunswick, Cumberland, Harnett, New Hanover, Richmond, Scotland)				
Ponometia tortricina	**W3**		**SU**	**GNR**
a Bird-dropping Moth				
M: unknown (Macon)				
Properigea costa	**W3**		**SU**	**G4**
Barrens Moth				
M: rocky outcrops (Rutherford)				
Properigea tapeta	**W3**		**SU**	**GNR**
a Noctuid Moth				
C: bottomlands? (Martin, Pender)				
Protodeltote sp. 1	**W3**		**S1S3**	**G1G3**
a Bird-dropping Moth				
C: pocosins and other wetlands; no locality data				
Psamatodes abydata	**W3**		**SU**	**GNR**
Dot-lined Angle				
MPC: unknown habitats; possibly a migrant (Ashe, Bladen, Brunswick, Macon*, Onslow, Pender, Stokes)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Ptichodis bistrigata	**W2**		**S3S4**	**G3**
Southern Ptichodis				
PSC: xeric sandhills (Hoke, Montgomery)				
Rivula stepheni	**W3**		**SU**	**GNR**
a Noctuid Moth				
C: no habitat information (Camden, Cumberland, Northampton)				
Schinia indiana	**W3**		**SH**	**G2G4**
Phlox Moth				
M: possibly dry ridges or rocky barrens, larval host *Phlox* species (Macon*)				
Schinia obscurata	**W3**		**S2S3**	**G4**
Erigeron Flower Moth				
S: sandhills (Moore)				
Schinia scissoides	**W3**		**S2S3**	**GNR**
Divided Flower Moth				
C: open areas (Brunswick, New Hanover)				
Schinia siren	**W3**		**SU**	**GNR**
Alluring Schinia Moth				
SC: open hardwood forests (Brunswick, Carteret, Hoke, Moore, New Hanover, Pender)				
Schinia sordidus	**W3**		**S2S3**	**G4?**
Sordid Flower Moth				
SC: savannas (Bladen, Brunswick, Carteret, Moore, New Hanover, Pender)				
Scopula aemulata	**W3**		**SU**	**GNR**
Diminutive Wave				
PC: on *Trillium* (Brunswick, New Hanover, Stokes)				
Scopula cacuminaria	**W3**		**S2S3**	**G4**
Frosted Tan Wave Moth				
MC: sandhills and other dry forests (Alleghany, Beaufort, Brunswick, Camden, Dare, Gates, Onslow)				
Scopula ordinata	**W3**		**SU**	**GU**
a Wave Moth				
MC: mesic hardwoods (Brunswick, Haywood, Macon, Swain, Transylvania)				
Scopula purata	**W3**		**S2S3**	**G4**
Chalky Wave				
SC: acidic wetlands (Brunswick, Cumberland, Hoke, Moore, Onslow, Pender, Richmond)				
Selenisa sueroides	**W3**		**SU**	**GNR**
Pale-edged Selenisa Moth				
P: no habitat information (Mecklenburg)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Sphingicampa bicolor	**W3**		**S3?**	**G5**
Honey Locust Moth				
P: on honey locust (*Gleditsia*) (Chatham, Durham*, Gaston, Lee, Wake)				
Sphinx franckii	**W3**		**SU**	**G4G5**
Franck's Sphinx				
PC: basic-mesic hardwoods and other habitats with ash (*Fraxinus*) (Brunswick, Cabarrus, Orange)				
Spilosoma dubia	**W3**		**S3?**	**G5**
Dubious Tiger Moth				
C: acidic wetlands (Bladen, Brunswick, Carteret, Cumberland, Dare, New Hanover, Onslow, Pender, Washington)				
Stiria rugifrons	**W3**		**SU**	**G4**
Yellow Sunflower Moth				
MC: habitat unknown, but often near sunflowers (Cumberland, Transylvania*)				
Sympistis dinalda	**W3**		**SU**	**GNR**
a Sallow				
P: no habitat information (Warren)				
Sympistis perscripta	**W3**		**SU**	**G4**
Scribbled Sallow				
C: on toadflax (Bladen, Brunswick, Cumberland, New Hanover, Onslow)				
Tacparia detersata	**W3**		**SU**	**G5**
Pale Alder Moth				
M: northern hardwoods (Alleghany, Ashe, Avery)				
Tornos abjectarius	**W3**		**S2S3**	**GNR**
a Tornos Moth				
PC: freshwater shorelines, savanna (Brunswick, Cumberland, Halifax, Pender, Richmond, Warren)				
Tornos cinctarius	**W3**		**SU**	**GNR**
a Tornos Moth				
SC: savannas and sandhills (Cumberland, Hoke, Onslow, Pender)				
Tripudia flavofasciata	**W3**		**SU**	**GNR**
a Seed Moth				
C: bottomlands (Cumberland, Halifax, Martin, Northampton, Onslow)				
Ulolonche modesta	**W3**		**SU**	**G5**
Modest Quaker Moth				
MPC: pine-oak-heath communities (Bladen, Cumberland, Dare, Pender, Stokes)				
Xestia youngii	**W3**		**S3S4**	**G5**
Young's Dart Moth				
C: peatlands (Beaufort, Bladen, Brunswick, Carteret, Dare, New Hanover, Pender, Washington)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Zale fictilis	**W3**		**SU**	**G5**
an Owlet Moth				
C: no habitat information; perhaps a stray from farther south (Brunswick)				
Zale sp. 2 nr. squamularis	**W3**		**SU**	**G4Q**
a new Zale				
PC: no habitat information (Brunswick, Cumberland, Stokes)				
Zale sp. 3 nr. buchholzi	**W3**		**S2S3**	**G3G4**
an Owlet Moth				
SC: pine forests (Brunswick, Cumberland, Hoke, Martin, Moore, New Hanover, Pender)				
Zanclognatha atrilineella	**W3**		**S1S3**	**GU**
an Owlet Moth				
C: no habitat information (Halifax, Martin, Onslow)				
Zanclognatha dentata	**W3**		**SU**	**G3G4**
an Owlet Moth				
M: dry pitch pine stands (Haywood, Macon, Swain)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global

Insects: Grasshoppers and Katydids

Amblycorypha arenicola **W3** **S2S3** **GNR**

Sandhill Virtuoso Katydid

S: sandhill habitats; no locality information

Amblycorypha bartrami **W3** **S2S3** **GNR**

Bartram's Round-winged Katydid

S: sandhill habitats; no locality information

Atlanticus gibbosus **W4** **SNA** **GNR**

Gibbous Shield-back Katydid

C: oak and pine forests; ranges north to near the North Carolina border, but uncertain if any state records

Belocephalus subapterus **W3** **S2S3** **GNR**

Half-winged Cone Head Katydid

SC: flatwoods and other shrubby areas; no locality information

Dendrotettix australis **W3** **SU** **GU**

Scrub Pine Grasshopper

MP: dry forests and monadnocks, often in pine stands (Macon*, Rutherford, Stokes)

Encoptolophus sordidus **W4** **SNA** **G5**

Dusky Grasshopper

reported from the state, but no locality or habitat information available (Avery*, Guilford*, Mecklenburg*, Watauga*)

Hesperotettix viridis **W3** **SU** **G5**

Meadow Purple-striped Grasshopper

SC: sandhill seeps and wet pine savannas (Brunswick*, Cumberland*, Harnett*, Moore, New Hanover*, Onslow, Pender*)

Hubbellia marginifera **W3** **S3?** **GNR**

Pine Katydid

SC: pinewoods (Chatham, Durham, Moore*, Sampson*, Wake)

Inscudderia walkeri **W3** **SU** **GNR**

Eastern Cypress Katydid

C: cypress swamps and savannas (Brunswick, Gates)

Melanoplus acrophilus **W3** **S2S3** **G2G3**

a Spur-throat Grasshopper

M: montane forests?; endemic to the southern Appalachians (Buncombe*, Burke*, Mitchell*, Watauga, Yancey*)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Melanoplus angustipennis	**W3**		**S2S3**	**G5**
Narrow-winged Spur-throat Grasshopper				
S: sandy areas in grasslands (Harnett, Moore*,)				
Melanoplus devius	**W3**		**SU**	**GU**
Devious Short-wing Grasshopper				
M?: dry montane forests at middle elevations; no locality information				
Melanoplus hubbelli	**W3**		**SU**	**G4**
Hubbell's Melanoplus				
M: dry woodlands, including second growth (Polk, Swain, Yancey)				
Melanoplus impudicus	**W3**		**SH**	**G4G5**
Immodest Spur-throat Grasshopper				
M: barrens and glades (Cherokee*, Richmond*, Wake*)				
Melanoplus nigrescens	**W3**		**S3?**	**GU**
Black-sided Spur-throat Grasshopper				
PCT: upland forests, dry pinewoods, and maritime forests (Brunswick*, Columbus*, Montgomery)				
Melanoplus strumosus	**W3**		**S2S3**	**G4G5**
Swollen Spur-throat Grasshopper				
SC: sandhills (Bladen*, Cumberland*, Hoke, Moore, Onslow*, Sampson*)				
Melanoplus sylvestris	**W3**		**S3?**	**G1G3**
a Spur-throat Grasshopper				
MP: deciduous forest undergrowth, especially near low-growing ericads (endemic to North Carolina) (Avery*, Buncombe*, Burke*, Stokes, Watauga*)				
Melanoplus tribulus	**W3**		**SU**	**G4G5**
Tribulus Spur-throat Grasshopper				
MPC: glades and open woodlands (Ashe*, Halifax*, Montgomery)				
Melanoplus walshii	**W3**		**SU**	**G4G5**
Walsh's Locust				
M: thickets in and near deciduous woodlands at mid to high elevations; only recent records for Mount Mitchell (Yancey)				
Mermiria intertexta	**W3**		**S3S4**	**G4?**
Intertexta Mermiria				
T: coastal marshes and damp depressions (Brunswick, Dare, New Hanover, Onslow)				
Mermiria picta	**W3**		**S3?**	**G5**
Lively Mermiria				
SC: longleaf pine savannas and flatwoods (Brunswick, Carteret, Columbus*, Cumberland, Moore*, New Hanover*, Onslow, Pender, Scotland)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Montezumina modesta	**W3**		**SU**	**GU**
Modest Katydid				
MPC: pinewoods and other habitats (Beaufort*, Brunswick*, Moore*, Pender*, Wake*)				
Neoconocephalus velox	**W3**		**SU**	**GNR**
Swift-flying Cone Head Katydid				
C: shrubby undergrowth in pinewoods; no locality information				
Orchelimum bradleyi	**W3**		**SU**	**GNR**
Bradley's Meadow Katydid				
CT: maidencane and sawgrass marshes (New Hanover*)				
Orchelimum superbum	**W3**		**SU**	**GNR**
Superb Meadow Katydid				
CT: bogs and tidal marshes; no locality information				
Paratylotropidia beutenmuelleri	**W3**		**SU**	**G4**
Beutenmueller's Grasshopper				
M: no habitat information (Buncombe*, Henderson*, Transylvania*)				
Pardalophora apiculata	**W3**		**SU**	**G5**
Coral-winged Grasshopper				
M: no habitat information (Buncombe*)				
Romalea microptera	**W3**		**SU**	**G5**
Eastern Lubber Grasshopper				
P: open woods and roadsides; no locality information				
Scudderia curvicauda laticauda	**W3**		**SU**	**G5TNR**
Broad-tailed Bush Katydid				
C: savannas, flatwoods, open pinewoods; no locality information				
Stenacris vitreipennis	**W3**		**S1S3**	**G5**
Glassy-winged Toothpick Grasshopper				
C: marshes; no locality information				
Trachyrhachys kiowa	**W3**		**SU**	**G5**
Ash-brown Grasshopper				
Unknown: bare or gravelly ground in dry upland habitats; no locality information				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global

Insects: Beetles

Ellipsoptera blanda **W3** **S2S3** **G3G4**

Sandbar Tiger Beetle

C: sandy floodplains and white sand bars along blackwater rivers and streams (Bladen, Columbus, New Hanover)

Gonielmis dietrichi **W3** **S2** **GNR**

a Water Beetle

S: in and around Fort Bragg (Hoke, Richmond, Scotland)

Lordithon niger **W4** **SU** **GU**

Black Lordithon Rove Beetle

no habitat or locality information

Stenelmis morsei **W5** **S2** **GNR**

a Riffle Beetle

C: Lumber River (Robeson)

Stenelmis sp. 1 **W3** **S1** **GNR**

Harley's Stenelmis Riffle Beetle

S: Lumber River (Hoke, Scotland)

Stenelmis sp. 2 **W2** **S2** **GNR**

William's Stenelmis Riffle Beetle

PS: James Creek, Upper Little River, Deep River (Harnett, Lee, Moore)

Stenelmis sp. 3 **W3** **S2** **GNR**

a Riffle Beetle

PSC: Little River (Cumberland, Harnett, Moore)

Trechus balsamensis **W3** **SU** **GH**

a Ground Beetle

M: Plott Balsam mountains; type locality Water Rock Knob (endemic to North Carolina) (Haywood*, Jackson*)

Trechus carolinae **W3** **SU** **GH**

a Ground Beetle

M: Spruce-Fir forests of the Black Mountains; type locality Mt. Mitchell (endemic to North Carolina) (Yancey*)

Trechus luculentus luculentus **W3** **SU** **GHTH**

Bright Ground Beetle

M: Great Smoky Mountains; type locality Clingmans Dome (Swain*)

Trechus luculentus unicoi **W3** **SU** **GHTH**

Unicoi Mountains Ground Beetle

M: Unicoi Mountains (Graham*)

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C	 Global
Trechus mitchellensis	**W3**		**SU**	**GH**
Mitchell's Ground Beetle				
M: Black Mountains (endemic to North Carolina) (Buncombe*, McDowell*, Yancey*)				
Trechus novaculosus	**W3**		**SU**	**GH**
a Ground Beetle				
M: Spruce-fir forests of Great Smoky Mountains National Park (endemic to the park) (Haywood*, Swain*)				
Trechus roanicus	**W3**		**SU**	**GH**
Roan Mountain Ground Beetle				
M: Roan Mountain (endemic to the mountain) (Mitchell*)				
Trechus rosenbergi	**W3**		**SU**	**GH**
Rosenberg's Ground Beetle				
M: Plott Balsam and Great Balsam mountains; type locality Water Rock Knob (endemic to North Carolina) (Haywood*, Jackson*)				
Trechus satanicus	**W3**		**SU**	**GH**
a Ground Beetle				
M: Great Balsam Mountains, vicinity of Devils Courthouse and Graveyard Fields (endemic to North Carolina) (Haywood*)				
Trechus subtilis	**W3**		**SU**	**GH**
Fine Ground Beetle				
M: Great Smoky and Plott Balsam mountains; type locality Mt. Sterling (endemic to North Carolina) (Haywood*)				

ENDEMIC ANIMALS IN NORTH CAROLINA

This is a list of all taxa (including subspecies) considered to be strictly endemic to North Carolina. The list does not include taxa whose range barely extends into another state, such as taxa endemic to the Roan Mountain area or Great Smoky Mountains National Park. The lists of most of the insect groups (other than butterflies, dragonflies, and damselflies) are incomplete, as are the lists for spiders and other arachnids. There are no endemic taxa of birds.

SCIENTIFIC NAME	COMMON NAME
MAMMALS	
Peromyscus leucopus buxtoni	Buxton Woods White-footed Deermouse
Sorex sp. 1	a shrew (Albemarle-Pamlico Peninsula)
REPTILES	
Lampropeltis getula sticticeps	Outer Banks Kingsnake
Nerodia sipedon williamengelsi	Carolina Watersnake
AMPHIBIANS	
Eurycea sp. 9	Sandhills Salamander
Necturus lewisi	Neuse River Waterdog
Plethodon amplus	Blue Ridge Gray-cheeked Salamander
Plethodon cheoah	Cheoah Bald Salamander
Plethodon meridianus	South Mountain Gray-cheeked Salamander
Plethodon yonahlossee pop. 1	Crevice Salamander
FRESHWATER FISHES	
Etheostoma perlongum	Waccamaw Darter
Fundulus cf. diaphanus	Lake Phelps Killifish
Fundulus waccamensis	Waccamaw Killifish
Lythrurus matutinus	Pinewoods Shiner
Menidia extensa	Waccamaw Silverside
Notropis mekistocholas	Cape Fear Shiner
Noturus furiosus	Carolina Madtom
MOLLUSKS – FRESHWATER BIVALVES	
Alasmidonta sp. 1	a bivalve (Upper Yadkin River system)
Alasmidonta sp. 2	a bivalve (Uwharries region)
Elliptio marsupiobesa	Cape Fear Spike
Elliptio steinstansana	Tar River Spinymussel
Elliptio sp. 2	File Spike
Elliptio sp. 4	a bivalve (Deep River system)
Lampsilis fullerkati	Waccamaw Fatmucket
Lampsilis sp. 2	Chameleon Lampmussel
Lampsilis sp. 3	a bivalve (Deep River system)
MOLLUSKS – FRESHWATER GASTROPODS	
Cincinnatia sp. 1	Waccamaw Siltsnail
Helisoma eucosmium	Greenfield Rams-horn
Planorbella magnifica	Magnificent Rams-horn
MOLLUSKS – TERRESTRIAL GASTROPODS	
Carychium arboreum	Tree Thorn
Catinella waccamawensis	Waccamaw Ambersnail
Fumonelix cherohalaensis	Rock-loving Covert

MOLLUSKS – TERRESTRIAL GASTROPODS	
Fumonelix orestes	Engraved Covert
Glyphyalinia clingmani	Fragile Glyph
Helicodiscus bonamicus	Spiral Coil
Paravitrea lacteodens	Ramp Cove Supercoil
Patera clarki nantahala	Noonday Globe
Triodopsis fulciden	Dwarf Threetooth
Triodopsis soelneri	Cape Fear Threetooth
ARACHNIDS	
Hypochilus coylei	a lampshade weaver
Hypochilus sheari	a lampshade weaver
Nesticus bishopi	a cave cobweb spider
Nesticus brimleyi	a cave cobweb spider
Nesticus carolinensis	Linville Caverns Spider
Nesticus cooperi	Lost Nantahala Cave Spider
Nesticus crosbyi	a cave cobweb spider
Nesticus nasicus	a cave cobweb spider
Nesticus sheari	a cave cobweb spider
Nesticus silvanus	a cave cobweb spider
Nesticus sp. 2	a cave cobweb spider
CRUSTACEANS	
Caecidotea carolinensis	Bennett's Mill Cave Water Slater
Cambarus brimleyorum	Valley River Crayfish
Cambarus catagius	Greensboro Burrowing Crayfish
Cambarus davidi	Carolina Ladle Crayfish
Cambarus eeseeohensis	Grandfather Mountain Crayfish
Cambarus hystricosus	Sandhills Spiny Crayfish
Cambarus johni	Carolina Foothills Crayfish
Cambarus lenati	Broad River Stream Crayfish
Cambarus reburrus	French Broad River Crayfish
Cambarus tuckasegee	Tuckasegee Stream Crayfish
Dactylocythere chelomata	Cherokee Crayfish Ostracod
Dactylocythere isabelae	Catawba Crayfish Octracod
Dactylocythere peedeeensis	Pee Dee Crayfish Ostracod
Dactylocythere prinsi	Whitewater Crayfish Ostracod
Diacyclops jeanneli putei	Carolina Well Diacyclops
Harpagocythere baileyi	Highlands Crayfish Ostracod
Procambarus medialis	Pamlico Crayfish
Procambarus plumimanus	Croatan Crayfish
Skistodiaptomus carolinensis	Carolina Skistodiaptomus
Stygobromus carolinensis	Yancy Sideswimmer
Waltoncythere acuta	Transylvania Crayfish Ostracod
INSECTS – MAYFLIES	
Maccaffertium wudigeum	Wilson Creek "Stenonema"

INSECTS - STONEFLIES	
Haploperla fleeki	Piedmont Sallfly
Haploperla parkeri	Parker Sallfly
Perlesta bjostadi	Anomalus Stone
Perlesta leathermani	Sandhills Stone
INSECTS – CADDISFLIES	
Ceraclea cama	a longhorned caddisfly
Ceraclea joannae	a caddisfly
Nectopsyche waccamawensis	Waccamaw White Miller
Oecetis sp. D	a caddisfly
Rhyacophila accola	a caddisfly
INSECTS – FLIES	
Eulonchus marialiciae	Mary Alice's Small-headed Fly
INSECTS – BUTTERFLIES	
Atrytonopsis quinteri	Crystal Skipper
Neonympha mitchellii francisci	Saint Francis' Satyr
INSECTS - MOTHS	
Agrotis carolina	a dart moth
Hemipachnobia subporphyrea	Venus Flytrap Cutworm Moth
Meropleon diversicolor sullivani	an owlet moth
Schizura sp. 1	a prominent moth
INSECTS – GRASSHOPPERS AND KATYDIDS	
Melanoplus coreyi	a grasshopper
Melanoplus decorus	Decorated Spur-throat Grasshopper
Melanoplus mirus	Weldon Short-wing Grasshopper
Melanoplus nubilus	Nubile Short-wing Grasshopper
Melanoplus serrulatus	Nantahala Short-wing Grasshopper
Melanoplus sylvestris	a spur-throat grasshopper
INSECTS – BEETLES	
Trechus balsamensis	a ground beetle
Trechus carolinae	a ground beetle
Trechus luculentus luculentus	a ground beetle
Trechus luculentus unicoi	a ground beetle
Trechus michellensis	a ground beetle
Trechus novaculosus	a ground beetle
Trechus roanicus	a ground beetle
Trechus rosenbergi	a ground beetle
Trechus satanicus	a ground beetle
Trechus subtilis	a ground beetle
INSECTS – SPRINGTAILS	
Pseudosinella flatua	a cave obligate springtail
Pseudosinella gisini carolina	a cave obligate springtail
Pseudosinella vespera	a cave obligate springtail

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EXTIRPATED ANIMALS IN NORTH CAROLINA

This is a list of all taxa considered by state biologists and NCNHP to be extirpated (N.C. Rank of SX) in North Carolina. Those species with N.C. Status of E, T, SC, or SR are also included on the Rare List. NOTE: Quite a few species that might be gone from N.C. are included in the Rare and Watch Lists with an SH (=historic) rank, generally indicating that they have not been seen for over 20 years, but because of inadequate survey or other factors they may well still exist in the state or may be absent but expected to be found again in upcoming years.

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	NOTES
MAMMALS			
Bos bison	American Bison	G4	MP:open woodlands
Canis lupus	Gray Wolf	G4	MPS?C?: extensive forests, remote areas
Erethizon dorsatum	North American Porcupine	G5	M:high elevation hardwood forests**
Lepus americanus	Snowshoe Hare	G5	M:spruce-fir, other high elevation forests**
Martes pennanti	Fisher	G5	M:spruce-fir forests**
Puma concolor couguar	Eastern Cougar	G5THQ	MPC:extensive forests,remote areas
BIRDS			
Campephilus principalis	Ivory-billed Woodpecker	GH	C:extensive swamps, bottomlands with old-growth trees (one NC record)
Columbina passerina	Common Ground-dove	G5	T:dunes, sandy fields, margins of maritime woods and thickets
Conuropsis carolinensis	Carolina Parakeet	GX	M?PSC:forests, esp. swamps and bottomlands
Ectopistes migratorius	Passenger Pigeon	GX	MPSC: forests (winter only)
Thryomanes bewickii altus	Appalachian Bewick's Wren	G5T2Q	M:woodland borders or openings, farmlands or brushy fields at high elevations
Vermivora bachmanii	Bachman's Warbler	GH	PC: bottomland forests, swamps

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	NOTES
FRESHWATER FISHES			
Etheostoma jessiae	Blueside Darter	G4Q	M:streams in Mills River system (Henderson*)
Lepomis megalotis	Longear Sunfish	G5	M:French Broad drainage (Buncombe,* Haywood*)
Percina williamsi	Sickle Darter	G2	M: French Broad River (Buncombe*)
MOLLUSKS – FRESHWATER BIVALVES			
Alasmidonta robusta	Carolina Elktoe	G1Q	P:Long Creek in Mecklenburg*
Epioblasma florentina walkeri	Tan Riffleshell	G1T1	M:French Broad, other rivers (Buncombe*)
Medionidus conradicus	Cumberland Moccasinshell	G3G4	M:French Broad River (Buncombe*)
Pleuronaia dolabelloides	Slabside Pearlymussel	G2	M:Little Tenn. River (?) (Macon,*Swain*)
Ptychobranchus fasciolaris	Kidneyshell	G4G5	M:Tenn. Drainages
Quadrula pustulosa	Pimpleback	G5	M:Tenn. Drainages
Quadrula verrucosa	Pistolgrip	G4G5	M:New River near Virginia border (Alleghany,* Ashe*)
Toxolasma lividus	Purple Lilliput	G2	M:French Broad River
INSECTS – BUTTERFLIES			
Speyeria idalia	Regal Fritillary	G3	M:wet or dry meadows, bogs, open hilltops

* All recorded occurrences in the county are either extirpated, have not been found in recent surveys, or have not been surveyed recently enough to be confident they are still present. Unsurveyed occurrences are regarded as historical after 20-40 years, the number of years depending on the species and the amount of habitat alteration in the area. An asterisk should not be regarded as a definitive statement that the species is gone from the county but indicates that there is reason to doubt its continued existence.

**No positively documented records.

POTENTIAL NEW TO NORTH CAROLINA ANIMALS

The following list contains species of well-known animal groups that are not currently thought to occur in North Carolina or those animal species not currently known to breed in North Carolina but which are considered to have some possibility of being found here based on their established range, habitat preferences, or breeding behaviors. Most are species that occur in the adjacent states of South Carolina, Georgia, Tennessee, or Virginia in habitats (or drainages) at least relatively similar to habitats known to exist in North Carolina. The purpose of this list is to encourage and challenge field workers to find new state occurrences and new breeding records. This list should give field investigators an idea of some of the species that may be regular components of North Carolina's fauna. Species that might occur as single record accidentals, such as western species of birds or Gulf Coast butterflies, are generally not included. While some of these species may have relatively remote chances of being found in North Carolina, the likelihood of finding new state records is greatly increased by awareness of the possibilities and by species-directed searching. Our knowledge of many of our animal groups is still quite imperfect, especially invertebrate groups. Many natural areas are being destroyed before they can be investigated, and it can be assumed that a number of native species have been extirpated from North Carolina before they were ever documented as occurring in the state. Following each species is the North Carolina province in which the species is considered most likely to be found. Where possible, a description of the typical habitat of the species in the vicinity of North Carolina is also given. Sometimes, the nearest known occurrence(s) to North Carolina are also listed.

MAMMALS

There are very few terrestrial mammals that could be discovered for the first time in North Carolina. Three of them, North American Porcupine, Shoeshoe Hare, and Fisher, may have occurred in the mountains many decades or centuries ago, but reports are fuzzy or second-hand; they are included on the Extirpated List.

Sylvilagus aquaticus – Swamp Rabbit
M: swamps, floodplain forests; SC, GA; questionable specimen from Clay County, NC

BIRDS

The species below are all considered to be potential breeders in North Carolina; some may possibly be breeding already. All have been recorded from the state on numerous occasions; those marked by (+) are known to occur in summer in the state to an extent and probably are nesting, but conclusive evidence is lacking.

Accipiter gentilis – Northern Goshawk
M: extensive forests, mainly at high elevations; MD, WV, VA; a few summer records for the NC mountains

Ammodramus caudacutus – Saltmarsh Sparrow
T: salt or brackish marshes; VA; some references list NC in the breeding range - this is erroneous; there have been a few summer reports, but some may be erroneous or of late migrating individuals

Asio flammeus – Short-eared Owl
T: extensive brackish marshes; MD, VA formerly, and might still nest there; several summer records for the NC coastal marshes, and might have nested once in 2001

BIRDS continued

Asio otus – Long-eared Owl
M: conifers or mixed woods at high elevations in northern mountains; VA; one or two summer reports from the NC mountains, but without visual confirmation

Cistothorus platensis – Sedge Wren
T: brackish marshes; VA (northern portion of Chesapeake Bay); several summer records from NC, mainly in brackish marshes, but these might be of wandering birds or migrants

Contopus cooperi – Olive-sided Flycatcher +
M: [breeding records for TN side of Great Smoky Mountains NP]; no active nest has been found in NC

Empidonax flaviventris – Yellow-bellied Flycatcher
M: high elevation spruce-fir, usually where stunted or young; VA (Mt. Rogers); two summer reports from NC mountains

Geothlypis philadelphia – Mourning Warbler
M: thickets, brushy places, clearings; VA; several males singing on territory have been found in the higher mountains since the mid-1980s, but no strong evidence of nesting has been found in NC

Haemorhous purpureus – Purple Finch
M: spruce-fir forests; VA (Mt. Rogers); one or two summer records for the NC mountains

Melospiza georgiana – Swamp Sparrow
M: bogs at high elevation; VA; no summer reports for NC

Oreothlypis ruficapilla – Nashville Warbler
M: spruce-fir forests, mainly along margins or in young or stunted trees; VA, but also a report from Mt. Rogers; one summer report for NC

Parkesia noveboracensis – Northern Waterthrush
M: bogs where spruce-fir is present; VA, plus two reports from Mt. Rogers; no summer reports NC

REPTILES

Apalone mutica – Smooth Softshell
M: large rivers in the Tennessee drainage; TN

Graptemys pseudogeographica -- False Map Turtle
M: large rivers in the Tennessee drainage; TN

Opheodrys vernalis – Smooth Green Snake
MP: meadows, grassy marshes and fields; VA

AMPHIBIANS

Ambystoma jeffersonianum – Jefferson Salamander
M: low woods, bottomlands; VA

Desmognathus planiceps – Virginia Dusky Salamander
P: springs, seeps, streams; VA

Desmognathus welteri – Black Mountain Salamander
M: along streams in mesic forests; TN

Eurycea bislineata – Northern Two-lined Salamander
MP: springs, seeps, streams; VA; reported from the northern Piedmont of NC, but with no documentation yet available

AMPHIBIANS continued

Eurycea lucifuga – Cave Salamander
M: limestone caves and ledges; TN, VA
Gyrinophilus palleucus – Tennessee Cave Salamander
M: caves, in limestone areas; TN
Plethodon websteri – Webster's Salamander
P: moist forests with steep north-facing slopes; SC
Pseudobranchus striatus – Dwarf Siren
C: swamps, ponds, other sluggish freshwater habitats; SC
Urspelerpes brucei – Patch-nosed Salamander
M: margins of seeps or streams in rich forests; SC, GA

FRESHWATER FISHES

Many fish species are found just beyond the border of North Carolina but have not been found within the state despite significant survey efforts. Higher stream gradients near the northern and western borders partly explain this phenomenon. Reservoirs along the borders have also eliminated riverine habitat and impede migration. Rather than list the many common species that are found in counties adjacent to North Carolina, here we are listing those which, if found, would be included in the Rare Animal List.

Etheostoma cinereum – Ashy Darter
M: Tennessee drainages; TN
Etheostoma hopkinsi – Christmas Darter
M: Savannah drainage; SC
Hemitremia flammea – Flame Chub
M: Tennessee drainages; TN
Notropis ariommus – Popeye Shiner
M: Tennessee drainages; TN
Noturus baileyi – Smoky Madtom
M: Tennessee drainages; TN

INSECTS -- BUTTERFLIES

There are numerous butterfly species which presently known range extends south in the mountains only to Virginia. Some of these might occur in the northern mountain counties of North Carolina, particularly those not restricted to habitats rare or absent in the state (e.g., shale barrens or limestone outcrops).

Amblyscirtes belli – Bell's Roadside-Skipper
MP: wooded edges and openings, wooded creeks; host plant – wild oats (*Chasmanthium latifolium*); SC (Oconee and Pickens counties)
Boloria selene – Silver-bordered Fritillary
M: wet meadows, bogs, marshes; host plant – violets (*Viola*) and other species; VA
Brephidium isophthalma – Eastern Pygmy-Blue
T: tidal flats and marshes; host plant – glassworts (*Salicornia*), possibly saltwort (*Batis maritima*); SC

INSECTS – BUTTERFLIES continued

Calephelis borealis – Northern Metalmark

M: rocky areas near shale, serpentine, or limestone, usually near streams; host plant – round-leaved ragwort (*Senecio obovatus*), possibly fleabanes (*Erigeron*); VA

Callophrys polios – Hoary Elfin

M: sunny, dry slopes and other barren or rocky habitats; host plant – mainly bearberry (*Arctostaphylos uva-ursi*) [not in NC], possibly trailing-arbutus (*Epigaea repens*); VA

Chlosyne harrisii – Harris' Checkerspot

M: marshes, damp meadows, and other wet brushy places; host plant – flat-topped white aster (*Doellingeria umbellata*); WV.

Colias interior – Pink-edged Sulphur

M: high elevation areas with acidic soils, such as wood margins, openings, and heath balds; host plant – blueberries (*Vaccinium*); VA

Erynnis lucilius – Columbine Duskywing

M: rocky woods, ravines, and wooded edges; host plant – wild columbine (*Aquilegia canadensis*); VA; reported from NC in early 2000s, but report retracted, likely an identification error

Erynnis persius – Persius Duskywing

M: openings in cool forests, fields or bogs near woods; host plant – lupine (*Lupinus perennis*); VA

Euphyes conspicuus – Black Dash

CM: marshes, wet meadows, but rarely in bogs; host plant – sedges, mainly *Carex stricta*; VA

Speyeria atlantis – Atlantis Fritillary

M: cool, open woods, wooded streams, clearings; host plant – violets (*Viola*); VA

SIGNIFICANT 2018 REVISIONS TO THE ANIMAL LIST

Animal Taxa with Upgraded State Status (Increased Concern)

SCIENTIFIC NAME	COMMON NAME	PREVIOUS STATUS	NEW STATUS
MAMMALS			
Canis rufus	Red Wolf	SR	T
Myotis septentrionalis	Northern Long-eared Bat	SR	T
BIRDS			
Calidris canutus rufa	Red Knot	W1	T
Hydroprogne caspia	Caspian Tern	SR	T
Mergus merganser	Common Merganser	--	W3
Sterna hirundo	Common Tern	SC	E
Ammodramus henslowii	Henslow's Sparrow	SC	E
Tyto alba	Barn Owl	SR	SC
REPTILES			
Clemmys guttata	Spotted Turtle	--	W1
Deirochelys reticularia reticularia	Chicken Turtle	SR	SC
Heterodon simus	Southern Hog-nosed Snake	SC	T
Pituophis melanoleucus	Eastern Pinesnake	SC	T
Seminatrix pygaea paludis	Carolina Swamp Snake	SR	SC
AMPHIBIANS			
Desmognatus folkertsi	Dwarf Black-bellied Salamander	SR	SC
Pseudacris brimleyi	Brimley's Chorus Frog	--	W5
Pseudacris ornata	Ornate Chorus Frog	SR	E
Rana capito	Carolina Gopher Frog	T	E
Rana heckscheri	River Frog	SC	E
Stereochilus marginatus	Many-lined Salamander	--	W5
FRESHWATER FISHES			
Ichthyomyzon bdellium	Ohio Lamprey	SR	SC
Notropis volucellus	Mimic Shiner	SR	T
Percina oxyrhynchus	Sharpnose Darter	SC	E
MOLLUSKS-FRESHWATER BIVALVES			
Fusconaia subrotunda	Longsolid	SR	E
Lioplax subcarinata	Ridged Lioplax	W3	SC
Villosa constricta	Notched Rainbow	SC	T
Villosa iris	Rainbow	SC	T
INSECTS - GRASSHOPPERS AND KATYDIDS			
Melanoplus nossi	Noss' Spur-throat Grasshopper	--	SR
INSECTS - MAYFLIES			
Epeorus punctatus	Dotted Flatheaded Mayfly	--	SR
Heterocloeon berneri	Berner's Two-winged Mayfly	--	SR
Neoephemera eatoni	a mayfly	--	SR
INSECTS - STONEFLIES			
Nemocapnia carolina	Southern Snowfly	--	SR
Remenus daniellae	Danielle's Stripetail	--	SR
Remenus duffieldi	Georgia Springfly	--	SR
Remenus kirchneri	Blueridge Springfly	--	SR
INSECTS - CADDISFLIES			
Neophylax virginica	a Uenoid casemaker	--	W3

INSECTS: BUTTERFLIES			
Hesperia metea	Cobweb Skipper	W2	SR
INSECTS: MOTHS			
Aplectoides condita	a Noctuid moth	--	SR
Catocala abbreviatella	Abbreviated Underwing Moth	--	W3
Catocala myristica	Nutmeg Underwing	--	SR
Dysstroma hersilata	Orange-barred Carpet Moth	--	SR
Euxoa campestris	a dart moth	--	SR
Euxoa violaris	Violet Dart	W3	SR
Lacanobia grandis	Grand Arches Moth	--	SR
Nemoria rubrifrontairia	Red-Fronted Emerald	--	W3
Polychrysia morigera	a looper moth	--	SR
Speranza subcessaria	Barred Angle	W3	SR
Schinia indiana	Phlox Moth	--	W3
INSECTS: BEETLES			
Stenelmis hollandi	a riffle beetle	--	SR

Animal Taxa with Downgraded State Status (Decreased Concern)

SCIENTIFIC NAME	COMMON NAME	PREVIOUS STATUS	NEW STATUS
MAMMALS			
Cervus elaphus	Elk	SC	delisted
Dasypus novemcinctus	Nine-banded Armadillo	W3	delisted
Sorex dispar blitchi	Southern Rock Shrew	SC	SR
Sorex palustris punctulatus	Southern Water Shrew	SC	SR
Sorex sp. 1	an undescribed shrew	SR	W3
BIRDS			
Accipter gentilis	Northern Goshawk	W3	delisted
Asio otus	Long-eared Owl	W3	delisted
Contopus cooperi	Olive-sided Flycatcher	SC	W3
Mycteria americana	Woodstork	E	T
Sphyrapicus varius	Yellow-bellied Sapsucker	SC	SR
REPTILES			
Opheodrys vernalis	Smooth Greensnake	W4	delisted
FRESHWATER FISHES			
Cottus carolinae	Banded Sculpin	SC	SR
Etheostoma podostemone	Riverweed Darter	SC	SR
Fundulus chrysotus	Golden Topminnow	SR	W2
Lethenteron appendix	American Brook Lamprey	T	SC
Percina nigrofasciata	Blackbanded Darter	T	SC
MOLLUSKS – FRESHWATER BIVALVES			
Elliptio roanokensis	Roanoke Slabshell	T	SC
Leptoxis dilatata	Seep Mudalia	T	SC
INSECTS - DRAGONFLIES AND DAMSELFLIES			
Epitheca spinosa	Robust Baskettail	W3	delisted
Hylogomphus abbreviatus	Spine-crowned Clubtail	SR	W2
Lestes vidua	Carolina Spreadwing	SR	W2

INSECTS - DRAGONFLIES AND DAMSELFLIES continued			
Ophiogomphus mainensis	Maine Snaketail	SR	W2
INSECTS - MOTHS			
Feltia manifesta	Adobe Dart	SR	W2
Lithophane laceyi	a pinion moth	SR	W3
Ptichodis bistrigata	Southern Ptichodis	SR	W2
INSECTS-GRASSHOPPERS AND KAYTDIDS			
Melanoplus angustipennis	Narrow-winged Spur-throat	SR	W3
Melanoplus impudicus	Immodest Spur-throat	SR	W3
Melanoplus sp. 6	a spur-throat grasshopper	W3	delisted
Melanoplus sp. 35	a spur-throat grasshopper	W3	delisted
Melanoplus sylvestris	a spur-throat grasshopper	SR	W3
Mermiria intertexta	Intertexta Mermiria	SR	W3
Scudderia septentrionalis	Northern Bush Katydid	SR	W3

U.S. Status Changes
(between December 1, 2016 and October 31, 2018)

SCIENTIFIC NAME	COMMON NAME	PREVIOUS STATUS	NEW STATUS
BIRDS			
Laterallus jamaicensis	Black Rail	--	PT
MOLLUSKS – FRESHWATER BIVALVES			
Elliptio lanceolata	Yellow Lance	--	T
Fusconaia masoni	Atlantic Pigtoe	--	PT
INSECTS - BEES			
Bombus affinis	Rusty Patched Bumble Bee	--	E

Scientific Name Changes

PREVIOUS NAME	NEW NAME
BIRDS	
Circus cyaneus	*Circus hudsonius*
REPTILES	
Micrurus fulvius	*Micrurus fulvius fulvius*
Liodytes pygaea	*Seminatrix pygaea paludis**
AMPHIBIANS	
Rana capito capito	*Rana capito*
FRESHWATER FISHES	
Acipenser oxyrinchus	*Acipenser oxyrinchus*
MOLLUSKS - TERRESTRIAL GASTROPODS	
Fumonelix clingmanica	*Fumonelix wheatleyi clingmanicus**
Pilsbryna vanattai	*Glyphyalinia vanattai**
MAYFLIES	
Neoephemera youngi	*Neoephemera eatoni*
CADDISFLIES	
Matrioptila jeanae	*Padunia jeanae*

DRAGONFLIES AND DAMSELFLIES	
Gomphus abbreviataus	*Hylogomphus abbreviataus*
Gomphus adelphus	*Hylogomphus adelphus*
Gomphus apomyius	*Hylogomphus apomyius*
Gomphus australis	*Phanogomphus australis*
Gomphus borealis	*Phanogomphus borealis*
Gomphus cavillaris	*Phanogomphus cavillaris*
Gomphus consanguis	*Stenogomphurus consanguis*
Gomphus descriptus	*Phanogomphus descriptus*
Gomphus dilatatus	*Gomphurus dilatatus*
Gomphus diminutus	*Phanogomphus diminutus*
Gomphus hybridus	*Gomphurus hybridus*
Gomphus fraternus	*Gomphurus fraternus*
Gomphus lineatifrons	*Gomphurus lineatifrons*
Gomphus parvidens	*Hylogomphus parvidens*
Gomphus quadricolor	*Phanogomphus quadricolor*
Gomphus rogersi	*Stenogomphurus rogersi*
Gomphus septima	*Gomphurus septima*
Gomphus ventricosus	*Gomphurus ventricosus*
Gomphus viridifrons	*Hylogomphus viridifrons*
MOTHS	
Papaipema birdi	*Papaipema insulidens*
Xestia n. sp. nr. youngii	*Xestia youngii*

* For these taxa, the scientific names in the Rare Animal list have been changed to conform to the species name used in regulation by the NC Wildlife Resources Commission or the US Fish and Wildlife Service although the NC Natural Heritage Program is aware that other names are more current and broadly accepted by the scientific community.

Historical Rank Changes

Only those changes involving taxa formerly or presently considered extinct, extirpated, or of historical occurrence are listed below.

SCIENTIFIC NAME	COMMON NAME	PREVIOUS S-RANK	NEW S-RANK
INSECTS - MOTHS			
Catocala dulciola	Sweet Underwing	SH	S2S3
Hemaris gracilis	Slender Clearwing	SH	S1S2
INSECTS – GRASSHOPPERS AND KATYDIDS			
Melanoplus angustipennis	Narrow-winged Spur-throat Grasshopper	SH	S2S3
INSECTS - BEES			
Bombus affinis	Rusty-patched Bumble Bee	SH	S1

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NORTH CAROLINA
Natural
Heritage
Program
SCIENCE GUIDING CONSERVATION

NC DEPARTMENT
OF NATURAL AND
CULTURAL RESOURCES

Enclosure 6. Protection Plant Species of North Carolina

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Natural Heritage Program

List of Rare Plant Species of North Carolina

2018

Revised October 19, 2018

Compiled by
Laura Gadd Robinson, Botanist

North Carolina Natural Heritage Program
N.C. Department of Natural and Cultural Resources
Raleigh, NC 27699-1601

www.ncnhp.org

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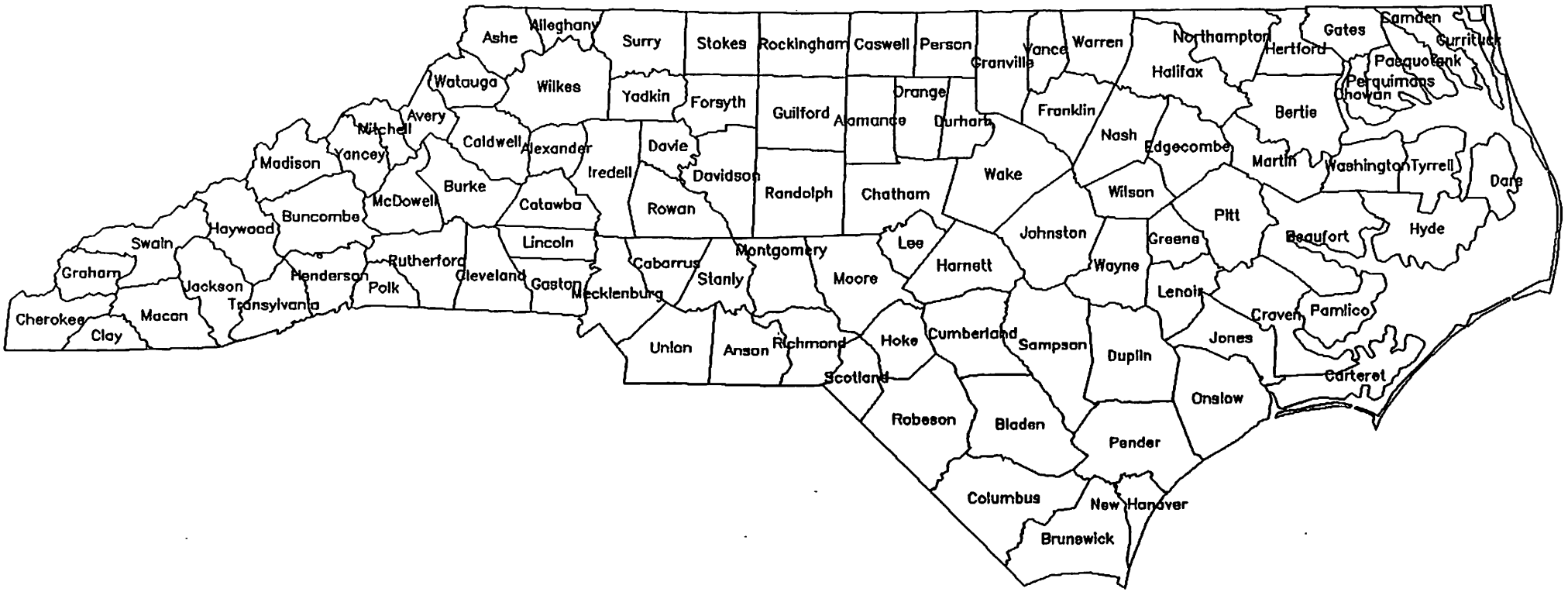
STATE OF NORTH CAROLINA



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Natural Heritage Program

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2018

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N.C. Department of Natural and Cultural Resources
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This list is dynamic and is revised frequently as new data become available. New species are added to the list, and others are dropped from the list as appropriate. The list is published every two years. Further information may be obtained by contacting the North Carolina Natural Heritage Program, Department of Natural and Cultural Resources, 1651 MSC, Raleigh, NC 27699-1651; by contacting the North Carolina Wildlife Resources Commission, 1701 MSC, Raleigh, NC 27699-1701; or by contacting the North Carolina Plant Conservation Program, Department of Agriculture and Consumer Services, 1060 MSC, Raleigh, NC 27699-1060. Additional information on rare species, as well as a digital version of this list, can be obtained from the Natural Heritage Program's website at www.ncnhp.org.

Cover Photo of *Allium keeverae* (Keever's Onion) by David Campbell.

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INTRODUCTION

The North Carolina Natural Heritage Program (NCNHP) conducts and maintains an inventory of known locations of rare animals and plants in the state as part of its mission to support conservation of natural areas. The primary functions of this inventory list are its use 1) in determining priorities for protection of the state's most important natural areas and the plants and animals contained therein, 2) in determining priorities for inventory, and 3) by public agencies and private persons for environmental assessment and land management planning.

The NCNHP is charged under the Nature Preserves Act (G.S. 143B-135.250 to 143B-135.272) with compiling and maintaining information relevant to the protection of North Carolina's most important natural areas. NCNHP takes the lead role in North Carolina in the inventory of the state's natural diversity and the identification of important natural areas and rare species habitats. The list incorporates the most recent federal status designations determined by the U.S. Fish and Wildlife Service (USFWS) for all animal and plant taxa native to North Carolina. Prior to 2018, NCNHP included Federal Species of Concern (FSC) as a federal status. The FSC list was collectively maintained by the North Carolina offices of the USFWS, but FSC is not an official federal status. Under the guidance of the USFWS Region 4 office, the Raleigh Ecological Services office has revised their focus toward At-Risk Species and as such the NCNHP will no longer report FSC as a federal status. The At-Risk Species list is a dynamic list which includes species proposed for listing under the ESA, Candidate species, and species that have been petitioned for listing. For more information, please refer to the At-Risk Species Finder at https://www.fws.gov/southeast/finder/#/species/list.

This list also includes North Carolina legal status information from the N.C. Plant Conservation Program (NCPCP), a unit of the Department of Agriculture and Consumer Services and the agency responsible for the listing and protection of North Carolina's endangered and threatened plants, under provisions of the North Carolina Plant Protection and Conservation Act (N.C. General Statutes - Chapter 106 Article 19B). The NCPCP *List of North Carolina's Endangered, Threatened and Special Concern Plant Species* can be found on the website: http://www.ncagr.gov/plantindustry/plant/plantconserve/. The North Carolina Wildlife Resources Commission (NCWRC) is responsible for the listing and protection of the state's nongame species of mammals, birds, reptiles, amphibians, freshwater fishes, mollusks, and crustaceans, under N.C. General Statutes - Chapter 113 Article 25. The NCNHP, NCPCP, NCWRC, and USFWS work cooperatively to ensure the continued survival of all of North Carolina's rich flora and fauna. Over the past 25 years and continuing in the future, the advice and protection designations (for example, Endangered, Threatened, and Special Concern) of scientific councils and committees have been considered in the creation of the list.

Many species that lack formal legal protection are nonetheless imperiled in North Carolina. Therefore, NCNHP collects data on these species in addition to those classified under the three protection designations above and places them in two categories: Significantly Rare (SR) and Watch List (W). These species receive no special legal protection; rather, the designation is used to convey information about the species' rarity within the state. The tracking of SR species, along with Endangered, Threatened, and Special Concern species, plays a critical role in how NCNHP evaluates natural areas for their importance in conservation of the state's native biodiversity. These status categories are defined in this list under "N.C. Status."

NCNHP requests locality and population data on the species listed in this publication. For the most current information about the range of tracked species in North Carolina, visit www.ncnhp.org. Information, including maps and datasets, on animals, plants, and communities nationwide may be found on NatureServe Explorer (www.natureserve.org/).

NUMBER OF PLANT TAXA IN NORTH CAROLINA

Numbers in the table indicate number of taxa – generally species as well as valid unique varieties and subspecies – for each group and status. Because many taxa have both an N.C. and a U.S. status, totals cannot be added across a complete line. The total number of species in North Carolina is an estimate of the species that do occur or have occurred at one time in the state.

GROUP	APPROXIMATE NUMBER IN NORTH CAROLINA	N.C. STATUS				U.S. STATUS		
		E	T	SC	SR	E	T	C
Vascular Plants	4,351	157	141	111	290	17	10	1
Mosses	440	0	1	1	121	0	0	0
Liverworts	225	0	0	5	53	0	0	0
Hornworts	9	0	0	0	1	0	0	0
Lichens	977	1	1	2	18	1	0	0
Totals	6,002	158	143	119	483	18	10	1

LIST FORMAT

Species are grouped by major taxa. Plants are placed in five groups: Vascular Plants, Mosses, Liverworts, Hornworts, and Lichens. Within a given taxon, species are listed alphabetically by scientific name. The following information is presented for each species on the list; "status" indicates the degree of legal recognition (if any); "rank" is a numerical scale of the rarity of a species, regardless of legal protection.

Scientific Name. Taxonomy and nomenclature of vascular plants (dicots, monocots, gymnosperms, ferns, and fern allies) generally follows Weakley, A.S. *Flora of the Southern and Mid-Atlantic States. 2018.* University of North Carolina Herbarium (NCU), N.C. Botanical Garden, University of North Carolina, Chapel Hill, North Carolina (available online at http://www.herbarium.unc.edu/. Scientific authorities for names have been omitted to save space, but follow Weakley (2018 *draft*) and J.T. Kartesz's *A Synonymized Checklist and Atlas with Biological Attributes for the Vascular Flora of the United States, Canada, and Greenland. First Edition.* (In: Kartesz, J.T. and C.A. Meacham. *Synthesis of the North American Flora, Version 1.0.* North Carolina Botanical Garden, Chapel Hill, N.C. 1999).

Taxonomy and nomenclature of nonvascular plants (mosses, liverworts, hornworts, and lichens) follow *Bryophyte Flora of North America*, provisional publication, Missouri Botanical Garden (2001), http://www.mobot.org/plantscience/BFNA/bfnamenu.htm. L.E. Anderson, H.A. Crum, and W.R. Buck's *List of the Mosses of North America North of Mexico* (Bryologist 93: 448-499 [1990]); L.E. Anderson's *A Checklist of Sphagnum in North America North of Mexico* (Bryologist 93: 500-501 [1990]); R. Schuster's *The Hepaticae and Anthocerotae of North America East of the Hundredth Meridian* (1966, 1969, 1974, 1980, and 1992); M.L. Hicks' *Liverworts of the Mountains of North Carolina* (1982); M.L. Hicks' *Guide to the Liverworts of North Carolina* (1992); M.L. Hicks and P.G. Davidson's *Some Rare, Endemic, and Disjunct Liverworts in North Carolina* (Castanea 54: 255-261 [1989]); G.B. Perlmutter's *Lichen Checklist for North Carolina*, Evansia 22[2]: 51-77 [2005]), see http://lichenportal.org/portal/checklists/checklist.php?cl=1187&pid=103); Brodo, Sharnoff, and Sharnoff's *Lichens of North America* (2001); and Esslinger's *Lichen Checklist for North America* (Esslinger, T.A. 2015. *A Cumulative Checklist for the Lichen-forming Lichenicolous and Allied Fungi of the Continental United States and Canada*. first posted 1 December 1997, most recent version [#22] 29 January 2018) https://www.ndsu.edu/pubweb/~esslinge/chcklst/chcklst7.htm.

EXPLANATION OF STATUS AND RANK CODES

Status Codes

In North Carolina, Endangered, Threatened, and Special Concern species have legally protected status through the North Carolina Plant Conservation Program (NCPCP). The Natural Heritage Program maintains computerized records and GIS map files on Significantly Rare species, as well as species considered extirpated in the state. United States Status is designated by the U.S. Fish and Wildlife Service (USFWS) and the U.S. National Marine Fisheries Service (USNMFS) in accordance with the U.S. Endangered Species Act of 1973 (USESA), as amended. Plants and plant varieties, (including fungi and lichens), animal species and subspecies, and vertebrate populations are considered for Endangered or Threatened status according to the criteria established under the USESA. Proposals and determinations to add taxa or populations to the Lists of Endangered and Threatened Wildlife and Plants are published in the Federal Register. Additionally, the USFWS and the USNMFS periodically publish a Notice of Review or Notice of Reclassification in the Federal Register that presents an updated list of plant and animal taxa that are regarded as candidates or proposed for possible addition to the Lists of Endangered and Threatened Wildlife and Plants. Contact the Asheville or Raleigh Ecological Services Field Offices for more information.

N.C. STATUS – PLANTS

N.C. STATUS CODE	STATUS	DEFINITION
E	Endangered	Any native or once-native species of higher taxon of plant whose continued existence as a viable component of the state's flora is determined to be in jeopardy or any species of plant determined to be an Endangered species pursuant to the Endangered Species Act. (GS19B-106:202.12.)
T	Threatened	Any native or once-native resident species of plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, or one that is designated as a Threatened species pursuant to the Endangered Species Act. (GS19B-106:202.12.)
SC-V	Special Concern-Vulnerable	Any species or higher taxon of plant which is likely to become a threatened species within the foreseeable future. (NCAC 02 NCAC 48F .0401.)
SC-H	Special Concern-Historical	Any species or higher taxon of plant that occurred in North Carolina at one time, but for which all known populations are currently considered to be either historical or extirpated. (NCAC 02 NCAC 48F .0401)
SR	Significantly Rare	This is a NCNHP designation. Any species which has not been listed by the NCPCP as an Endangered, Threatened, or Special Concern species, but which exists in the state (or recently occurred in the state) in small numbers (generally fewer than 100 statewide populations) and has been determined by the NCNHP to need monitoring. Significantly Rare species include species of historical occurrence with some likelihood of rediscovery in the state and species substantially reduced in numbers by habitat destruction, direct exploitation, or disease. Species considered extirpated in the state, with little likelihood of rediscovery, are given no N.C. status

N.C. STATUS CODE	STATUS	DEFINITION
		listed by the NCWRC or NCPCP as E, T, or SC).
SR-L	Significantly Rare-Limited	The range of the species is **limited** to North Carolina and adjacent states (endemic or near endemic). These are species that may have 20-50 populations in North Carolina, but fewer than 100 populations range-wide. The preponderance of their distribution is in North Carolina and their fate depends largely on conservation here.
SR-T	Significantly Rare-Throughout	The species is rare **throughout** its range (fewer than 100 populations total).
SR-D	Significantly Rare-Disjunct	The species is **disjunct** to North Carolina from a main range in a different part of the country or world.
SR-P	Significantly Rare-Peripheral	The species is at the **periphery** of its range in North Carolina. These species are generally more common somewhere else in their ranges, occurring in North Carolina peripherally to their main ranges, mostly in habitats that are unusual in North Carolina.
SR-O	Significantly Rare-Other	The range of the species is sporadic or cannot be described by the other Significantly Rare categories.
WL	Watch List	This is an NCNHP designation for any other species believed to be rare and of conservation concern in the state but not warranting active monitoring at this time.

U.S. STATUS – PLANTS

U.S. STATUS CODE	STATUS	DEFINITION
E	Endangered	A taxon that is in danger of extinction throughout all or a significant portion of its range (Public Law 93-205 87 Stat. 884).
T	Threatened	A taxon that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (Public Law 93-205 87 Stat. 884).
C	Candidate	Taxa for which the USFWS has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened. Proposed rules have not yet been issued because this action is precluded at present by other listing activity. Development and publication of proposed rules on these taxa are anticipated. The USFWS encourages state and other federal agencies as well as other affected parties to give consideration to these taxa in environmental planning [Federal Register, 5 December 1996 Volume 61(235):64481]. Taxa formerly considered "Category 1" are now considered "Candidate."

Ranking System

Natural Heritage Programs and the NatureServe Network have developed a consistent method for evaluating the relative imperilment of both species and ecological communities. These assessments led to the designation of a conservation rank. These ranks provide an estimate of extinction risk. Conservation rank values have been assigned over the past 30 years by the NCNHP, NatureServe, and a large number of collaborators in government agencies, universities, natural history museums, botanical gardens, and other conservation organizations. This information has been developed primarily to help in guiding conservation and informing environmental planning and management.

Conservation ranks are either state (S) or global (G) and are based on a one-to-five scale, ranging from critically imperiled (S1 or G1) to demonstrably secure (S5 or G5). These assessments are based on the best available information, considering a variety of factors such as abundance, distribution, population trends, and threats. Global ranks apply to the species throughout its range. The system is widely used by nationwide agencies and organizations, as the best available scientific and objective assessment of a species' imperilment throughout its range.

A rank involving two numbers indicates uncertainty. For example, an S2S3 or a G2G3 rank indicates that the species may be S2 or S3 (or G2 or G3), but that existing data do not allow that determination to be made.

N.C. RANK – PLANTS

N.C. RANK	NUMBER OF EXTANT POPULATIONS	DESIGNATION	DESCRIPTION
S1	1-5	Critically Imperiled	Critically imperiled due to extreme rarity or some factor(s) making it especially vulnerable to extirpation (local extinction) from the state. Typically 5 or fewer occurrences or very few remaining individuals (<1,000).
S2	6-20	Imperiled	Imperiled due to rarity or some factor(s) making it very vulnerable to extirpation from the state. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000).
S3	21-100	Vulnerable	Vulnerable to extinction either because rare or uncommon, found only in a restricted range (even if abundant at some locations), or due to other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 to 10,000 individuals.
S4	101-1,000	Apparently Secure	Apparently secure and widespread, usually with more than 100 occurrences and more than 10,000 individuals.

N.C. RANK	NUMBER OF EXTANT POPULATIONS	DESIGNATION	DESCRIPTION
S5	1,001+	Secure	Common, widespread, and abundant. Essentially ineradicable under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
SH	0?	Historical	Of historical occurrence, with some expectation that it may be rediscovered. Its presence may not have been verified in the past 20 years. Upon verification of an extant occurrence, SH-ranked elements would typically receive an S1 rank. Note: an element is not automatically assigned an SH (or SX) rank if it has not been verified in the past 20 years; some effort must have been made to locate or relocate occurrences.
SX	0	Presumed Extirpated	Believed to be extirpated. Has not been located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SU	Unknown	Unrankable	Currently unrankable due to lack of information or substantially conflicting information about status or trends. More information is needed.
SNR	Unknown	Not Ranked	Statewide rank not yet assessed.
SNA	N/A	Not Applicable	A conservation rank is not applicable because the element is not a suitable target for conservation for one of these reasons: • Hybrid – an interspecific hybrid without conservation value; • Exotic Origin – not native to North Carolina; • Accidental/Nonregular – outside usual range and not regularly found in North Carolina; • Not Confidently Present – never documented as present in NC; • Synonym – the taxon is not recognized by the NCNHP.
S_?	---	Uncertain	Denotes inexact or uncertain numeric rank.

GLOBAL STATUS - PLANTS

GLOBAL RANK	NUMBER OF EXTANT POPULATIONS	DESIGNATION	DESCRIPTION
G1	1-5	Critically Imperiled	Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically five or fewer occurrences or very few remaining individuals (<1,000) or acres (<2,000) or linear miles (<10).
G2	6-20	Imperiled	Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000) or acres (2,000 to 10,000) or linear miles (10 to 50).
G3	21-100	Vulnerable	Vulnerable globally either because very rare throughout its range, found only in a restricted range (even if abundant at some locations), or other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
G4	101-1,000	Apparently Secure	Uncommon but not rare (although it may be rare in parts of its range, particularly on the periphery) and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern. Typically more than 100 occurrences and more than 10,000
G5	1,001+	Secure	Common, widespread, and abundant (although it may be rare in parts of its range, particularly on the periphery). Not vulnerable in most of its range. Typically with considerably more than 100 occurrences and more than 10,000 individuals.
GH	0?	Historical	Known only from historical occurrences, but with some expectation that it may be rediscovered. May still be extant; further searching is needed.
GX	0	Presumed Extinct	Believed to be extinct throughout its range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered. Not located despite intensive searches of historical sites and other appropriate habitat.
GU	Unknown	Unrankable	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends; need more information.
GNR	Unknown	Not Ranked	Global rank not yet assessed.
G_T_	---	Subspecies or Variety Rank	The rank of a taxonomic subspecies or variety. As an example, G4T1 would apply to a subspecies of a species with an overall rank of G4, but the subspecies warranting a rank of G1.
G_?	---	Uncertain	Denotes inexact or uncertain numeric rank.

GLOBAL RANK	NUMBER OF EXTANT POPULATIONS	DESIGNATION	DESCRIPTION
G_Q	---	Questionable Taxonomy	Taxonomic classification that may reduce conservation priority. Distinctiveness of this entity as a taxon at the current level is questionable. Resolution of this uncertainty may result in change from a species to a subspecies or inclusion of this taxon in another taxon, with the resulting element having a lower-priority conservation status rank.

Physiographic Province/Region. The provinces/regions in which the species is known to occur are indicated. This should not be regarded as the only province(s) or regions(s) of the state in which the species could occur; our knowledge of the flora of North Carolina is still very imperfect. The provinces are abbreviated as follows:

ABBREVIATION	PROVINCE/REGION	DESCRIPTION
M	Mountains (Blue Ridge)	All parts of North Carolina west of the foot of the Blue Ridge Escarpment.
P	Piedmont	All parts of North Carolina east of the foot of the Blue Ridge Escarpment and west of the Fall Line, including outlying "foothill" ranges, such as the Brushy, Uwharrie, Sauratown, and South mountains. This province is shallowly underlain by crystalline metamorphic, igneous, or (rarely) consolidated sedimentary rocks.
S	Sandhills	Portions of Cumberland, Harnett, Hoke, Lee, Moore, Richmond, Scotland, and Montgomery counties consisting mostly of deep aeolian sands of the Middendorf and Pinehurst formations (Cretaceous to Tertiary age). The Sandhills are really part of the coastal plain but are here distinguished because of their distinctive geomorphology and vegetation. Areas somewhat resembling the Sandhills region but occurring in other parts of the state (such as Carolina bay rims and aeolian or beach ridge deposits in the outer Coastal Plain) are considered part of the Coastal Plain Province.
C	Coastal Plain	All parts of North Carolina east of the Fall Line, but excluding the Sandhills region and Tidewater. Generally consisting of unconsolidated sands, silts, clays, and peats, though rarely shallowly underlain by consolidated coquina limestone ("marl").
T	Tidewater	Areas associated with tidal water, such as the ocean and barrier islands, sounds, estuaries, and mainland brackish or salt marshes.

Habitat. The known habitats are described; as with provinces, these should not be regarded as the only possible habitats of the species in the state.

Counties of Known Occurrence. Following the description of habitats is a listing of the known counties of occurrence in the NCNHP database. We request information about any new occurrences in the state. County names are followed by symbols (defined below) if the species has not been recently verified within the county.

*	All recorded occurrences in the county are either extirpated, have not been found in recent surveys, or have not been surveyed recently enough to be confident they are still present. Unsurveyed occurrences are regarded as historical after 20-40 years, the number of years depending on the species and the amount of habitat alteration in the area. An asterisk should not be regarded as a definitive statement that the species is gone from the county but indicates that its continued existence is uncertain.
+	Counties with obscure or undatable records.
?	There is some question as to the validity of the county report.

The botanical exploration of North Carolina is far from complete, and many additional county records will be found, generally (but not always) in proximity to counties listed. Most species that do not have county of occurrence information are new to the Rare List and county status information had not been compiled at the time of publication. Visit the Natural Heritage Program website for the most up-to-date county occurrence information: www.ncnhp.org.

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C.	 Global

NORTH CAROLINA PLANT RARE LIST

Vascular Plants

Acmella repens **SR-D** **S1** **G5T5**

Creeping Spotflower

CP: low wet areas and floating mats in alluvial forests and swamps (Columbus, Robeson, Wake)

Acmispon helleri **SC-V** **S3** **G5T3**

Carolina Birdfoot-trefoil

P: open woods over clay soils, roadsides (Cabarrus, Caswell, Catawba*, Davidson, Davie*, Granville, Iredell*, Mecklenburg, Moore, Person, Randolph, Rockingham, Rowan, Stanly, Union, Wake, Warren*)

Aconitum reclinatum **SR-T** **S3** **G3**

Trailing Wolfsbane

M: rich coves, seepage slopes, boulderfields, rocky stream banks, mainly associated with mafic rocks (Ashe, Avery, Buncombe, Caldwell*, Cherokee, Graham, Haywood, Henderson, Jackson, Macon*, Mitchell, Transylvania*, Watauga, Yancey)

Adiantum capillus-veneris **T** **S1** **G5**

Venus Hair Fern

C: coquina limestone (marl) outcrops, also adventitious on mortar of old stone walls in Wilmington, New Hanover County (Columbus)

Adlumia fungosa **SC-V** **S2** **G4**

Climbing Fumitory

M: coves and cliffs (Alleghany, Buncombe, Graham, Haywood, Henderson, Jackson*, Macon*, Madison, Mitchell, Swain, Yancey)

Aeschynomene virginica **T** **T** **S1** **G2**

Sensitive Jointvetch

TC: freshwater to slightly brackish tidal marshes and wet ditches (Beaufort, Craven, Hyde, Lenoir*)

Agalinis virgata **T** **S2** **G3G4Q**

Branched Gerardia

CS: savannas and depression pond shores (Brunswick, Carteret, Craven, Duplin*, New Hanover, Onslow, Pender, Scotland)

Agastache nepetoides **SR-P** **S1** **G5**

Yellow Giant-hyssop

P: oak–hickory forests, especially over mafic rocks (Buncombe, Caswell, Durham, Granville, Madison*, Moore, Orange, Polk, Stokes*, Surry*, Transylvania*, Wake*, Warren*)

Agrostis altissima **SR-T** **S2** **G4**

Tall Bentgrass

C: wet savannas (Brunswick, Carteret, Onslow, Pender)

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C.	Rank Global
Agrostis mertensii	**E**		**S1**	**G5**
Arctic Bentgrass				
M: high elevation rocky summits and balds (Avery, Mitchell*, Yancey)				
Aletris lutea	**SR-P**		**S1**	**G4G5**
Yellow Colic-root				
C: pine savannas (Pender)				
Allium allegheniense	**SR-T**		**S1**	**G3?**
Allegheny Onion				
M: rock outcrops and woodlands over mafic rock at moderate to high elevations (Ashe, Caldwell)				
Allium keeverae	**T**		**S2**	**G2**
Keever's Onion				
P: thin soils around rock outcrops, receiving nutrient-rich seepage (Alexander, Wilkes)				
Allium sp. 1	**SR-L**		**S1S2**	**G1G2**
Savanna Onion				
C: wet savannas (Brunswick, Onslow, Pender)				
Alnus viridis ssp. crispa	**SC-V**		**S1**	**G5T5**
Green Alder				
M: balds (Avery, McDowell, Mitchell)				
Amaranthus pumilus	**T**	**T**	**S1**	**G2**
Seabeach Amaranth				
T: ocean beaches and island-end flats (Brunswick, Carteret, Currituck, Dare, Hyde*, New Hanover, Onslow, Pender)				
Amorpha confusa	**T**		**S3**	**G3T3**
Savanna Indigo-bush				
C: wet savannas (Bladen*, Brunswick, Columbus, New Hanover*)				
Amorpha georgiana	**E**		**S2**	**G3T2**
Georgia Indigo-bush				
CS: mesic to moist terraces along blackwater streams and ecotones between pocosins and savannas (Cumberland, Harnett, Hoke, Lee, Lenoir*, Moore, Pender, Richmond, Robeson*, Scotland)				
Amphicarpum muhlenbergianum	**E**		**S1**	**G4**
Florida Goober Grass				
C: clay-based Carolina bays (Hoke, Robeson, Scotland)				
Andropogon mohrii	**T**		**S2**	**G4?**
Bog Bluestem				
C: wet savannas (Brunswick, Carteret, Columbus, Craven, Onslow, Pender, Robeson*, Scotland, Washington*)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C.	Rank Global
Anemone berlandieri	**E**		**S2**	**G4?**
Southern Anemone				
P: thin soils around rock outcrops, usually on basic soil (Alexander, Anson, Mecklenburg*, Montgomery, Moore, Orange, Polk*, Randolph, Rowan, Rutherford, Stanly, Union)				
Anemone caroliniana	**E**		**S1**	**G5**
Prairie Anemone				
P: clayey woodlands over mafic rocks (Mecklenburg, Rutherford, Stanly*)				
Anthoxanthum hirtum	**SR-D**		**S1**	**G5**
Holy Grass				
M: bogs (Ashe, Macon, Watauga*)				
Anticlea glauca	**SR-P**		**S1**	**G5T4T5**
White Camas				
M: calcareous rock outcrops (Buncombe*, McDowell, Yancey)				
Arabis patens	**SR-T**		**S1**	**G3**
Spreading Rockcress				
M: thin soils around limestone and nutrient-rich seepage from amphibolite (Madison, Rutherford, Swain)				
Arabis pycnocarpa var. adpressipilis	**E**		**S1**	**G5T4Q**
Hairy Rockcress				
PM: thin soils around basic rock outcrops (Alexander, Buncombe)				
Arenaria lanuginosa var. lanuginosa	**SR-P**		**S1**	**G5T5**
Spreading Sandwort				
TC: maritime grasslands and forests, other sandy sites, shell middens, coquina limestone (marl) outcrops (Beaufort*, Brunswick*, Carteret*, Dare*, Jones, Onslow, Pender*)				
Arethusa bulbosa	**E**		**S1**	**G5**
Bog Rose				
MP: bogs (Alleghany, Ashe*, Avery, Forsyth*, Henderson*, Transylvania)				
Arisaema stewardsonii	**SR-P**		**S2**	**G5T5**
Bog Jack-in-the-pulpit				
M: bogs (Alleghany, Ashe, Avery, Catawba, Henderson, Jackson, Macon, McDowell, Mitchell, Rutherford, Transylvania, Watauga, Yancey)				
Aristida condensata	**T**		**S2**	**G4?**
Big Three-awn Grass				
C: bay rims with xeric pine-oak scrub (Bladen, Hoke*, New Hanover, Pender, Richmond*, Scotland*)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C.	Rank Global
Aristida simpliciflora	**E**		**S1S2**	**G3G4**
Chapman's Three-awn				
C: wet savannas (Brunswick, Columbus, Pender)				
Aristida tenuispica	**SR-P**		**S1**	**G5T5**
Hillsboro Three-awn Grass				
C: xeric sandhill scrub (New Hanover, Pender)				
Arnoglossum ovatum var. lanceolatum	**E**		**S2**	**G4G5TNR**
Savanna Indian-plantain				
C: wet savannas (Bladen*, Brunswick, Columbus, Jones, Onslow, Pender)				
Asarum rosei	**SR-L**		**S1**	**G1?**
Rose's Heartleaf				
(=*Hexastylis* sp. 3) P: moist acid forests under *Rhododendron maximum* (Caldwell)				
Asclepias cinerea	**SR-D**		**SH**	**G4?**
Carolina Milkweed				
C: pine savannas (Columbus*)				
Asclepias pedicellata	**SC-V**		**S3**	**G4**
Savanna Milkweed				
C: dry savannas and moist flatwoods (Bladen, Brunswick, Carteret, Columbus, New Hanover, Onslow, Pender, Sampson)				
Asclepias purpurascens	**SR-T**		**S1?**	**G5?**
Purple Milkweed				
PMC: swamps, bottomlands, edges of moist woods (Bertie*, Burke, Davidson, Durham, Hertford, Johnston, Moore, Pender, Person, Union, Wilkes)				
Asemeia grandiflora	**SR-P**		**S2**	**G5?**
Showy Milkwort				
SC: sandhills (Hoke, Richmond, Robeson, Scotland)				
Asplenium bradleyi	**SR-P**		**S2**	**G4**
Bradley's Spleenwort				
PM: acidic rock outcrops and cliffs (Burke, Cleveland*, Gaston, McDowell, Orange, Polk, Rutherford, Stokes)				
Asplenium heteroresiliens	**E**		**S2**	**G2**
Carolina Spleenwort				
C: coquina limestone outcrops (Bladen, Craven, Jones, Onslow*)				
Asplenium monanthes	**E**		**S1**	**G4**
Single-sorus Spleenwort				
M: outcrops near waterfalls in escarpment gorges (Jackson, Transylvania)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C.	Rank Global
Asplenium pinnatifidum	**SR-P**		**S2**	**G4**
Lobed Spleenwort				
PM: acidic rock outcrops and cliffs (Caldwell*, Henderson, Macon, Madison, Polk, Rutherford, Transylvania, Wilkes)				
Asplenium ruta-muraria var. cryptolepis	**SC-V**		**S1**	**G5T5**
American Wall-rue				
M: limestone outcrops (Burke, Madison, McDowell)				
Astragalus michauxii	**SC-V**		**S3**	**G3**
Sandhills Milk-vetch				
SC: dry to xeric longleaf pine-oak woodlands and river-deposited sandhills (Bladen, Cumberland, Harnett, Hoke, Moore, New Hanover*, Pender, Richmond, Robeson*, Sampson, Scotland)				
Athyrium angustum	**SR-P**		**S1**	**G5T5**
Northern Lady Fern				
M: rock outcrops and forests at high elevations (Avery)				
Baccharis glomeruliflora	**SC-H**		**S1**	**G4**
Silverling				
T: shrubby areas on margins of brackish marshes (Brunswick, New Hanover*, Pender)				
Bacopa caroliniana	**T**		**S1**	**G4G5**
Blue Water-hyssop				
C: Shallow ponds, marshes, natural lakes, and tidal creeks (Bladen, Brunswick, Columbus, New Hanover, Onslow, Pender)				
Bacopa innominata	**SC-H**		**SH**	**G3G5**
Tropical Water-hyssop				
C: tidal freshwater marshes (Chowan*, New Hanover*, Pender*)				
Bacopa rotundifolia	**SR-D**		**S1**	**G5**
Round-leaf Water-hyssop				
C: natural lakes (Hyde*, Pender)				
Balduina atropurpurea	**E**		**S1**	**G2**
Purple Honeycomb-head				
C: savannas (Bladen, Brunswick*)				
Baptisia aberrans	**E**		**S2**	**G5T2**
Prairie Blue Wild Indigo				
P: glades and open forests on basic soils (Cabarrus*, Caswell, Durham, Granville, Montgomery, Orange*, Person*)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C.	Rank Global
Baptisia alba	**T**		**S2**	**G5**
Thick-pod White Wild Indigo				
PCS: open woodlands, clearings (Anson, Cabarrus, Davidson, Johnston, Montgomery, Randolph, Stanly, Union)				
Baptisia bracteata	**SC-H**		**SH**	**G4G5T4?**
Creamy Wild Indigo				
P: open woodlands (McDowell*)				
Berberis canadensis	**SC-V**		**S2**	**G3G4**
American Barberry				
PM: open forests and glades on basic soils (Alamance*, Alexander*, Buncombe*, Catawba, Durham, Granville, Guilford*, Haywood*, Iredell*, Macon, Madison, McDowell, Montgomery, Orange*, Person*, Randolph*, Rockingham, Rutherford, Swain*, Transylvania*)				
Betula cordifolia	**SC-V**		**S1**	**G5T5**
Mountain Paper Birch				
M: high elevation forests and landslide scars (Orange, Yancey)				
Bidens trichosperma	**SR-P**		**S1**	**G5?**
Crowned Beggar-ticks				
CT: brackish marshes (Beaufort*, Chowan*, Craven*, Dare, Tyrrell*)				
Boechera missouriensis	**SC-V**		**S1S2**	**G5**
Missouri Rockcress				
P: thin soils around basic rock outcrops (Anson, Madison, Stanly, Union)				
Boltonia asteroides var. glastifolia	**SR-O**		**S2**	**G5TNR**
White Doll's-daisy				
CS: clay-based Carolina bays, marshes, savannas (Brunswick, Camden*, Columbus, Hoke, New Hanover, Robeson, Scotland)				
Botrychium lanceolatum var. angustisegmentum	**SR-P**		**S1**	**G5T4**
Lance-leaf Moonwort				
MP: cove forests (Burke, Macon, McDowell)				
Botrychium matricariifolium	**SR-P**		**S1**	**G5**
Daisy-leaf Moonwort				
MP: cove forests (Avery, Burke, Haywood, Jackson, Mitchell, Swain, Yancey)				
Botrychium simplex var. simplex	**SR-P**		**S2**	**G5T3T4**
Least Moonwort				
M: open, grassy sites (Haywood, Jackson, Mitchell, Transylvania)				

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Bouteloua curtipendula var. curtipendula	**SR-P**		**S1**	**G5T5**
Sideoats Grama				
M: dry rocky slopes and bluffs (Swain)				
Brachyelytrum aristosum	**SR-P**		**S3**	**G5**
Northern Shorthusk				
M: northern hardwood forests (Ashe, Avery, Buncombe, Caldwell, Clay, Graham, Haywood, Henderson*, Jackson, Macon, Mitchell, Swain, Transylvania, Watauga)				
Bromus ciliatus	**SR-P**		**S1**	**G5**
Fringed Brome				
M: moist areas near high elevation grassy balds (Alexander, Ashe, Buncombe, Haywood, Henderson, Mitchell*, Transylvania, Watauga)				
Bromus latiglumis	**SR-P**		**S1**	**G5**
Riverbank Brome				
M: river floodplains (Alleghany, Ashe, Jackson, Swain)				
Buchnera americana	**E**		**S1**	**G5?**
American Bluehearts				
MPS: glades, open forests, streambanks, probably primarily over mafic or calcareous rocks (Cherokee, Cumberland*, Durham*, Harnett*, Orange*, Polk*, Rowan, Sampson*, Union, Wake*)				
Buckleya distichophylla	**T**		**S2**	**G3**
Piratebush				
M: bluffs, dry slopes, forests on lower slopes (Buncombe, Haywood, Macon, Madison, Mitchell, Swain*)				
Bulbostylis warei	**SC-H**		**SH**	**G3G4**
Ware's Hair Sedge				
T: interdunes, riverine sandhills, and other xeric sand deposits (Brunswick*)				
Calamagrostis cainii	**E**		**S1**	**G1**
Cain's Reedgrass				
M: high elevation rocky summits (Buncombe, Yancey)				
Calamagrostis canadensis var. canadensis	**SR-P**		**S1**	**G5T5**
Canada Reed Grass				
M: bogs and moist areas around high elevation rock outcrops (Alleghany, Ashe, Avery, Haywood*, Macon, Mitchell*, Watauga*)				
Calamagrostis porteri ssp. porteri	**SR-P**		**S2?**	**G4T4**
Porter's Reed Grass				
M: middle elevation ridgetop forests (Cherokee, Clay, Graham, Jackson, Macon, Mitchell, Rutherford, Surry, Transylvania*)				

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Callitriche terrestris	**SR-O**		**S2?**	**G5**
Terrestrial Water-starwort				
CP: low, wet places (Granville, Moore, Richmond, Stanly, Union)				
Calopogon multiflorus	**E**		**S1**	**G2G3**
Many-flower Grass-pink				
C: savannas (Brunswick, Carteret, Onslow, Pender)				
Caltha palustris var. palustris	**E**		**S1**	**G5T5**
Marsh-marigold				
M: boggy sites (Alleghany, Ashe, Avery*, Buncombe*, Madison*, Watauga, Yancey*)				
Camassia scilloides	**T**		**S1**	**G4G5**
Wild Hyacinth				
CP: rich levees, slopes, and bottomlands (Alleghany, Franklin, Northampton, Vance)				
Campanula aparinoides var. aparinoides	**SR-P**		**S2**	**G5TNR**
Marsh Bellflower				
M: bogs and other wet, open sites (Alleghany, Ashe, Avery, Burke, Cherokee, Clay*, Haywood, Henderson, Jackson, Macon, Mitchell*, Transylvania, Wilkes*, Yancey)				
Campanula rotundifolia	**E**		**S1**	**G5**
Bluebells				
M: high elevation rocky summits (Ashe)				
Cardamine clematitis	**SR-T**		**S2S3**	**G3**
Mountain Bittercress				
M: high elevation seeps, shaded outcrops, and streambanks (Avery, Buncombe, Burke, Caldwell, Clay, Graham, Haywood, Jackson, Macon, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Cardamine dissecta	**SC-V**		**S2**	**G4?**
Dissected Toothwort				
PM: rich woods, cove forests, bottomlands (Anson, Davidson, Durham, Guilford*, Mecklenburg, Montgomery, Randolph, Rowan*, Rutherford*, Union)				
Cardamine douglassii	**T**		**S2**	**G5**
Douglass's Bittercress				
P: bottomlands, rich lower slopes (Cumberland, Durham, Granville, Harnett, Hertford*, Northampton, Orange*, Wake)				
Cardamine longii	**SC-V**		**S2**	**G3?**
Long's Bittercress				
C: tidal marshes and tidal cypress-gum forests (Bladen, Columbus, Craven*, New Hanover, Onslow, Pender, Robeson, Washington)				

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Cardamine micranthera	**E**	**E**	**S1**	**G2**
Small-anthered Bittercress				
P: seeps, streamside sandbars, and floodplain depressions (Forsyth*, Stokes)				
Cardamine rotundifolia	**T**		**S2**	**G4**
Mountain Watercress				
MP: seeps, banks of mountain brooks (Alleghany, Ashe, Mitchell, Stokes, Watauga, Yancey)				
Carex amplisquama	**SR-T**		**S2**	**G5T3**
Fort Mountain Sedge				
M: rich woods (Henderson, Polk, Transylvania)				
Carex arctata	**SR-P**		**S1**	**G5**
Black Sedge				
M: northern hardwood and spruce forests, bog edges (Ashe, Watauga)				
Carex argyrantha	**E**		**S1**	**G5**
Hay Sedge				
M: wet meadows (Ashe)				
Carex austrodeflexa	**SR-L**		**S2**	**G3G4**
Canebrake Sedge				
CS: streamhead pocosins and floodplains of small blackwater streams (Brunswick, Harnett, Hoke, Moore, Onslow, Pender, Richmond, Scotland)				
Carex baileyi	**SR-P**		**S2**	**G4**
Bailey's Sedge				
M: bogs and seeps (Alleghany, Ashe, Avery, Haywood, Henderson, Jackson, Mecklenburg*, Transylvania, Watauga)				
Carex barrattii	**SC-H**		**SH**	**G4**
Barratt's Sedge				
MS: seepage slopes (Harnett*, Henderson*)				
Carex basiantha	**SR-D**		**S1**	**G5**
Widow Sedge				
C: mesic forests, bottomlands, and lower slopes, over calcareous rock (Jones, Pender)				
Carex bushii	**SR-P**		**S1**	**G4**
Bush's Sedge				
PM: open wet areas (Ashe*, Cabarrus, Durham*, Gaston*, Granville*, Johnston*, Nash*, Orange, Rowan, Stanly)				
Carex buxbaumii	**SC-V**		**S2**	**G5**
Brown Bog Sedge				
MP: bogs and fens (Alleghany, Ashe, Avery, Forsyth*, Henderson, Watauga, Yancey)				

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Carex calcifugens	**SR-T**		**S2?**	**G3**
Calcium-fleeing Sedge				
C: mesic deciduous forests and maritime woodlands (Brunswick, Carteret, Dare, Onslow)				
Carex canescens var. disjuncta	**SR-P**		**S2**	**G5T5**
Silvery Sedge				
CS: beaver ponds, old millponds, impoundments; usually on *Nyssa biflora* (Dare, Hoke, Hyde, Richmond, Scotland, Tyrrell)				
Carex careyana	**T**		**S1**	**G4G5**
Carey's Sedge				
M: rich cove forests (Jackson)				
Carex cherokeensis	**E**		**S1**	**G4G5**
Cherokee Sedge				
MP: floodplains (Bertie, Cherokee, Macon, Madison, Pender, Polk)				
Carex conoidea	**SC-V**		**S1**	**G5**
Cone-shaped Sedge				
MP: bogs (Alleghany, Ashe, Iredell*)				
Carex cristatella	**SC-H**		**S1**	**G5**
Small-crested Sedge				
M: grassy balds, bogs (Jackson*, Swain*, Yancey)				
Carex crus-corvi	**SR-P**		**S1**	**G5**
Crowfoot Sedge				
C: swamp forests (Bertie, Bladen, Columbus, Craven, Currituck, Durham, Edgecombe*, Halifax, Johnston, Lenoir, Martin, Northampton, Pitt*, Wayne)				
Carex decomposita	**SC-V**		**S2**	**G3G4**
Cypress Knee Sedge				
C: beaver ponds, old millponds; often on Taxodium ascendens trunks and knees (Brunswick, Chowan, Cumberland, Gates, New Hanover*, Richmond, Scotland, Warren*)				
Carex deflexa	**SR-D**		**S1?**	**G5**
A Sedge				
M: high elevation seepy forests				
Carex eburnea	**T**		**S1**	**G5**
Bristle-leaf Sedge				
M: calcareous outcrops (Madison*)				

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Carex emmonsii	**SR-O**		**S2**	**G5T5**
Emmons's Sedge				
CS: moist woods and stream banks (Columbus, Harnett*, Hoke, Johnston*, Jones, Moore, Northampton*, Onslow, Pender, Tyrrell, Washington, Wayne*)				
Carex exilis	**E**		**S2**	**G5**
Coastal Sedge				
S: seepage slopes, wet seepy powerlines (Cumberland, Harnett, Hoke, Moore*)				
Carex hitchcockiana	**SC-V**		**S1**	**G5**
Hitchcock's Sedge				
M: moist to dryish forests over calcareous or mafic rocks (Ashe, Buncombe, Jackson, Macon, McDowell)				
Carex hormathodes	**T**		**S1**	**G4G5**
A Sedge				
C: freshwater and slightly brackish tidal marshes (Currituck)				
Carex impressinervia	**SR-T**		**S2**	**G2**
Ravine Sedge				
CP: rich alluvial forests (Anson, Harnett, Montgomery, Stanly, Union)				
Carex jamesii	**SR-P**		**S2**	**G5**
James's Sedge				
PC: rich woods, especially over mafic rocks (Bertie, Caswell, Cumberland, Durham, Halifax, Harnett, Lee, Martin, Moore, Northampton)				
Carex lasiocarpa var. americana	**SR-P**		**S1**	**G5T5**
Slender Sedge				
M: high elevation fens over amphibolite (Ashe)				
Carex lupuliformis	**SR-P**		**S1**	**G4**
False Hop Sedge				
CP: moist bottomlands, especially in calcareous or mafic areas (Bertie, Brunswick, Craven*, Forsyth*, Jones, Moore, Sampson, Tyrrell)				
Carex lutea	**E**	**E**	**S2**	**G2**
Golden Sedge				
C: ecotones between very wet clay savannas and swamp forests (Onslow, Pender)				
Carex meadii	**SR-P**		**S1**	**G4G5**
Mead's Sedge				
P: low wet places over diabase (Durham*, Granville, Macon, Wake*)				

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Carex molestiformis	**SR-D**		**S1**	**G4**
Ozark Plateau Sedge				
M: Bottomland forests (Alleghany)				
Carex oligocarpa	**T**		**S1**	**G4G5**
Rich-woods Sedge				
CM: rich woods, mostly over calcareous or mafic rocks (Carteret)				
Carex oligosperma	**E**		**S1**	**G5**
Few-seeded Sedge				
M: seeps and bogs (Avery, Mitchell, Watauga)				
Carex pedunculata var. pedunculata	**SC-V**		**S2**	**G5**
Longstalk Sedge				
M: rich cove forests (Buncombe, Henderson, Polk, Transylvania)				
Carex projecta	**SR-P**		**S1**	**G5**
Necklace Sedge				
CMP: bogs, marshes, swamps, brownwater floodplain forests and openings (Avery, Cherokee, Cumberland*, Iredell*, Lee, Madison, Mecklenburg, Mitchell, Swain*, Transylvania, Wilkes)				
Carex purpurifera	**SC-V**		**S3**	**G4?**
Purple Sedge				
M: low elevation, rich forests over limestone or marble (Cherokee, Clay, Graham, Macon, Swain)				
Carex radfordii	**T**		**S1**	**G3**
Radford's Sedge				
M: rich cove forests in the Blue Ridge escarpment region (Jackson, Polk, Transylvania)				
Carex reniformis	**T**		**S1**	**G4?**
Kidney Sedge				
CP: swamps, open wet areas (Bladen, Johnston*, Pender, Sampson, Wake*)				
Carex roanensis	**SR-T**		**S2**	**G2G3**
Roan Sedge				
M: forests (Ashe, Avery, Buncombe, Haywood, Madison*, McDowell, Mitchell, Transylvania, Watauga, Yancey)				
Carex socialis	**SR-P**		**S1**	**G4**
Social Sedge				
C: streambeds and riverbanks (Bladen, Brunswick, Columbus, Cumberland, Pender)				
Carex sp. 2	**SR-T**		**S1**	**G1**
Fen Sedge				
M: seepage over mafic or ultramafic rocks (Alleghany)				

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Carex superata	**SR-T**		**S1?**	**G4?**
Limestone Forest Sedge				
P: Mesic Hardwood Forests (Anson)				
Carex tenax	**E**		**S1**	**G5?**
Wire Sedge				
CS: xeric sandhills (Moore, Wayne*)				
Carex trichocarpa	**SR-P**		**S1**	**G4**
Hairy-fruit Sedge				
M: marshy bogs (Alleghany, Ashe*, Haywood*)				
Carex trisperma	**E**		**S1**	**G5**
Three-seeded Sedge				
M: bogs, wet forests at high elevations (Ashe, Avery, Buncombe*, Mitchell*, Swain*, Watauga)				
Carex utriculata	**SR-P**		**S1**	**G5**
Beaked Sedge				
M: wet meadows (Alleghany, Henderson)				
Carex verrucosa	**SR-P**		**S2**	**G4**
Warty Sedge				
CS: savannas and pinelands (Beaufort*, Brunswick, Columbus*, Cumberland, Dare, Hoke, New Hanover*, Onslow, Pender, Robeson, Scotland)				
Carex vesicaria	**SR-P**		**S1**	**G5**
Inflated Sedge				
M: bogs (Alleghany, Ashe, Avery, Dare)				
Carex vestita	**SC-H**		**S1**	**G5**
Velvet Sedge				
P: low woods (Chatham*, Durham*, Polk)				
Carya laciniosa	**T**		**S1**	**G5**
Big Shellbark Hickory				
PC: brownwater river levees (Bertie, Durham, Halifax, Iredell)				
Carya myristiciformis	**E**		**S1**	**G4**
Nutmeg Hickory				
C: wet marl forests (Brunswick, Pender)				
Caulophyllum giganteum	**SR-P**		**S1**	**G4G5**
Northern Blue Cohosh				
M: cove forests (Alleghany, Ashe, Graham)				

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Celastrus scandens	**E**		**S2?**	**G5**
American Bittersweet				
MP: cove forests and rich woods (Buncombe, Burke, Caswell, Cherokee, Cleveland, Graham, Haywood*, Henderson, Jackson, Macon, Madison*, McDowell, Mitchell*, Randolph*, Rutherford, Surry, Swain*, Watauga*, Wilkes, Yancey*)				
Ceratophyllum australe	**SR-P**		**S1**	**G5TNR**
Southern Hornwort				
CT: pools in maritime forests, possibly other natural depression wetlands (Carteret*, Chowan)				
Chamerion platyphyllum	**E**		**S1**	**G5T5**
Fireweed				
M: grassy balds, roadsides, disturbed areas (Alleghany, Avery, Caldwell, Haywood, Mitchell, Watauga, Yancey*)				
Chasmanthium nitidum	**T**		**S1**	**G3G4**
A Spanglegrass				
C: blackwater bottomlands over marl (Pender)				
Chelone cuthbertii	**SC-V**		**S3**	**G3**
Cuthbert's Turtlehead				
MPC: bogs (Alleghany, Ashe, Avery, Burke, Catawba, Cumberland, Henderson, Jackson, Macon, Madison, McDowell, Stokes, Swain, Transylvania, Watauga, Wayne, Yancey)				
Chelone obliqua	**SR-T**		**S2**	**G4**
Red Turtlehead				
CM: swamp forests, bogs, wet places (Ashe, Burke, Gates, Graham, Hertford*, Jackson, McDowell, Rutherford, Swain, Transylvania, Watauga)				
Chenopodium foggii	**SR-T**		**SH**	**G2G3**
Fogg's Goosefoot				
M: rocky, mountain slopes (Haywood*)				
Chenopodium simplex	**T**		**S1**	**G5**
Giant-seed Goosefoot				
M: shaded soil at bases of cliffs (Alleghany, Ashe*, Jackson)				
Chrysoma pauciflosculosa	**E**		**S1**	**G4G5**
Woody Goldenrod				
C: riverine sand ridges and xeric pine-oak scrub (Columbus, Cumberland, Robeson)				
Cirsium carolinianum	**E**		**S2**	**G5**
Carolina Thistle				
P: forests and disturbed areas, mostly on basic soils (Burke, Cabarrus*, Granville, Mecklenburg, Montgomery, Onslow, Rowan, Rutherford, Wake*, Wilkes*)				

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Cirsium lecontei	**SC-V**		**S2**	**G3**
Leconte's Thistle				
C: savannas (Bladen*, Brunswick, Carteret, Columbus, Craven, Onslow, Pender, Robeson*)				
Cirsium nuttallii	**SR-P**		**S1**	**G5**
Nuttall's Thistle				
C: pine savannas, roadsides, pastures (Columbus, Pender)				
Cladium mariscoides	**SR-O**		**S3**	**G5**
Twig-rush				
CSMT: bogs, fens, brackish marshes, sandhill seepage bogs (Alleghany, Ashe, Camden, Carteret, Columbus, Craven*, Cumberland, Currituck, Dare, Harnett, Hoke, Moore, New Hanover, Onslow, Pender, Watauga, Yancey)				
Clematis catesbyana	**SR-P**		**S2**	**G4G5**
Coastal Virgin's-bower				
TCM: dunes, edges of maritime forests, or over dolomite (Carteret, Currituck*, Dare, Jones, McDowell, Onslow, Rutherford, Wake*)				
Clematis occidentalis var. occidentalis	**SC-V**		**S1**	**G5T5**
Mountain Clematis				
M: montane oak forests and northern hardwood forests (Ashe, Buncombe)				
Clinopodium georgianum	**E**		**S1**	**G5**
Georgia Calamint				
SC: rock ledges near blackwater streams and disturbed pine-oak uplands (Anson*, Brunswick, Pender, Richmond, Robeson*)				
Collinsonia tuberosa	**SC-V**		**S1**	**G3G4**
Piedmont Horsebalm				
PM: rich hardwood forests (Alamance*, Anson, Chatham, Davie, Guilford*, Henderson*, McDowell, Mecklenburg, Montgomery, Polk, Rutherford)				
Collinsonia verticillata	**SC-V**		**S2**	**G3G4**
Whorled Horsebalm				
PM: cove forests (Burke, Madison, Polk)				
Conioselinum chinense	**T**		**S1**	**G5**
Hemlock-parsley				
M: high elevation seepage slopes (Avery)				
Coptis trifolia var. groenlandica	**T**		**S1**	**G5T5**
Goldthread				
M: bogs and moist, mossy forests (Alleghany, Ashe)				

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Corallorhiza maculata var. maculata	**SR-P**		**S1**	**G5T5**
Spotted Coralroot				
M: northern hardwood forests (Buncombe*, Haywood*, Henderson*, Jackson*, Macon*, McDowell*, Transylvania, Watauga*, Yancey*)				
Corallorhiza wisteriana	**SR-O**		**S1**	**G5**
Spring Coral-root				
MPCT: nutrient-rich forests, especially over limestone, mafic rocks or shell rich sands (Buncombe, Carteret*, Catawba*, Cleveland, Davie*, Durham*, Graham*, Harnett, Jackson*, Macon*, Madison, McDowell, New Hanover, Orange*, Polk*, Rutherford, Surry*)				
Coreopsis aristulata	**SR-L**		**S1**	**G1**
Short-awned Coreopsis				
C: wet savanna with calcareous influence (Onslow, Pender)				
Coreopsis grandiflora var. grandiflora	**SR-O**		**S1**	**G5T4T5**
Large-flowered Tickseed				
M: acidic glades (Jackson, Macon)				
Coreopsis palustris	**SR-P**		**S1S2**	**G3G4Q**
Beadle's Coreopsis				
C: swamp forests and swamp edges (Beaufort*, Brunswick, Carteret, Columbus, Craven*, Duplin*, Jones*, Onslow, Pender, Pitt*)				
Cornus asperifolia	**E**		**S1**	**G4**
Roughleaf Dogwood				
C: wet marl forests (Onslow, Pender)				
Cornus racemosa	**SR-P**		**S1**	**G5**
Gray Dogwood				
P: moist soil in riparian zones, roadsides, and thickets (Caswell, Durham, Orange)				
Corydalis micrantha	**T**		**S1**	**G5T4**
Slender Corydalis				
PM: thin, circumneutral soils on rock outcrops or cliffs (Alexander, Carteret, Jackson*, Madison)				
Crataegus coccinea	**SR-P**		**S2?**	**G5**
Scarlet Hawthorn				
MP: deciduous forest understories, pastures, upland thickets (Alexander*, Alleghany*, Ashe)				
Crataegus munda	**SR-T**		**S2?**	**G3G5Q**
Batesburg Hawthorn				
C: xeric or subxeric forests, scrublands, disturbed woodlands (Bladen, Cumberland*, Sampson, Wake)				

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Crataegus pallens	**SR-T**		**S1S2**	**G1G2**
Pale Hawthorn				
M: subxeric forests, slopes, rock outcrops, especially over mafic or calcareous substrates (Buncombe)				
Crataegus senta	**SR-T**		**S1?**	**G2**
A Hawthorn				
CM: upland hills, disturbed forests, pastures (Buncombe*)				
Crataegus succulenta	**SR-P**		**S1S2**	**G5**
Fleshy Hawthorn				
M: high elevation rocky summits, mesic forests, pastures, especially over basic soil or mafic substrate (Ashe, Buncombe, Orange*, Stokes)				
Crinum americanum var. americanum	**SC-H**		**SH**	**G5T5**
Swamp-lily				
C: tidal swamp forests, tidal marshes (New Hanover*)				
Crocanthemum bicknellii	**SC-V**		**S1**	**G5**
Plains Sunrose				
M: rock outcrops, glades, fens (Ashe, Buncombe, Haywood, Henderson, Jackson*, Macon*, Swain*, Transylvania, Yancey)				
Crocanthemum carolinianum	**E**		**S1**	**G4**
Carolina Sunrose				
CS: sandhills, pinelands, dry savannas (Brunswick, Carteret, Craven*, Cumberland*, Dare, Hoke, New Hanover, Onslow, Pender, Robeson, Wilson*)				
Crocanthemum corymbosum	**T**		**S1**	**G4G5**
Pinebarren Sunrose				
TC: maritime forests (Brunswick, Carteret, Dare)				
Crocanthemum georgianum	**E**		**S1**	**G4**
Georgia Sunrose				
TC: maritime forests (Brunswick, Carteret, Dare, Hyde, New Hanover)				
Crocanthemum nashii	**E**		**S1**	**G3?**
Florida Scrub Frostweed				
C: coastal fringe sandhill (Brunswick, New Hanover)				
Crocanthemum propinquum	**T**		**S1**	**G4**
Creeping Sunrose				
MP: rock outcrops, glades (Alleghany, Ashe, Avery*, Buncombe*, Clay, Forsyth, Haywood, Henderson*, Macon, Stokes, Transylvania*, Watauga, Wilkes*, Yancey)				

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Crocanthemum rosmarinifolium	**T**		**S2**	**G4**
Rosemary Sunrose				
SC: dry clearings and roadsides within longleaf pine ecosystems (Hoke, Richmond, Scotland)				
Croton monanthogynus	**E**		**S1**	**G5**
Prairie-tea Croton				
M: calcareous rock outcrops (Madison)				
Cuscuta cephalanthi	**SR-T**		**S1**	**G5**
Buttonbush Dodder				
MP: on woody hosts (Alleghany)				
Cuscuta coryli	**SR-T**		**S1?**	**G5?**
Hazel Dodder				
CPM: on woody or herbaceous hosts (Burke, McDowell, Rutherford)				
Cyperus dentatus	**SC-H**		**SH**	**G4**
Toothed Flatsedge				
C: marshes (Brunswick*, Currituck*, Dare*)				
Cyperus granitophilus	**T**		**S2**	**G3G4Q**
Granite Flatsedge				
P: granite flatrocks, other rock outcrops (Alexander*, Anson, Forsyth*, Franklin, Granville, Rutherford, Wake, Yadkin*)				
Cyperus lecontei	**T**		**S2**	**G4?**
Leconte's Flatsedge				
C: limesink ponds (Brunswick, New Hanover*, Onslow)				
Cyperus tetragonus	**SC-V**		**S1**	**G4?**
Four-angled Flatsedge				
T: maritime forests and barrier island grasslands (Brunswick, Carteret, Dare, New Hanover*, Onslow, Pender)				
Cyperus virens	**SR-P**		**S1**	**G5**
Green Flatsedge				
C:marshes and ditches (Columbus, Hyde)				
Cypripedium parviflorum var. parviflorum	**SR-T**		**S1S2**	**G5T3T5**
Small Yellow Lady's-slipper				
M: upper slopes of rich high elevation forests (Buncombe, Clay, Graham, Henderson, Jackson, Macon)				
Cystopteris fragilis	**SR-P**		**S1**	**G5**
Fragile Fern				
M: high elevation cliffs (Ashe, Haywood, Jackson, Mitchell, Watauga)				

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Cystopteris tennesseensis	**E**		**S1**	**G5**
Tennessee Bladder-fern				
CM: calcareous rock outcrops (Craven, Graham*, Jones, Onslow*)				
Cystopteris tenuis	**SR-P**		**S1**	**G5**
Upland Bladder-fern				
M: high elevation rocky summits, cliffs (Transylvania, Watauga)				
Dactylorhiza viridis	**E**		**S1**	**G5T5**
Long-bracted Frog Orchid				
MP: seeps in cove forests (Ashe, Avery*, Buncombe*, Forsyth*, Haywood*, Jackson*, Macon*, Watauga)				
Danthonia epilis	**SR-T**		**S3**	**G4**
Bog Oatgrass				
MS: seepage bogs, wet seepy powerlines (Burke, Cumberland, Harnett, Haywood, Henderson, Jackson, Macon, Montgomery, Moore, Richmond, Scotland, Transylvania)				
Delphinium exaltatum	**E**		**S2**	**G3**
Tall Larkspur				
MP: grassy balds, glades, woodlands, mostly over mafic rock (Alleghany, Ashe, Avery, Caswell, Durham, Gaston*, Granville*, Haywood, Jackson, McDowell, Mecklenburg*, Mitchell*, Person, Watauga)				
Dendrolycopodium dendroideum	**SR-P**		**S2**	**G5**
Prickly Ground-pine				
M: openings and balds (Ashe, Avery, Burke, Graham, Haywood, Henderson*, Jackson, Macon, Swain, Transylvania*)				
Dendrolycopodium hickeyi	**SR-P**		**S2?**	**G5**
Pennsylvania Ground-pine				
M: openings, balds, bog margins, and high elevation forests (Avery, Buncombe, Burke*, Haywood, Henderson, Jackson, Macon, Mitchell, Transylvania, Yancey)				
Deschampsia cespitosa ssp. glauca	**T**		**S1**	**G5T5**
Tufted Hairgrass				
M: olivine barrens, high elevation outcrops of mafic rock (Alleghany, Ashe, Avery, Clay, Mitchell)				
Desmodium fernaldii	**SR-P**		**S1**	**G4**
Fernald's Tick-trefoil				
SC: dry to mesic hardwood-pine woodlands (Brunswick*, Cumberland, Dare*, Duplin*, Edgecombe*, Gates*, Hoke, Jones*, Lenoir*, Martin*, Montgomery, Richmond, Scotland*, Washington*)				

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Desmodium ochroleucum	**SC-H**		**SH**	**G2**
Creamy Tick-trefoil				
P: sandy or rocky woodland openings (Davie*, Orange*, Swain*)				
Desmodium sessilifolium	**SC-H**		**SH**	**G5**
Sessile Tick-trefoil				
P: open woodlands (Cabarrus*, Mecklenburg*)				
Diarrhena americana	**E**		**S1**	**G4G5**
Eastern Beakgrass				
M: rich cove forest (Graham, Jackson)				
Dicentra eximia	**SR-P**		**S3**	**G4**
Bleeding Heart				
MP: rock outcrops (Buncombe, Burke, Graham, Haywood, Henderson, Macon, Madison, McDowell, Mitchell, Rutherford, Swain, Transylvania, Watauga*, Yancey)				
Dichanthelium annulum	**SR-P**		**S1**	**G4**
Ringed Witch Grass				
CP: dry sandy or rocky open woods and borders of thickets (Alleghany, Chatham*, Clay*, Dare*, Davie*, Durham, Lee*, Mecklenburg*, Montgomery*, Orange*, Person*, Rowan*, Stanly, Stokes*, Wake*)				
Dichanthelium bicknellii	**SR-P**		**S2**	**G4?Q**
Bicknell's Witch Grass				
MP: open woods (Alexander, Alleghany, Ashe, Columbus, Granville, Jackson, Macon, Madison, Mitchell, Montgomery, Moore*, Rowan, Union, Yancey)				
Dichanthelium caerulescens	**E**		**S1**	**G2G3**
Blue Witch Grass				
C: maritime grasslands and wet savannas with a calcareous influence (Brunswick*, Carteret, Currituck, Dare, Hyde, Onslow, Pender)				
Dichanthelium cryptanthum	**SR-T**		**S2**	**G3G4Q**
Hidden-flowered Witchgrass				
C: wet streamhead pocosin openings, including utility clearings (Bladen, Brunswick, Carteret, Cumberland, Harnett, Hoke, Johnston*, Moore, New Hanover*, Onslow, Pender, Richmond, Wake*)				
Dichanthelium fusiforme	**SR-P**		**S1**	**G5?**
Spindle-fruited Witch Grass				
CSM: dry sandy pinelands and dry montane woodlands (Alexander, Beaufort, Bladen*, Brunswick, Columbus*, Dare, Gates, Hoke, Jones, Moore*, Onslow, Richmond*)				

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Dichanthelium hirstii	**E**		**S1**	**G1**
Hirsts' Panic Grass				
C: cypress savannas (Onslow)				
Dichanthelium neuranthum	**SC-V**		**S1**	**G5T3**
Nerved Witch Grass				
T: maritime wet grasslands (Brunswick*, Carteret*, Dare, Hyde, New Hanover*, Union)				
Dichanthelium spretum	**SR-D**		**S1S2**	**G5**
Eaton's Witch Grass				
CP: wet sands and peats of bogs, savannas, meadows, and shores (Carteret, Craven, Onslow, Pender)				
Dichanthelium strigosum var. glabrescens	**SR-D**		**S1**	**G5T4T5**
Hairless Witch Grass				
C: sandy pinelands and hammocks (Onslow)				
Didiplis diandra	**SR-P**		**S1**	**G5**
Water Purslane				
CS: sluggish streams and ponds (Chowan*, Edgecombe*, Harnett*, Hertford*, Johnston, Moore*, Nash, Perquimans*, Richmond, Wake, Warren*)				
Didymoglossum petersii	**SR-T**		**S2**	**G4G5**
Dwarf Filmy-fern				
M: moist rocks in humid gorges (Graham, Jackson, Macon, Transylvania)				
Diervilla rivularis	**T**		**S1**	**G3**
Riverbank Bush-honeysuckle				
M: forests (Mitchell, Yancey)				
Dionaea muscipula	**SC-V**		**S2**	**G2**
Venus Flytrap				
CST: savannas, seepage bogs, pocosin edges (Beaufort, Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Duplin, Hoke, Jones, Lenoir*, Moore*, New Hanover, Onslow, Pamlico, Pender, Robeson*, Sampson)				
Diplachne maritima	**E**		**S1**	**G5T3T4**
Salt-meadow Grass				
CT: fresh to brackish tidal marshes (Brunswick, Currituck, Dare, Hyde, Tyrrell)				
Ditrysinia fruticosa	**SC-V**		**S2**	**G5**
Sebastian-bush				
C: swamp forests (Brunswick, Columbus, Pender*, Robeson)				

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Draba ramosissima	**SC-V**		**S2**	**G4**
Branching Draba				
MP: calcareous and mafic rock outcrops (Buncombe, Haywood, Jackson, Madison, Rutherford)				
Drosera filiformis	**SC-V**		**S2**	**G4**
Threadleaf Sundew				
C: depression ponds, wet borrow pits, and ditches in various habitats including savannas, riverine sand ridges, and bay rims (Bladen, Brunswick, Columbus, Duplin, New Hanover, Robeson, Sampson)				
Echinacea laevigata	**E**	**E**	**S1S2**	**G2G3**
Smooth Coneflower				
P: glades, woodlands, and open areas over mafic rocks (Durham, Granville, Mecklenburg, Montgomery*, Orange*, Rockingham*)				
Echinacea pallida	**SR-D**		**S1**	**G4**
Pale Coneflower				
P: mafic glades and barrens (Gaston*, Granville, McDowell*, Mecklenburg*, Richmond, Rutherford)				
Echinacea purpurea	**SC-V**		**S1**	**G4**
Purple Coneflower				
M: open woods and clearings (Alleghany, Ashe, Chatham, Graham, Jackson*, Madison, McDowell, Randolph, Rutherford*, Vance, Warren, Yadkin*)				
Eleocharis atropurpurea	**SR-D**		**S1**	**G4G5**
Purple Spikerush				
C: clay-based Carolina bays (Scotland*)				
Eleocharis cellulosa	**E**		**S2**	**G4G5**
Gulfcoast Spikerush				
CT: interdune ponds, brackish marshes & tidal freshwater marshes (Beaufort, Carteret, Dare, Hyde, Onslow*, Washington)				
Eleocharis elongata	**E**		**S1**	**G5?**
Florida Spikerush				
C: limesink ponds (Brunswick, Onslow)				
Eleocharis fallax	**SR-T**		**S1S2**	**G4G5**
Creeping Spikerush				
C: fresh to brackish tidal marshes (Carteret*, Currituck, Dare, Jones, Onslow)				
Eleocharis halophila	**SR-P**		**S1**	**G4Q**
Saltmarsh Spikerush				
CT: brackish and freshwater marshes (Dare, Hyde*)				

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Eleocharis montevidensis	**SR-P**		**S1**	**G5**
Sand Spikerush				
CT: maritime wet grassland (Currituck*, Dare, Hyde, Onslow)				
Eleocharis parvula	**SR-D**		**S1**	**G5**
Little-spike Spikerush				
CT: brackish and fresh marshes (Brunswick, Carteret, Currituck, Dare, Hyde, Onslow, Tyrrell)				
Eleocharis robbinsii	**SC-V**		**S2S3**	**G4G5**
Robbins' Spikerush				
CS: limesink ponds, clay-based Carolina bays, peat-burn lakes, millponds, beaver ponds, artificial lakes (Bladen*, Brunswick, Carteret, Craven, Cumberland, Harnett, Hoke, Moore, New Hanover, Onslow, Sampson, Scotland, Washington)				
Eleocharis rostellata	**SR-O**		**S2**	**G5**
Beaked Spikerush				
CT: brackish marshes (Beaufort*, Brunswick, Camden, Carteret, Currituck, Dare, Hyde, Pamlico)				
Eleocharis vivipara	**E**		**S1**	**G5**
Viviparous Spikerush				
C: bogs and pools (Brunswick, Carteret, Hyde, Moore, New Hanover, Onslow, Pender, Tyrrell)				
Eleocharis wolfii	**SR-T**		**S1**	**G3G5**
Wolf's Spikerush				
P: oak flatwoods, prairies (Cabarrus)				
Elymus trachycaulus ssp. trachycaulus	**T**		**S1**	**G5T5**
Slender Wheatgrass				
M: olivine barrens (Clay)				
Elymus virginicus var. halophilus	**SC-V**		**S1**	**G5T5**
Terrell Grass				
C: brackish marshes, maritime forests and hammocks (Beaufort, Brunswick, Carteret, Craven, Hyde, Washington)				
Enemion biternatum	**SC-V**		**S2**	**G5**
Eastern Isopyrum				
PC: rich bottomlands, levees, and lower slopes (Caswell, Chatham*, Cumberland, Durham, Franklin, Granville, Halifax, Harnett, Lee, Northampton, Orange*, Person, Vance)				
Epidendrum magnoliae	**T**		**S1S2**	**G4**
Green Fly Orchid				
C: epiphytic on trees in blackwater river swamps (Bladen, Brunswick, Columbus, New Hanover, Pender)				

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Epilobium ciliatum ssp. ciliatum	**SR-P**		**S2**	**G5T5**
American Willow-herb				
M: seeps and bogs (Avery, Buncombe, Caldwell, Henderson, Jackson*, Macon, Madison, Mitchell*, Swain*, Watauga, Yancey*)				
Erigenia bulbosa	**SR-P**		**S1**	**G5**
Harbinger-of-spring				
MP: rich woods (Caswell, Graham)				
Eriocaulon aquaticum	**SC-V**		**S2**	**G5**
Seven-angled Pipewort				
CS: blackwater creeks, natural lakes, tidal freshwater marshes (Bladen*, Brunswick*, Columbus, Craven, Cumberland, Hoke, Moore, New Hanover, Perquimans*, Tyrrell, Washington)				
Eriocaulon parkeri	**T**		**S1**	**G3**
Estuary Pipewort				
C: natural lakes (Craven, Hyde, Tyrrell*)				
Eriocaulon texense	**E**		**S1**	**G4**
Texas Hatpins				
S: streamhead seepage ecotones and seepage slopes (Cumberland, Richmond)				
Eriogonum tomentosum	**SC-H**		**SH**	**G4G5**
Southern Wild-buckwheat				
C: sandhills (Bladen*)				
Eryngium aquaticum var. ravenelii	**SR-P**		**S1**	**G4T2T3**
Marsh Eryngo				
C: wet flatwoods with a calcareous influence, ditches (Pender)				
Erythrina herbacea	**E**		**S2**	**G5**
Coralbean				
TC: maritime forests (Brunswick, Carteret*, New Hanover)				
Eupatorium anomalum	**SR-T**		**S1?**	**G2G3**
Florida Thoroughwort				
C: wet savannas				
Eupatorium leptophyllum	**E**		**S2**	**G4G5**
Limesink Dog-fennel				
C: limesink ponds and clay-based Carolina bays (Brunswick, New Hanover, Robeson, Scotland)				
Eupatorium paludicola	**T**		**S1S2**	**G2**
Bay Boneset				
C: cypress savannas, clay-based bays, and small depressions ponds (Brunswick, Onslow, Scotland)				

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Eupatorium resinosum	**SR-O**		**S3**	**G3**
Pine Barren Boneset				
SC: seepage bogs, impoundments, shrub swamps, openings in streamhead pocosins (Bladen, Cumberland, Harnett, Hoke, Moore, Robeson, Sampson, Scotland)				
Eupatorium saltuense	**SR-L**		**S1?**	**G4**
Tall Boneset				
P: upland forests, woodland borders (Burke, Caswell*, Granville, McDowell, Person, Rutherford, Sampson, Warren)				
Euphorbia bombensis	**SR-T**		**S2?**	**G4G5**
Southern Seaside Spurge				
T: seabeaches (Brunswick, Carteret, Dare, Onslow)				
Euphorbia commutata	**T**		**S1**	**G5**
Cliff Spurge				
MP: thin soil around mafic or calcareous outcrops (Buncombe, Caswell*, Haywood, Rutherford)				
Euphorbia cordifolia	**T**		**S1**	**G5**
Heartleaf Sandmat				
CS: sandhills (Bladen, Richmond*, Wayne*)				
Euphorbia mercurialina	**SC-V**		**S2**	**G4**
Cumberland Spurge				
P: rich slopes over gabbro (Anson, Granville, Montgomery, Moore, Richmond)				
Euphorbia purpurea	**SR-T**		**S3**	**G3**
Glade Spurge				
M: forests, especially over mafic rock (Ashe, Buncombe, Clay, Graham, Haywood, Jackson, Macon, Madison, Mitchell, Swain, Watauga*, Yancey)				
Eurybia mirabilis	**SR-T**		**S3**	**G3**
Piedmont Aster				
P: rich slopes and bottomlands (Anson, Macon*, Mecklenburg, Montgomery, Richmond, Stanly, Union)				
Eurybia spectabilis	**SR-O**		**S2?**	**G5**
Showy Aster				
CMP: pine barrens and woodland borders (Bertie*, Cabarrus*, Chatham, Chowan*, Craven*, Durham, Gates*, Granville, Hertford, Johnston, Jones, Lee*, Onslow, Pitt*, Polk, Robeson*, Rowan*, Stanly*)				
Eustachys glauca	**SR-P**		**SH**	**G4**
Saltmarsh Fingergrass				
T: salt marshes (New Hanover)				

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Filipendula rubra	**E**		**S1**	**G4G5**
Queen-of-the-prairie				
M: bogs, wet meadows (Buncombe, Haywood, Macon, Transylvania, Watauga, Yancey)				
Fimbristylis perpusilla	**T**		**S1**	**G2**
Harper's Fimbry				
C: drawdown zones of blackwater rivers (Brunswick, Columbus)				
Fleischmannia incarnata	**T**		**S2**	**G5**
Pink Thoroughwort				
PMC: rich woods and thin woodlands over diabase, calcareous rocks, other basic rocks, or rich alluvium (Alexander, Durham, Madison, Martin*, Polk, Richmond, Warren*, Wilkes)				
Fothergilla major	**SR-T**		**S3**	**G3**
Large Witch-alder				
MP: dry ridgetop or bluff forests, seepage wetlands, and Piedmont longleaf pine forests (Burke, Chatham, Gaston*, Harnett, Jackson, McDowell, Montgomery, Orange, Person, Polk*, Rutherford, Stanly, Stokes, Surry, Transylvania, Wake)				
Frasera caroliniensis	**SR-P**		**S2S3**	**G5**
Columbo				
M: deciduous forests on mafic soil (Cherokee, Clay, Graham, Macon)				
Gaillardia aestivalis var. aestivalis	**E**		**S2**	**G5TNR**
Sandhills Blanket-flower				
S: dry sandy roadsides, dry longleaf pine-oak uplands (Cumberland*, Hoke, Moore*, Richmond, Scotland)				
Galactia mollis	**T**		**S2**	**G4G5**
Soft Milk-pea				
CST: loamy sand depressions in longleaf pine-oak uplands (Brunswick*, Cumberland, Hoke, Richmond, Scotland, Wayne*)				
Gaylussacia brachycera	**E**		**S1**	**G3**
Box Huckleberry				
P: dry ridges and slopes (Durham)				
Gaylussacia nana	**E**		**S1**	**G4**
Confederate Huckleberry				
C: coastal fringe sandhill (New Hanover)				
Gaylussacia orocola	**SR-L**		**S1**	**G1**
Appalachian Dwarf Huckleberry				
M: bogs (Avery*, Buncombe*, Haywood*, Henderson, Macon*, Transylvania)				

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Gelsemium rankinii	**SC-V**		**S1S2**	**G5**
Swamp Jessamine				
C: floodplains of blackwater rivers and streams (Brunswick, Columbus, Cumberland*, New Hanover, Pender, Robeson)				
Gentiana alba	**SC-V**		**SH**	**G4**
Yellow Gentian				
M: habitat not known (Watauga*)				
Gentiana latidens	**SR-L**		**S1S2**	**G5T2T3**
Balsam Mountain Gentian				
M: moist open sites on rocky slopes (Haywood, Jackson, Macon*, Transylvania)				
Gentianopsis crinita	**T**		**S1**	**G5**
Fringed Gentian				
M: glades, serpentine barrens, open sites over basic rocks (Ashe, Clay, Macon*, Watauga)				
Geum aleppicum	**E**		**S1**	**G5**
Yellow Avens				
M: bogs (Avery, Swain*)				
Geum geniculatum	**SC-V**		**S1S2**	**G2**
Bent Avens				
M: high elevation forests, streambanks, seepage slopes (Avery, Caldwell, Mitchell, Watauga)				
Geum laciniatum	**E**		**S1**	**G5**
Rough Avens				
M: bogs and wet meadows (Avery, Wilkes*)				
Geum lobatum	**E**		**S1**	**G3**
Lobed Barren Strawberry				
M: streambanks and ravines (Jackson*, Transylvania)				
Geum radiatum	**E**	**E**	**S2**	**G2**
Spreading Avens				
M: high elevation rocky summits (Ashe, Avery, Buncombe, Burke*, Haywood, Mitchell, Transylvania, Watauga, Yancey)				
Gillenia stipulata	**T**		**S2**	**G5**
Indian Physic				
P: forests and open woods, mainly over mafic rocks (Cabarrus*, Chatham*, Davidson, Durham, Granville, Lee*, McDowell, Montgomery, Moore*, Orange*, Person, Stokes, Surry, Transylvania, Union, Wake)				

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Glyceria laxa	**SR-P**		**S2**	**G5**
Lax Mannagrass				
M: seeps (Alleghany, Ashe, Avery, Buncombe, Henderson, Jackson*, Macon, Transylvania)				
Glyceria nubigena	**SR-L**		**S2**	**G2G3**
Smoky Mountain Mannagrass				
M: high elevation seeps (Graham, Haywood, Jackson, Swain, Transylvania)				
Gratiola aurea	**SC-V**		**S1**	**G5**
Golden Hedge-hyssop				
C: drawdown zones of blackwater rivers (Bladen, Brunswick, Columbus, Gates*, Pender, Sampson)				
Gratiola ramosa	**SR-P**		**S1**	**G4G5**
Branched Hedge-hyssop				
CS: cypress savannas and clay-based Carolina bays (Hoke, Robeson*, Scotland)				
Gymnocarpium appalachianum	**T**		**S1**	**G3**
Appalachian Oak Fern				
M: shaded and sheltered crevices on high elevation rocky summits (Ashe)				
Hackelia virginiana	**SR-P**		**S2**	**G5**
Virginia Stickseed				
MP: woods and thickets with circumneutral soil (Alexander, Alleghany, Ashe, Avery*, Buncombe, Burke, Caldwell, Clay*, Granville, Haywood*, Jackson*, Macon*, Madison, Martin, McDowell, Polk*, Rockingham, Rutherford, Surry*, Vance)				
Helanthium tenellum	**E**		**SH**	**G5?**
Dwarf-burhead				
C: drawdown zones of clay-based Carolina bays and blackwater rivers (Brunswick*, Columbus*, Robeson)				
Helenium brevifolium	**E**		**S1**	**G4**
Littleleaf Sneezeweed				
PMC: bogs, seeps, riverbanks, other wet sites (Alleghany, Brunswick*, Clay, Columbus, Davidson*, Henderson*, Iredell, Lenoir*, Lincoln, Montgomery, Rowan*, Stanly*, Wake*)				
Helenium pinnatifidum	**SR-P**		**S2**	**G4**
Dissected Sneezeweed				
C: savannas and open, wet, mucky sites (Bladen, Brunswick, Columbus, New Hanover*, Pender, Robeson*)				
Helenium vernale	**E**		**S1**	**G4?**
Spring Sneezeweed				
C: savannas and adjacent ditches (Brunswick, Columbus)				

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Helianthus floridanus	**T**		**S1**	**G3G4**
Florida Sunflower				
C: savannas and pocosins (Bladen, Brunswick, Columbus, Robeson)				
Helianthus laevigatus	**SC-V**		**S3**	**G4**
Smooth Sunflower				
PM: shaly open woods and roadsides (Anson, Burke, Cabarrus, Cleveland*, Davidson, Jackson, McDowell, Montgomery, Rowan, Rutherford, Stanly, Transylvania, Union)				
Helianthus occidentalis ssp. occidentalis	**SC-H**		**SX**	**G5T5**
Naked-stem Sunflower				
M: Rocky or sandy flood-scoured riversides (Buncombe*)				
Helianthus schweinitzii	**E**	**E**	**S3**	**G3**
Schweinitz's Sunflower				
P: open woods, roadsides, and other rights-of-way (Anson, Cabarrus, Catawba, Davidson, Gaston, Guilford, Mecklenburg, Montgomery, Randolph, Richmond, Rowan, Stanly, Stokes, Surry, Union)				
Heliotropium curassavicum var. curassavicum	**SR-P**		**SH**	**G5T5**
Seaside Heliotrope				
T: salt flats and salt marshes (Hyde*)				
Helonias bullata	**T**	**T**	**S2**	**G3**
Swamp Pink				
M: bogs (Ashe, Henderson, Jackson, Macon, Transylvania)				
Heteranthera multiflora	**SR-P**		**S1**	**G4**
Multiflowered Mud-plantain				
C: open pools in brownwater or blackwater river floodplains (Bertie*, Durham, Martin, Pasquotank, Perquimans, Wake, Washington)				
Heuchera hispida	**SR-P**		**S1**	**G5T3?**
Hispid Alumroot				
P: rich, rocky woods (Alleghany, Ashe, Wilkes)				
Heuchera pubescens	**SR-P**		**S1**	**G4?**
Downy Alumroot				
MP: rock outcrops (Haywood*, Madison, Stokes*, Surry, Yadkin)				
Hexalectris spicata	**SR-P**		**S2**	**G5**
Crested Coralroot				
PMC: dry or mesic woods on basic soils (Alleghany, Burke*, Cabarrus, Clay, Cumberland, Davidson*, Davie*, Durham, Franklin*, Granville, Harnett, Hoke, Jackson*, Johnston*, Jones*, Lincoln, Macon, Madison*, Mecklenburg, Orange, Polk*, Randolph, Rutherford, Stanly, Surry*)				

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Hexastylis contracta **Mountain Heartleaf** M: acidic forests under rhododendron (Buncombe, Caldwell, Henderson)	**E**		**S1**	**G3**
Hexastylis naniflora **Dwarf-flowered Heartleaf** P: rich deciduous forests, bluffs, and ravines (Alexander, Burke, Caldwell, Catawba, Cleveland, Gaston, Iredell, Lincoln, Polk, Rutherford)	**T**	**T**	**S3**	**G3**
Hexastylis rhombiformis **French Broad Heartleaf** MP: cove forests (Buncombe, Burke, Henderson, Polk, Transylvania)	**SR-L**		**S3**	**G3**
Hibiscus aculeatus **Comfortroot** C: bay forests, sand ridges, and roadsides (Carteret, New Hanover, Robeson)	**T**		**S1**	**G4G5**
Hottonia inflata **Featherfoil** CPT: pools in blackwater or brownwater swamps, interdune ponds (Bertie, Dare, Edgecombe*, Gates, Halifax, Johnston, Lenoir, Martin, Tyrrell)	**SR-O**		**S1?**	**G4**
Houstonia montana **Roan Mountain Bluet** M: high elevation rocky summits, grassy balds (Ashe, Avery, Caldwell, Mitchell, Watauga, Yancey)	**E**	**E**	**S2**	**G5T2**
Hudsonia montana **Mountain Golden-heather** M: gorge rim outcrops, rocky summits, pine-oak/heath ridges (Burke, McDowell)	**T**	**T**	**S1**	**G1**
Hudsonia tomentosa **Sand Heather** T: openings in maritime forest, blowouts, and dunes (Currituck, Dare)	**T**		**S2**	**G5**
Huperzia porophila **Rock Fir-clubmoss** M: in spray zone of waterfalls (Ashe, Jackson, Macon, Polk*, Rutherford, Transylvania)	**SR-P**		**S2**	**G4**
Hydrastis canadensis **Goldenseal** MP: cove forests, other rich deciduous forests (Alleghany, Buncombe, Durham, Graham, Haywood, Jackson, Macon, Madison, McDowell, Mitchell, Polk, Rockingham, Stokes, Swain, Watauga*)	**SR-O**		**S3**	**G3G4**
Hymenocallis occidentalis var. occidentalis **Hillside Spider-lily** M: wooded hillsides (McDowell*)	**SC-H**		**SH**	**G4?TNR**

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Hymenocallis pygmaea	**T**		**S1**	**G2Q**
Waccamaw River Spiderlily				
C: banks of blackwater rivers (Brunswick, Columbus, Pender)				
Hymenophyllum tayloriae	**SR-O**		**S1S2**	**G2**
Gorge Filmy Fern				
M: moist grottoes and spray cliffs in escarpment gorges with high rainfall (Jackson, Macon, Transylvania)				
Hypericum adpressum	**SC-H**		**SH**	**G3**
Bog St. John's-wort				
C: streamside seepage areas, depression ponds and other isolated wetlands (Halifax*, Northampton*)				
Hypericum brachyphyllum	**SC-V**		**S1S2**	**G5**
Coastal Plain St. John's-wort				
C: wet pine savannas (Brunswick, Columbus, New Hanover, Onslow, Pender)				
Hypericum fasciculatum	**E**		**S1**	**G5**
Peelbark St. John's-wort				
CS: beaver ponds, low pinelands, pools (Bladen*, Brunswick, Carteret, Columbus, Cumberland*, Moore, New Hanover*, Robeson)				
Hypericum fraseri	**SR-P**		**S1**	**G5**
Fraser's Marsh St. John's-wort				
M: bogs and peaty wetlands (Northampton)				
Hypericum radfordiorum	**SR-L**		**S2**	**G2**
Radford's St. John's-wort				
P: thin soils around rock outcrops in the Brushy Mountains (Alexander, Caldwell*, Wilkes)				
Hypericum suffruticosum	**SC-H**		**SH**	**G4G5**
Pineland St. John's-wort				
C: pine savannas (Bladen*, Sampson*)				
Hypoxis juncea	**SR-P**		**S1**	**G4?**
Fringed Yellow Stargrass				
C: savannas (Bladen, Brunswick, Carteret, Craven, Hoke, Pender)				
Hypoxis rigida	**SR-P**		**S2**	**G4**
Stiff-leaved Yellow Stargrass				
CS: savannas and seepage slopes associated with streamheads (Brunswick, Cumberland, Hoke, Moore*)				

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Hypoxis sessilis	**SR-P**		**S1**	**G4**
Sessile Yellow Stargrass				
CS: savannas, pinelands (Brunswick, Hoke, Pender, Robeson)				
Ilex collina	**SC-V**		**S1**	**G3**
Long-stalked Holly				
M: bogs, wet streamsides, or high elevation forests (Ashe, Haywood, Swain, Watauga)				
Ilex longipes	**SR-P**		**S1**	**G5**
Georgia Holly				
P: upland forests and woodlands (Anson*, Gaston, Iredell, Johnston*, Lincoln, Mecklenburg, Nash*, Rutherford, Union, Wilson*)				
Ipomoea imperati	**T**		**S1**	**G5**
Beach Morning-glory				
T: sea beaches and foredunes (Brunswick, Carteret, Hyde, Onslow)				
Ipomoea macrorhiza	**SR-P**		**SH**	**G3G5**
Manroot				
TC: low marshy places, dunes (Brunswick*)				
Iris prismatica	**SR-T**		**S1S2**	**G4G5**
Slender Blue Iris				
CM: bogs, marshes, and wet powerline clearings (Anson, Beaufort, Brunswick, Camden*, Dare, Gates*, Harnett, Hoke, Johnston, Montgomery, New Hanover, Pamlico, Pasquotank*, Perquimans*)				
Isoetes microvela	**T**		**S1**	**G1**
Thin-wall Quillwort				
C: emergent riverbanks, calcareous influenced riverbanks (Brunswick, Jones, Onslow, Pender, Sampson)				
Isoetes piedmontana	**E**		**S2**	**G4**
Piedmont Quillwort				
P: granite flatrocks and diabase glades (Anson, Franklin, Granville, Rowan, Rutherford, Wake)				
Isoetes virginica	**SR-L**		**S1**	**G1**
Virginia Quillwort				
P: upland depression swamp forests, clayey soils (Caswell, Chatham*, Person, Rowan*, Union*)				
Isolepis carinata	**SR-P**		**S1**	**G5**
Keeled Beakrush				
PC: wet places, granitic flatrocks (Anson, Moore, Pender, Tyrrell, Union)				

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Isotria medeoloides	**T**	**T**	**S1**	**G2?**
Small Whorled Pogonia				
MP: forests, especially with white pine (Burke, Cherokee, Guilford, Haywood, Henderson, Jackson, Macon, McDowell, Rutherford, Surry*, Transylvania)				
Iva microcephala	**T**		**S2**	**G5**
Small-headed Marsh Elder				
C: clay-based Carolina bays (Robeson, Scotland)				
Jeffersonia diphylla	**T**		**S1**	**G5**
Twinleaf				
M: rich cove forests, especially over calcareous rocks (Jackson, Madison)				
Juncus articulatus	**SR-D**		**SH**	**G5**
Jointleaf Rush				
C: marshes (Dare*)				
Juncus caesariensis	**E**		**S1**	**G2G3**
New Jersey Rush				
M: seepage bog (Clay, Henderson)				
Juncus dudleyi	**SR-P**		**S1**	**G5**
Dudley's Rush				
M: calcareous seepages and riverscours (Bladen*)				
Juncus militaris	**SR-D**		**S1**	**G5**
Bayonet Rush				
C: exposed peaty-sandy shorelines of lakes (Washington)				
Juniperus communis var. depressa	**SC-V**		**S1**	**G5T5**
Dwarf Juniper				
MP: high elevation granitic domes, low elevation rocky summits (Buncombe*, Cleveland, Gaston, Macon, Rutherford)				
Kalmia angustifolia	**T**		**S1**	**G5**
Sheep-laurel				
C: sandy, xeric to mesic hillsides (Gates)				
Lachnocaulon minus	**T**		**S2**	**G3G4**
Brown Bogbutton				
CS: depression ponds and ditches (Brunswick, New Hanover, Onslow, Pender, Robeson, Scotland)				
Lathyrus pusillus	**SR-D**		**SH**	**G5?**
Tiny Peavine				
PC: wet, disturbed sites (McDowell*)				

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Lechea maritima var. virginica	**E**		**S1**	**G5T3Q**
Maritime Pinweed				
T: barren dunefields with Hudsonia tomentosa (Currituck, Dare)				
Lechea torreyi var. congesta	**E**		**S1**	**G4**
Torrey's Pinweed				
CS: sandhills, savannas (Brunswick, Moore*, Onslow, Pender)				
Leersia lenticularis	**SR-P**		**S2?**	**G5**
Catchfly Cutgrass				
C: low woods (Bertie, Bladen, Chatham, Craven, Halifax, Johnston, Martin)				
Liatris aspera	**T**		**S1**	**G4G5**
Rough Blazing-star				
M: glades, open woods, fens (Ashe, Burke, Clay*, Cleveland, Henderson*, Jackson*, Macon*, McDowell, Polk*, Rutherford, Stanly, Stokes, Transylvania*)				
Liatris helleri	**T**	**T**	**S2**	**G2Q**
Heller's Blazing-star				
M: high elevation rocky summits, cliffs (Ashe, Avery, Burke, Caldwell, Mitchell*, Watauga)				
Liatris microcephala	**SC-V**		**S1**	**G3G4**
Small-head Blazing-star				
M: rock outcrops, glades, dry woodlands (Macon*, Polk*, Rutherford)				
Liatris squarrulosa	**SR-P**		**S2**	**G4G5**
Earle's Blazing-star				
PSM: diabase glades, open woods especially over mafic rocks; also loamy-sand soils in longleaf pine-oak sandhills (Anson, Bladen, Cherokee, Cumberland, Durham, Graham, Granville, Harnett*, Hoke, McDowell, Orange*, Person, Richmond, Robeson, Rutherford, Scotland, Stokes*, Swain*, Wake)				
Liatris turgida	**SR-T**		**S1S2**	**G3**
Shale-barren Blazing-star				
M: dry rocky woods (Buncombe*, Burke, Cleveland, Polk*, Rutherford)				
Lilaeopsis carolinensis	**SR-O**		**S2**	**G3G5**
Carolina Grasswort				
TC: freshwater marshes, pools, tidal marshes (Brunswick, Camden, Currituck, Dare, Hyde, Martin, New Hanover, Pasquotank, Perquimans, Washington)				
Lilium canadense ssp. editorum	**E**		**S1**	**G5T4**
Red Canada Lily				
MP: bogs, wet meadows (Alleghany, Avery*, Cabarrus, Graham, Henderson, Randolph, Rutherford*, Stanly*)				

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Lilium canadense var. canadense	**E**		**S1**	**G5T4?**
Yellow Canada Lily				
MP: bogs, wet meadows (Cabarrus, Haywood, Watauga)				
Lilium grayi	**T**		**S1S2**	**G1G2**
Gray's Lily				
M: bogs, wet meadows, seeps, grassy balds, high elevation forests (Alleghany, Ashe, Avery, Buncombe, Caldwell, Haywood, Henderson*, McDowell, Mitchell, Watauga, Yancey)				
Lilium philadelphicum var. philadelphicum	**E**		**S2**	**G5T4T5**
Wood Lily				
M: grassy balds, glades (Ashe, Avery, Haywood, Mitchell, Polk*, Swain, Watauga, Yancey)				
Lilium pyrophilum	**E**		**S2**	**G2**
Sandhills Lily				
CS: streamhead pocosin ecotones and openings (Cumberland, Harnett, Hoke, Lee, Moore, Nash*, Northampton*, Richmond, Scotland)				
Limosella australis	**T**		**S1**	**G4G5**
Awl-leaf Mudwort				
T: tidal marshes (Currituck, Dare)				
Lindera melissifolia	**E**	**E**	**S1**	**G3**
Pondberry				
C: Carolina bays and seasonally wet depressions (Bladen*, Cumberland, Onslow, Orange*, Sampson)				
Lindera subcoriacea	**SR-T**		**S2**	**G3**
Bog Spicebush				
SP: streamhead pocosins, white cedar swamps, seepage slopes (Anson*, Chatham, Cumberland, Hoke, Johnston, Lee, Montgomery, Moore, Richmond, Robeson, Scotland, Wake)				
Linum floridanum var. chrysocarpum	**T**		**S1S2**	**G5?T3?**
Yellow-fruited Flax				
C: pine savannas (Brunswick, Columbus, Onslow, Pender)				
Linum sulcatum	**SC-H**		**SH**	**G5T5**
Glade Flax				
P: diabase barrens (Durham*, Granville*)				
Liparis loeselii	**E**		**S1**	**G5**
Fen Orchid				
MT: seeps, bay swamps (Alleghany, Ashe*, Avery*, Dare, Jackson*, Madison, Rutherford*, Swain, Transylvania, Watauga*, Yancey)				

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Lipocarpha micrantha	**SC-H**		**SH**	**G5**
Small-flowered Hemicarpha				
CT: drawdown zones of blackwater rivers, salt marshes (Brunswick*, Columbus*, Dare*)				
Lithospermum canescens	**T**		**S2**	**G5**
Hoary Puccoon				
P: diabase glades, open woods over diabase (Durham, Granville)				
Litsea aestivalis	**SC-V**		**S2S3**	**G3?**
Pondspice				
C: limesink ponds, other pools (Bladen, Brunswick, Carteret, Craven, Cumberland, Gates, Hoke, Lenoir, New Hanover, Onslow, Pender, Sampson, Wayne)				
Lobelia boykinii	**E**		**S1S2**	**G2G3**
Boykin's Lobelia				
C: depression ponds and meadows and clay-based cypress savannas (Bladen*, Cumberland, Hoke, Onslow, Robeson, Scotland)				
Lonicera canadensis	**SR-P**		**S2**	**G5**
American Fly-honeysuckle				
M: bogs, moist woods (Alleghany, Buncombe, Graham, Haywood, Jackson, Macon, Mitchell*, Transylvania, Watauga, Yancey)				
Lophiola aurea	**E**		**S2**	**G4**
Golden-crest				
C: very wet, mucky habitats in pine savannas (Brunswick, Columbus, New Hanover, Onslow)				
Ludwigia alata	**SR-P**		**S2**	**G3G5**
Winged Seedbox				
TC: interdune ponds, marshes (Brunswick, Camden, Carteret, Craven, Currituck, Dare, Hyde, New Hanover*, Onslow*, Pasquotank, Tyrrell*)				
Ludwigia brevipes	**SR-T**		**S1S2**	**G2**
Long Beach Seedbox				
CS: natural lake shores, blackwater stream shores and impoundments, and freshwater interdune ponds (Brunswick, Columbus, Craven*, Cumberland, Currituck, Dare, Gates*, Harnett*, Hyde*, Johnston*, Robeson*, Sampson*, Wayne*)				
Ludwigia lanceolata	**E**		**S1**	**G3**
Lanceleaf Seedbox				
TC: interdune ponds, open wet areas (Brunswick*, Carteret, Dare*, New Hanover)				
Ludwigia linifolia	**T**		**S2**	**G4**
Flaxleaf Seedbox				
CT: limesink ponds (Brunswick, Carteret, Columbus, New Hanover, Onslow)				

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Ludwigia ravenii	**T**		**S1**	**G1G2**
Raven's Seedbox				
C: savannas, swamps, marshes, wet open places (Brunswick*, Carteret, Chowan*, Columbus, Craven, Duplin*, Gates*, Jones, New Hanover*, Pamlico*, Perquimans*, Sampson)				
Ludwigia sphaerocarpa	**E**		**S1**	**G5**
Globe-fruit Seedbox				
CS: bogs, pools, and lake shores (Bladen*, Columbus, Craven, Dare*, Hoke*, Johnston*, Moore, New Hanover, Richmond, Washington)				
Ludwigia suffruticosa	**T**		**S2**	**G5**
Shrubby Seedbox				
CS: limesink ponds, clay-based Carolina bays (Bladen*, Brunswick, Columbus, New Hanover, Onslow, Robeson, Scotland)				
Lupinus villosus	**SR-P**		**S1**	**G5**
Lady Lupine				
C: sandhills and other dry sandy woods (Bladen, Brunswick*, Cumberland, Pender)				
Luziola fluitans var. fluitans	**SR-P**		**S2**	**G4G5TNR**
Southern Water Grass				
C: pools, lakes, streams (Bladen, Columbus, Dare, Moore, Pender, Richmond, Scotland, Tyrrell, Washington)				
Lycopodiella inundata	**SR-P**		**S1**	**G5**
Bog Clubmoss				
M: bogs and seeps (Avery, Haywood, Watauga)				
Lycopus angustifolius	**SR-P**		**S1**	**G4?Q**
Southern Bog Water-horehound				
C: bogs and marshes (Columbus, Richmond, Washington)				
Lysimachia asperulifolia	**E**	**E**	**S3**	**G3**
Rough-leaf Loosestrife				
CS: pocosin/savanna ecotones, pocosins (Beaufort, Bladen, Brunswick, Carteret, Columbus*, Craven, Cumberland, Harnett, Hoke, Montgomery*, Moore*, New Hanover, Onslow, Pamlico, Pender, Richmond, Scotland)				
Lysimachia fraseri	**E**		**S3**	**G3**
Fraser's Loosestrife				
M: wet forest borders, roadsides, alluvial meadows (Buncombe*, Haywood*, Henderson*, Jackson, Macon, Polk, Swain, Transylvania)				
Lysimachia hybrida	**SR-P**		**S2?**	**G5**
Lowland Loosestrife				
MPC: bottomlands (Pender)				

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Lysimachia tonsa	**SR-P**		**S2**	**G4**
Southern Loosestrife				
P: upland forests and openings (Alexander, Ashe, Burke, Caswell, Granville, Madison, Orange*, Rockingham, Rutherford, Stokes, Surry, Swain, Vance)				
Lythrum lanceolatum	**SR-T**		**S1**	**G5T5**
Southern Winged-loosestrife				
C: marshes and low, wet places (New Hanover*, Pender)				
Macbridea caroliniana	**E**		**S2**	**G2G3**
Carolina Bogmint				
C: blackwater swamps, savanna/pocosin ecotones, ditches (Bladen, Brunswick, Columbus, Harnett, Johnston, Jones*, Pender, Robeson)				
Magnolia macrophylla	**T**		**S2**	**G5**
Bigleaf Magnolia				
P: rich deciduous forests (Gaston, Henderson, Iredell, Lincoln, Surry, Wake)				
Malaxis bayardii	**SR-T**		**S1**	**G1G2**
Appalachian Adder's-mouth				
MP: upland forests (Caldwell*, McDowell)				
Malaxis spicata	**SC-V**		**S1**	**G4?**
Florida Adder's-mouth				
CT: maritime swamp forests, calcareous but mucky outer coastal plain swamps (Brunswick, Carteret, Chowan, Craven, Dare, Jones, Pender*)				
Marshallia grandiflora	**SC-H**		**SH**	**G3**
Large-flowered Barbara's-buttons				
MP: bogs, dry basic soils (Henderson*, Polk*)				
Marshallia legrandii	**SR-L**		**S1**	**G1**
Oak Barrens Barbara's-buttons				
P: clayey upland soils over diabase (Granville)				
Marshallia trinervia	**SC-H**		**SH**	**G3**
Broadleaf Barbara's-buttons				
M: moist rocky streambanks and in calcareous clays (Macon*)				
Matelea decipiens	**SR-P**		**S3**	**G5**
Glade Milkvine				
PC: thin woodlands over mafic or calcareous rocks (Alamance, Alexander, Anson, Bertie, Burke, Davidson*, Durham, Franklin, Granville, Halifax, Hertford*, Lincoln, Martin, McDowell, Mecklenburg, Montgomery, Northampton, Orange, Richmond, Rutherford, Stanly, Wake)				

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Matelea obliqua	**SR-P**		**S1**	**G4?**
Climbing Milkvine				
M: dry, rocky woodlands over calcareous rocks (Madison)				
Meehania cordata	**SR-P**		**S2**	**G5**
Meehania				
M: cove forests, boulderfields (Alleghany, Ashe, Avery*, Haywood, Madison, Watauga, Wilkes, Yancey)				
Melica nitens	**E**		**S1**	**G5**
Three-flowered Melic				
M: open calcareous woods (Madison, Polk)				
Menyanthes trifoliata	**T**		**S1**	**G5**
Buckbean				
M: bogs (Alleghany*, Watauga)				
Micranthes caroliniana	**SR-T**		**S3**	**G3**
Carolina Saxifrage				
MP: high to middle elevation moist cliffs and rock outcrops (Alleghany, Ashe, Watauga, Wilkes)				
Micranthes pensylvanica	**E**		**S1**	**G5**
Swamp Saxifrage				
MP: bogs, seeps (Wake*, Watauga)				
Milium effusum var. cisatlanticum	**SR-P**		**S1**	**G5T5**
Millet-grass				
M: high elevation forests or openings (Swain)				
Mnesithea cylindrica	**SC-H**		**SH**	**G4G5**
Carolina Jointgrass				
P: open woodlands and roadsides (Anson*, Union)				
Monarda media	**SR-P**		**S1?**	**G4?**
Purple Bee-balm				
M: grassy balds (Avery, Graham, Jackson)				
Mononeuria groenlandica	**T**		**S2**	**G5**
Greenland Sandwort				
MP: high elevation and low elevation rocky summits (Alleghany, Ashe, Avery, Burke, Caldwell, Henderson, McDowell, Mitchell, Stokes, Surry, Wilkes)				
Mononeuria paludicola	**E**		**S1**	**G1**
Godfrey's Sandwort				
T: tidal freshwater marshes (Craven, Jones*)				

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Mononeuria uniflora	**E**		**S1**	**G4**
Single-flowered Sandwort				
P: granite flatrocks (Anson, Rowan*, Rutherford)				
Monotropsis odorata	**SC-V**		**S3**	**G3**
Sweet Pinesap				
PM: dry forests and bluffs (Alamance*, Alleghany*, Buncombe, Burke, Caldwell, Catawba, Chatham, Cherokee, Clay, Cleveland, Durham, Haywood, Henderson, Jackson, Macon, McDowell, Mecklenburg, Orange, Person*, Polk, Randolph, Rutherford, Stokes, Swain*, Transylvania, Wake, Yancey)				
Moranopteris nimbata	**T**		**S1**	**G4?**
West Indian Dwarf Polypody				
M: spray zone behind waterfalls (Macon)				
Muhlenbergia glomerata	**SC-V**		**S1**	**G5**
Spiked Muhly				
M: olivine barrens, fens, mafic cliffs (Ashe, Avery, Clay)				
Muhlenbergia sobolifera	**SC-V**		**S2**	**G5**
Rock Muhly				
M: dripping cliffs and rocky slopes (Alexander, Ashe, Avery, Jackson, Macon, McDowell*, Mitchell*, Transylvania*)				
Muhlenbergia torreyana	**SC-V**		**S2**	**G3**
Pinebarren Smokegrass				
CS: cypress savannas (Brunswick, Cumberland, Hoke, Onslow, Pender, Richmond, Robeson)				
Myrica gale	**E**		**S1**	**G5**
Sweet Gale				
M: bogs (Henderson)				
Myriophyllum laxum	**E**		**S2**	**G3**
Loose Water-milfoil				
CS: limesink ponds, waters of natural lakes (Brunswick, Carteret, Craven*, Cumberland, Hoke, Onslow)				
Myriophyllum pinnatum	**SR-T**		**S1**	**G5**
Cutleaf Water-milfoil				
CS: pools and ditches (Bladen, Brunswick, Currituck*)				
Myriophyllum tenellum	**E**		**S1**	**G5**
Leafless Water-milfoil				
C: waters of natural lakes (Bladen, Tyrrell, Washington)				

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Myriopteris alabamensis	**SR-P**		**S1**	**G4G5**
Alabama Lipfern				
M: calcareous outcrops (Madison)				
Nabalus albus	**T**		**S2?**	**G5**
Northern Rattlesnake-root				
M: hardwood forests (Ashe, Granville, Haywood*, Henderson*, Jones, McDowell, Mitchell*, Montgomery, Onslow, Rutherford, Transylvania*)				
Narthecium montanum	**SC-H**		**SX**	**GX**
Appalachian Yellow Asphodel				
M: bogs (Henderson*)				
Oenothera perennis	**SC-V**		**S2**	**G5**
Perennial Sundrops				
MPC: wet meadows and bogs (Alleghany, Ashe, Avery*, Burke, Cabarrus, Clay, Hertford*, Iredell*, Jackson, Macon, McDowell, Transylvania, Tyrrell*, Watauga)				
Oenothera riparia	**SR-L**		**S2S3**	**G2G3**
Riverbank Evening-primrose				
C: tidal marshes (Brunswick, Dare, New Hanover, Pender, Tyrrell)				
Oldenlandia boscii	**E**		**S2**	**G5**
Bosc's Bluet				
C: clay-based Carolina bays (Brunswick, Columbus, Cumberland, Hoke, Robeson, Scotland)				
Oplismenus setarius	**SR-P**		**S1**	**G5T5**
Shortleaf Basket Grass				
TC: maritime forests, bottomlands (Bladen, Brunswick, Carteret, Columbus, Dare, Onslow, Pender, Washington)				
Orbexilum macrophyllum	**SC-H**		**SX**	**GX**
Bigleaf Scurfpea				
M: low mountain forests or outcrops? (Polk*)				
Orbexilum onobrychis	**SC-H**		**SH**	**G5**
Lanceleaf Scurfpea				
M: habitat in North Carolina not known (Haywood*)				
Orbexilum pedunculatum	**SR-P**		**S1**	**G5**
Sampson's Snakeroot				
MP: Open woodlands (Cherokee, Durham*, Orange*, Transylvania*)				
Oreojuncus trifidus	**SR-D**		**S1**	**G5**
Highland Rush				
M: high elevation rocky summits (Alleghany, Ashe, Buncombe, Mitchell)				

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Orthochilus ecristatus	**E**		**S1**	**G2G3**
Spiked Medusa				
C: Mesic pinelands with blackjack oak, sandhills, and dry-mesic to mesic longleaf pinelands. (Bladen*, Cumberland*, Hoke, New Hanover, Sampson*)				
Oxalis macrantha	**SR-D**		**SH**	**G3G5**
Sadie Price's Yellow Wood Sorrel				
P: Rich woodlands (Stanly*)				
Oxypolis canbyi	**E**	**E**	**S1**	**G2**
Canby's Dropwort				
C: clay-based Carolina bays (Scotland)				
Pachysandra procumbens	**E**		**S1**	**G4G5**
Allegheny Spurge				
P: cove forests (Polk)				
Packera crawfordii	**SR-T**		**S1**	**G2G3**
Bog Ragwort				
CM: bogs, fens, and wet savannas (Onslow, Pender, Watauga, Yancey)				
Packera millefolium	**T**		**S2**	**G3**
Divided-leaf Ragwort				
M: granitic domes, other outcrops (Buncombe, Haywood, Henderson, Jackson, Macon, McDowell, Polk, Rutherford, Transylvania)				
Packera paupercula var. appalachiana	**T**		**S1**	**G5TNR**
Prairie Ragwort				
M: mafic and calcareous glades, rock outcrops, and cliffs (Ashe, Madison)				
Packera paupercula var. paupercula	**SR-P**		**S1?**	**G5**
Balsam Ragwort				
PMC: fens, bogs, and diabase glades (Avery*, Burke, Caldwell*, Granville, McDowell, Nash*, Rutherford, Transylvania*, Watauga*)				
Packera schweinitziana	**T**		**S2**	**G5?**
Schweinitz's Ragwort				
M: grassy balds (Avery, Buncombe, Mitchell, Watauga, Yancey)				
Packera serpenticola	**SR-L**		**S1**	**G1**
Buck Creek Ragwort				
M: Serpentine barrens (Clay)				
Panicum dichotomiflorum var. puritanorum	**SR-P**		**S1**	**G5T4**
Puritan Panic Grass				
C: wet sands and peats of seasonally exposed pond and lake shores. (Onslow, Pender)				

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Panicum flexile	**T**		**S1**	**G5**
Wiry Panic Grass				
PM: glades and openings over mafic rocks (Ashe*, Durham, Granville, Henderson, Orange*)				
Panicum philadelphicum ssp. lithophilum	**SR-T**		**S1**	**G2G3Q**
Flatrock Panic Grass				
MP: soil islands on granite flatrocks (Anson, Granville)				
Parietaria praetermissa	**SC-V**		**S1**	**G3G4**
Large-seed Pellitory				
TC: shell middens, disturbed sites, maritime forests (Brunswick*, Carteret, Hyde, New Hanover*, Onslow)				
Parnassia caroliniana	**T**		**S2**	**G3**
Carolina Grass-of-Parnassus				
CS: wet savannas (Bladen, Brunswick, Columbus, Cumberland, Harnett, Hoke, Lee*, Onslow, Pender, Scotland)				
Parnassia grandifolia	**T**		**S2**	**G3**
Large-leaved Grass-of-Parnassus				
MCP: fens and seeps over calcareous or mafic rocks (Alleghany, Ashe, Avery*, Brunswick, Buncombe*, Clay, Columbus, Haywood, Macon, McDowell, Pender, Transylvania, Watauga)				
Paronychia herniarioides	**E**		**S1**	**G2G4**
Michaux's Whitlow-wort				
S: sandhills (Scotland)				
Parthenium auriculatum	**SR-T**		**S3**	**G3G4**
Glade Wild Quinine				
PM: glades and openings over mafic rocks (Alexander, Burke, Caswell, Durham, Franklin, Granville, Guilford*, Macon*, Mecklenburg, Montgomery, Orange, Person, Rockingham*, Rutherford, Stanly, Warren*)				
Parthenocissus inserta	**SR-P**		**S1**	**G5**
Thicket Creeper				
M: Rich alluvial forests (Polk)				
Paspalum dissectum	**E**		**S2**	**G4?**
Mudbank Crown Grass				
CTP: mudflats, other open wet areas (Brunswick, Columbus, Craven, Moore, Onslow, Pender, Scotland, Union*)				
Paspalum fluitans	**SR-P**		**S1**	**G5**
Horsetail Crown Grass				
CP: drawdown riverbanks and seepage areas in swamp forests (Bertie*, Bladen*, Chatham*, Harnett, Johnston, Martin*, Northampton*, Wake)				

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Paspalum vaginatum	**SR-P**		**S1S2**	**G5**
Seashore Crown Grass				
CPT: brackish marshes, low wet places (Carteret, Dare, Hyde, Onslow, Tyrrell)				
Pedicularis lanceolata	**T**		**S1**	**G5**
Swamp Lousewort				
M: bottomlands, swampy woods (Buncombe*, Cherokee*, Clay, Haywood, Jackson*, Macon*, Watauga*)				
Pellaea wrightiana	**E**		**S1**	**G5**
Wright's Cliff-brake				
P: rock outcrops, mafic or with nutrient-rich seepage (Alexander, Stanly, Union)				
Peltandra sagittifolia	**SR-P**		**S2S3**	**G3G4**
Spoonflower				
C: pocosins, other wet, peaty sites (Brunswick, Carteret, Columbus*, Craven, Dare, Jones, New Hanover, Onslow, Pender)				
Persicaria amphibia	**SR-P**		**S1**	**G5**
Water Smartweed				
MPC: marshes (Beaufort*)				
Persicaria hirsuta	**E**		**S1**	**G3G4**
Hairy Smartweed				
CS: limesink ponds, clay-based Carolina bays, drawdown zones of blackwater riverbanks (Bladen, Brunswick, Carteret*, Onslow*, Richmond, Scotland)				
Phacelia covillei	**SR-T**		**S3**	**G3**
Buttercup Phacelia				
PC: bottomlands, rich lower slopes (Alamance, Caswell, Chatham, Franklin, Harnett, Lee, Moore, Orange, Vance)				
Phacelia maculata	**E**		**S1**	**G3G4**
Spotted Phacelia				
P: granite flatrocks and creek bottomlands (Cleveland)				
Phanopyrum gymnocarpon	**SR-O**		**S2**	**G5**
Swamp Panic Grass				
C: tidal and blackwater cypress-gum swamps (Bertie, Bladen, Columbus, Martin, Pender, Robeson)				
Phegopteris connectilis	**E**		**S2**	**G5**
Northern Beech Fern				
M: spray zone of waterfalls, spruce-fir forests, high elevation seepage bogs (Buncombe, Haywood, Jackson, Macon, Mitchell, Swain*, Transylvania)				

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Phemeranthus piedmontanus	**SR-L**		**S1**	**G1**
Piedmont Fameflower				
P: shallow soil over mafic rock, where periodically wet by seepage (Granville)				
Phlox subulata	**SR-P**		**S1**	**G5**
Moss Pink				
M: outcrops and glades, especially over mafic rocks (Ashe, Buncombe, Jackson*, Macon*, Madison, Yancey)				
Pinguicula lutea	**SR-P**		**S1**	**G4G5**
Yellow Butterwort				
C: savannas (Bladen*, Brunswick, Columbus, New Hanover, Pender)				
Pinguicula pumila	**E**		**S2**	**G4**
Small Butterwort				
C: savannas (Brunswick*, Carteret, Columbus, Onslow, Pender)				
Pityopsis graminifolia var. graminifolia	**E**		**S1**	**G5T4**
A Silkgrass				
C: savannas, pine flatwoods, sandy roadsides (Brunswick, Columbus)				
Plantago cordata	**E**		**S1**	**G4**
Heart-leaf Plantain				
P: beds of small, slate-bottomed, perennial streams (Davidson)				
Plantago sparsiflora	**T**		**S1S2**	**G3**
Pineland Plantain				
C: wet savannas (Bladen*, Brunswick, Columbus, Onslow, Pender)				
Platanthera grandiflora	**T**		**S2**	**G5**
Large Purple-fringed Orchid				
M: bogs, seeps, grassy balds, high elevation moist forests and banks (Alleghany, Ashe, Avery, Buncombe, Clay, Haywood*, Macon, McDowell, Mitchell, Swain, Transylvania*, Watauga, Yancey)				
Platanthera herbiola	**SR-P**		**S1S2**	**G4?T4Q**
Northern Rein Orchid				
M: bogs and moist forests (Buncombe*, Burke, Cherokee, Clay*, Forsyth*, Graham*, Haywood, Jackson*, Macon, Mitchell, Swain*, Transylvania, Watauga)				
Platanthera integra	**SC-V**		**S2**	**G3G4**
Yellow Fringeless Orchid				
CMP: savannas (Brunswick, Carteret, Cherokee*, Columbus, Craven, Forsyth*, Henderson*, Jones, Onslow, Pamlico*, Pender, Robeson*, Rowan*)				

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Platanthera integrilabia	**SC-H**	**T**	**SH**	**G2G3**
White Fringeless Orchid				
M: bogs (Cherokee*, Henderson*)				
Platanthera nivea	**T**		**SH**	**G5**
Snowy Orchid				
C: wet savannas (Beaufort*, Bladen*, Brunswick, Columbus*, Craven, Dare*, Hoke*, New Hanover*, Pender*, Robeson*)				
Platanthera peramoena	**T**		**S2**	**G5**
Purple Fringeless Orchid				
MP: bogs, forests (Buncombe*, Burke*, Caldwell*, Clay*, Durham, Forsyth, Franklin, Graham, Guilford, Haywood*, Henderson*, Jackson, Macon, Mitchell*, Orange, Swain*, Transylvania, Warren, Watauga, Yancey*)				
Platanthera shriveri	**SR-T**		**S1**	**G1**
Shriver's Purple Fringed Orchid				
M: damp, open woods, often along seeps (Watauga)				
Poa paludigena	**SR-T**		**S1**	**G3**
Bog Bluegrass				
M: bogs (Ashe, Avery, Watauga)				
Poa palustris	**SR-P**		**S1**	**G5**
Swamp Bluegrass				
M: spruce-fir forests, grassy balds (Ashe, Avery, Haywood*, Henderson*, Macon, Mitchell, Polk*, Swain, Yancey*)				
Poa saltuensis	**T**		**S1**	**G5**
A Bluegrass				
M: olivine barrens (Clay, Haywood)				
Polemonium reptans var. reptans	**T**		**S1**	**G5T5**
Jacob's Ladder				
PM: moist, nutrient-rich forests such as bottomlands and rich slopes (Ashe, Iredell, Rockingham, Stokes*, Watauga*)				
Polygala hookeri	**SC-V**		**S2S3**	**G3**
Hooker's Milkwort				
C: savannas (Brunswick, Carteret, Columbus, Craven, New Hanover, Onslow, Pender)				
Polygala nana	**SR-D**		**SH**	**G5**
Dwarf Milkwort				
M: habitat in North Carolina not known (Buncombe*)				

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Polygala senega	**SR-D**		**S2**	**G4G5**
Seneca Snakeroot				
MP: woodlands and in thin soil around outcrops, usually over mafic or calcareous rocks (Ashe, Durham, McDowell, Stanly, Transylvania, Wake)				
Polygonella articulata	**SC-H**		**SH**	**G5**
Coast Jointweed				
C: sandhills (Gates*)				
Polygonum glaucum	**E**		**S1**	**G3**
Seabeach Knotweed				
T: ocean and sound beaches (Beaufort*, Brunswick, Carteret, Dare, Hyde, New Hanover*)				
Ponthieva racemosa	**T**		**S2**	**G4G5**
Shadow-witch				
C: blackwater forests and swamps, especially over marl (Beaufort*, Brunswick, Carteret, Craven, Jones, Onslow, Pender)				
Portulaca smallii	**T**		**S2**	**G3**
Small's Portulaca				
P: granite flatrocks and diabase glades (Cabarrus, Forsyth, Franklin, Granville, Rowan, Wake)				
Potamogeton amplifolius	**SR-D**		**S1**	**G5**
Largeleaf Pondweed				
C: submersed in blackwater streams (Brunswick, Craven*)				
Potamogeton confervoides	**SR-D**		**S2**	**G5**
Conferva Pondweed				
SC: beaverponds and old millponds on blackwater creeks (Craven, Cumberland, Gates*, Harnett, Hoke, Moore, Richmond, Scotland)				
Potamogeton illinoensis	**SR-D**		**S1**	**G5**
Illinois Pondweed				
C: alkaline waters of streams, rivers, lakes, and ponds (Brunswick*, Dare)				
Potamogeton natans	**SR-D**		**SH**	**G5**
Floating Pondweed				
M: lakes and artificial impoundments (Buncombe*)				
Potamogeton nodosus	**SR-D**		**SH**	**G5**
American Pondweed				
CMP: ponds and streams with moderate to high PH (Carteret*, Haywood*, Perquimans*, Vance*)				

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Primula meadia	**T**		**S2S3**	**G5**
Shooting-star				
MP: mafic cliffs, dry coniferous woodlands, and associated nutrient-rich alluvial forests (Anson, Buncombe, Davidson*, Forsyth*, Haywood, Henderson, Iredell*, Jackson, Macon, Mecklenburg*, Montgomery, Orange*, Rutherford, Stanly, Union, Watauga*)				
Prunus alleghaniensis var. alleghaniensis	**SR-T**		**S1**	**G4T4**
Allegheny Plum				
M: Dry rocky woodlands (McDowell, Rutherford)				
Prunus susquehanae	**SR-P**		**SH**	**G5T4T5**
Susquehanna Cherry				
MP: rocky forests (Durham*)				
Pseudognaphalium helleri	**SR-P**		**S3**	**G4G5T3**
Heller's Rabbit-tobacco				
PS: dry woodlands, openings, and glades, especially over mafic rocks (Anson*, Cabarrus, Davidson, Davie*, Forsyth*, Franklin*, Gaston, Granville, Guilford*, Halifax*, Hoke, Iredell*, Mecklenburg, Montgomery, Northampton*, Orange*, Person*, Richmond*, Rowan*, Scotland*, Union, Wake)				
Pseudognaphalium micradenium	**SR-T**		**S1**	**G4G5T3?**
Small Rabbit-tobacco				
P: dry woodlands (Caswell, Durham*, Granville*, Person, Stokes*, Vance)				
Ptilimnium ahlesii	**SR-T**		**S1**	**G1**
Carolina Bishopweed				
C: tidal freshwater marshes (Brunswick, New Hanover)				
Ptilimnium costatum	**T**		**S1**	**GNR**
Ribbed Bishop-weed				
CT: tidal swamps or marshes (New Hanover)				
Ptilimnium nodosum	**E**	**E**	**S1**	**G2**
Harperella				
P: rocky riverbeds (Chatham, Granville, Lee)				
Pycnanthemum curvipes	**SR-T**		**S1**	**G3**
Tennessee Mountain-mint				
M: dry rocky woodlands and rock outcrops (Buncombe, Haywood, Madison)				
Pycnanthemum setosum	**SR-T**		**S2**	**G4**
Awned Mountain-mint				
C: blackwater swamps (Brunswick, Columbus, Craven, Gates, Jones, Pender, Tyrrell)				

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Pycnanthemum torreyi	**SR-T**		**S1**	**G2**
Torrey's Mountain-mint				
PM: dry upland forests and woodlands, over mafic rocks (Alexander*, Ashe*, Caswell, Cleveland*, Gaston*, Granville*, Haywood*, Jackson*, Macon*, Orange, Person*, Wilkes*)				
Pycnanthemum virginianum	**SR-P**		**S1?**	**G5**
Virginia Mountain-mint				
CMP: forests, woodland borders, bogs (Alleghany, Brunswick, Caswell, Henderson, Wake)				
Pyrola elliptica	**E**		**S1**	**G5**
Elliptic Shinleaf				
M: moist forests (Ashe, Watauga*)				
Pyxidanthera brevifolia	**SR-L**		**S3**	**G3**
Sandhills Pyxie-moss				
S: sandhills (Brunswick*, Cumberland, Harnett, Hoke, Moore)				
Quercus austrina	**SR-P**		**S1**	**G4?**
Bluff Oak				
CP: bluff and bottomland forests over circumneutral soil (Anson, Craven, Johnston*, Montgomery, Richmond, Sampson)				
Quercus elliottii	**SR-P**		**S2**	**G3G5**
Running Oak				
CP: mesic pine flatwoods and dry, silty sites (Bladen, Brunswick, Columbus, Duplin*, New Hanover*, Pender*, Robeson)				
Quercus georgiana	**SR-P**		**S1**	**G3**
Georgia Oak				
P: dry slopes and bluffs (Rutherford)				
Quercus ilicifolia	**E**		**S2**	**G5**
Bear Oak				
P: dry summits and rocky woods on Piedmont monadnocks (Alleghany, Burke, Gaston, Stokes, Surry, Wilkes)				
Quercus minima	**SR-P**		**S1**	**G5**
Dwarf Live Oak				
C: pine flatwoods, coastal fringe sandhills (Bladen, Carteret, New Hanover)				
Quercus prinoides	**E**		**S1**	**G5**
Dwarf Chinquapin Oak				
PM: dry, rocky slopes (Caldwell, Caswell, Cleveland*, Gaston*, Guilford*, Iredell*, Jackson*, Polk*, Rowan, Rutherford, Stanly*)				

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Ranunculus ambigens **Water-plantain Spearwort** CP: open wet areas (Bertie*, Orange*, Perquimans*)	**SC-H**		**SH**	**G4**
Ranunculus fascicularis **Thick-root Buttercup** MP: serpentine and diabase barrens (Clay)	**SR-P**		**S1**	**G5**
Ranunculus flabellaris **Yellow Water-crowfoot** C: pools in blackwater swamps (Bertie, Edgecombe*, Gates*)	**SC-H**		**S1**	**G5**
Ranunculus hederaceus **Ivy Buttercup** C: marshes (Currituck*, Onslow)	**E**		**S1**	**G5**
Ranunculus micranthus **Rock Buttercup** P: rich woods on circumneutral soil (Caswell, Durham, Person*)	**SR-P**		**S1**	**G5**
Rhexia aristosa **Awned Meadow-beauty** C: clay-based Carolina bays and limesink ponds (Bladen, Brunswick*, Cumberland*, Hoke, Onslow, Robeson, Sampson, Scotland)	**SC-V**		**S3**	**G3G4**
Rhodiola rosea **Roseroot** M: high elevation rocky summits (Ashe*, Avery*, Caldwell*, Mitchell*, Watauga*, Yancey*)	**E**		**SH**	**G5**
Rhododendron cumberlandense **Cumberland Azalea** M: grassy or shrub balds (Graham*, Haywood*, Jackson, Macon, Swain, Transylvania)	**SR-P**		**S1**	**G4?**
Rhododendron prinophyllum **Election Pink** M: high elevation forests (Ashe)	**T**		**S1**	**G5**
Rhododendron vaseyi **Pink-shell Azalea** M: high elevation oak forests, heath balds, spruce-fir forests, and rocky areas (Avery, Buncombe, Caldwell, Haywood, Jackson, Macon*, McDowell, Mitchell*, Transylvania, Watauga, Yancey)	**SR-L**		**S3**	**G3**

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Rhus michauxii	**E**	**E**	**S2**	**G2G3**
Michaux's Sumac				
SCP: sandhills, sandy forests, woodland, woodland edges (Cumberland, Davie, Durham, Franklin, Hoke, Johnston*, Lincoln*, Mecklenburg, Moore, Nash, Orange*, Richmond, Robeson, Scotland, Union*, Wake, Wilson*)				
Rhynchospora alba	**SR-P**		**S2**	**G5**
Northern White Beaksedge				
MCS: fens, bogs, pocosin openings, limesink ponds (Alleghany, Ashe, Bladen, Brunswick, Craven, Cumberland*, Currituck, Dare, Mitchell, Pender*, Rutherford, Tyrrell, Watauga, Yancey)				
Rhynchospora crinipes	**T**		**S1**	**G2G3**
Alabama Beaksedge				
S: seepy banks of blackwater rivers (Hoke, Moore)				
Rhynchospora decurrens	**T**		**S1S2**	**G3G4**
Swamp Forest Beaksedge				
C: swamp forests (Brunswick, Columbus, Onslow, Pender)				
Rhynchospora divergens	**SR-P**		**S2**	**G4**
White-seeded Beaksedge				
C: wet savannas (Brunswick, Columbus, Onslow, Pender)				
Rhynchospora galeana	**SR-P**		**S2S3**	**G3G4**
Short-bristled Beaksedge				
C: savannas (Brunswick, Carteret, Columbus, Craven, Cumberland, Onslow, Pender)				
Rhynchospora harperi	**SC-V**		**S2**	**G4?**
Harper's Beaksedge				
C: limesink ponds and cypress savannas (Brunswick, Carteret, Onslow)				
Rhynchospora macra	**T**		**S2**	**G3G4**
Southern White Beaksedge				
S: sandhill seeps, blackwater impoundments, streamhead pocosins (Carteret, Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)				
Rhynchospora microcarpa	**SR-P**		**S2**	**G5**
Southern Beaksedge				
CTP: maritime wet grasslands, clay-based Carolina bays, limesink ponds, swamp forests (Brunswick, Carteret, Columbus, Dare, Pender)				
Rhynchospora odorata	**SC-V**		**S1**	**G4**
Fragrant Beaksedge				
T: maritime wet grasslands (Brunswick*, Carteret, Dare, Hyde, Pender*)				

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Rhynchospora pinetorum	**SR-T**		**S2**	**G5?T3?**
Small's Beaksedge				
C: wet savannas, maritime wet grasslands (Brunswick, Carteret, Columbus, Onslow, Pender)				
Rhynchospora pleiantha	**T**		**S2**	**G2G3**
Coastal Beaksedge				
C: limesink ponds (Bladen, Brunswick, Carteret, New Hanover, Onslow)				
Rhynchospora thornei	**SC-V**		**S2**	**G3**
Thorne's Beaksedge				
C: wet savannas (Brunswick, Onslow, Pender)				
Rhynchospora tracyi	**T**		**S2**	**G4**
Tracy's Beaksedge				
C: clay-based Carolina bays, limesink ponds (Brunswick, New Hanover, Onslow, Scotland)				
Robinia hartwigii	**SR-L**		**S1S2**	**G3T2**
Hartwig's Locust				
M: high elevation granitic domes (Jackson, Macon, Mitchell*)				
Robinia hispida var. fertilis	**SR-O**		**S1**	**G4T1Q**
Fruitful Locust				
M: acidic cove forests, northern hardwoods forests, high elevation granitic domes (Alleghany, Avery, Burke*, Graham*, Haywood, Jackson, Macon*, Stokes, Swain, Wilkes)				
Robinia hispida var. kelseyi	**SR-O**		**S1**	**G4T1**
Kelsey's Locust				
M: high elevation red oak forests, dry rocky woods (Buncombe*, Burke*, Haywood, Henderson, Madison, Transylvania*)				
Robinia viscosa	**SR-T**		**S1**	**G3**
Clammy Locust				
MP: open woods (Catawba*, Jackson*, Rutherford, Transylvania)				
Rosa virginiana	**SR-P**		**SH**	**G5**
Virginia Rose				
M: moist to dry forests and woodlands (Ashe*, Buncombe*)				
Rubus idaeus ssp. strigosus	**T**		**S2?**	**G5T5**
Red Raspberry				
M: high elevation spruce-fir forests and openings (Buncombe, Haywood, Jackson, Swain, Yancey)				
Rubus repens	**E**		**S2**	**G5**
Robin Runaway				
M: bogs and moist woods under rhododendrons (Alleghany, Ashe, Transylvania)				

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Rudbeckia heliopsidis	**E**		**S1**	**G2**
Sun-facing Coneflower				
C: moist pine flatwoods and woodland borders (Harnett, Moore)				
Rudbeckia triloba var. beadlei	**SR-T**		**S1**	**G5TNR**
Chauncey's Coneflower				
M: mafic cliffs (Buncombe, Graham, Madison, Swain)				
Ruellia ciliosa var. ciliosa	**T**		**S2**	**G5T3T5**
Sandhills Wild-petunia				
S: sandhills, especially in loamy, submesic swales (Cumberland, Hoke, Richmond, Scotland)				
Ruellia humilis	**E**		**S1**	**G5**
Low Wild-petunia				
P: diabase glades (Durham, Granville, Stanly, Wake)				
Ruellia purshiana	**SC-V**		**S2**	**G3**
Pursh's Wild-petunia				
PM: glades and woodlands, mostly over mafic or calcareous rocks (Alamance, Caswell, Cleveland, Davidson, Durham, Forsyth*, Gaston, Granville, Madison, Montgomery, Orange, Randolph*, Rutherford*, Stanly, Wake*)				
Ruellia strepens	**E**		**S1**	**G4G5**
Limestone Wild-petunia				
C: low woods over marl (Bertie, Pender, Richmond)				
Rugelia nudicaulis	**SR-L**		**S3**	**G3**
Rugel's Ragwort				
M: spruce-fir forests (Haywood, Swain)				
Sabal palmetto	**T**		**S1**	**G5**
Cabbage Palm				
TC: maritime forests on the southeastern coast (Brunswick, Carteret*, Dare, New Hanover)				
Sabatia kennedyana	**T**		**S2**	**G3**
Plymouth Gentian				
C: drawdown zones on banks of blackwater rivers (Brunswick, Columbus)				
Sageretia minutiflora	**T**		**S1**	**G4**
Small-flowered Buckthorn				
C: shell middens (Carteret, Onslow, Pender)				
Sagittaria chapmanii	**E**		**S1**	**G5T3?**
Chapman's Arrowhead				
C: limesink ponds (Bladen, Carteret, Columbus, Onslow)				

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Sagittaria fasciculata	**E**	**E**	**S1**	**G2**
Bunched Arrowhead				
M: bogs and mountain swamp forests (Buncombe*, Henderson)				
Sagittaria filiformis	**SR-P**		**SH**	**G4G5**
Water Arrowhead				
C: blackwater streams, rivers, and lakes (Bladen, Columbus*, Craven*, Pender, Wilson*)				
Sagittaria isoetiformis	**T**		**S2**	**G4?**
Quillwort Arrowhead				
CS: limesink ponds, clay-based Carolina bays, beaver ponds, natural lakes (Bladen, Brunswick*, Columbus, Cumberland, Hoke, New Hanover, Sampson, Scotland, Washington)				
Sagittaria macrocarpa	**T**		**S2**	**G5T2**
Streamhead Sagittaria				
S: shoreline of blackwater stream impoundment (Hoke, Moore)				
Sagittaria weatherbiana	**E**		**S2**	**G5T3T4**
Grassleaf Arrowhead				
C: fresh to slightly brackish marshes, streams, swamps, and pond margins (Beaufort*, Bladen*, Brunswick*, Columbus, Craven, Currituck*, Duplin, Gates*, Hyde*, New Hanover, Onslow, Pasquotank*, Pender, Pitt*, Sampson*, Wake*)				
Salvia azurea var. azurea	**SR-P**		**S2**	**G4G5T4?**
Azure Sage				
SC: sandhills (Anson, Hoke, New Hanover*, Richmond, Scotland)				
Sarracenia jonesii	**E**	**E**	**S1**	**G4T2**
Mountain Sweet Pitcher Plant				
M: bogs (Buncombe, Henderson, Macon, Transylvania)				
Sarracenia minor var. minor	**E**		**S2**	**G4T4**
Hooded Pitcherplant				
C: savannas (Brunswick, Columbus, New Hanover)				
Sarracenia oreophila	**E**	**E**	**S1**	**G2**
Green Pitcher Plant				
M: seepage bogs (Clay)				
Sarracenia purpurea var. montana	**SR-L**		**S1S2**	**G5T1T3**
Southern Appalachian Purple Pitcherplant				
M: mountain bogs, seepage bogs (Henderson, Jackson, Macon, Transylvania)				

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Sceptridium jenmanii	**SC-V**		**S2**	**G3G4**
Alabama Grape-fern				
MP: moist woods (Buncombe*, Burke, Cherokee, Clay*, Davie*, Granville, Iredell*, Jackson*, McDowell, Mecklenburg*, Rockingham*, Rutherford, Stokes*, Transylvania*)				
Sceptridium lunarioides	**SR-P**		**SH**	**G4?**
Winter Grape-fern				
P: dry pine woods (Davie*)				
Sceptridium multifidum	**SR-P**		**S1**	**G5**
Leathery Grape-fern				
M: grassy balds (Alleghany, Avery, Mitchell)				
Sceptridium oneidense	**SR-P**		**S2**	**G4**
Blunt-lobed Grape-fern				
MP: cove forests, bogs (Avery*, Buncombe*, Burke, Forsyth*, Haywood*, Jackson, Macon, McDowell, Mitchell*, Rutherford, Yancey*)				
Schisandra glabra	**T**		**S1**	**G3**
Magnolia Vine				
CP: rich slopes and floodplain islands (Gaston, Martin)				
Schoenoplectus acutus	**SR-P**		**SH**	**G5**
Hardstem Bulrush				
C: natural lakes (Carteret*, Craven*, Hyde*)				
Schoenoplectus etuberculatus	**SR-P**		**S3**	**G3G4**
Canby's Bulrush				
CS: blackwater creeks (Bladen, Brunswick, Carteret, Columbus, Craven*, Cumberland, Dare*, Harnett, Hoke, Hyde*, Johnston*, Moore, Onslow, Pender*, Randolph*, Richmond, Scotland, Wayne*)				
Schwalbea americana	**E**	**E**	**S2**	**G2**
Chaffseed				
SC: savannas and moist to dryish pinelands with frequent fire (Bladen, Cumberland, Hoke, Moore*, Pender*, Scotland)				
Scirpus divaricatus	**SR-O**		**S2?**	**G5**
Spreading Bulrush				
C: swamp forests (Bladen, Duplin)				
Scirpus flaccidifolius	**E**		**S1**	**G2**
Reclining Bulrush				
C: swamp forests (Northampton)				

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Scirpus lineatus	**T**		**S2**	**G4**
Drooping Bulrush				
C: low rich woods over marl (Brunswick, Carteret, Craven, Jones, New Hanover, Onslow, Pender)				
Scirpus pendulus	**SR-O**		**S1**	**G5**
Rufous Bulrush				
PC: wet places over mafic rocks (Cabarrus, Carteret, Durham*, Granville, Onslow)				
Scleria baldwinii	**T**		**S2**	**G4**
Baldwin's Nutrush				
C: wet savannas (Brunswick, Carteret, Columbus, Pender)				
Scleria bellii	**SR-L**		**S1**	**G2G3**
Smooth-seeded Hairy Nutrush				
C: pine savannas over limestone, diabase glades (Granville*, Onslow, Pender)				
Scleria reticularis	**T**		**S2**	**G4**
Netted Nutrush				
CS: clay-based Carolina bays, limesink ponds (Brunswick, Cumberland, Hoke, New Hanover, Onslow, Sampson, Scotland)				
Scleria verticillata	**SR-P**		**S2**	**G5**
Savanna Nutrush				
TC: calcareous wet savannas, maritime wet grasslands influenced by shell deposits (Brunswick*, Carteret, Columbus, Dare, Hyde, New Hanover*, Onslow, Pender, Tyrrell)				
Sclerolepis uniflora	**SR-T**		**S2**	**G4**
One-flower Hardscale				
C: clay-based Carolina bays, blackwater river foodplains, limesink ponds (Brunswick, Columbus, Cumberland, Hoke, Moore, New Hanover*, Robeson, Sampson*, Scotland)				
Scrophularia lanceolata	**SR-P**		**S1**	**G5**
American Figwort				
P: woodlands and forests (Guilford)				
Scutellaria australis	**E**		**S1**	**G4T4?**
Southern Skullcap				
PS: alluvial forests (Anson*, Granville*, Johnston*, Lee*, Orange*, Richmond*, Wake*)				
Scutellaria galericulata	**SC-H**		**SH**	**G5**
Hooded Skullcap				
M: spring-fed seepage (Buncombe*)				
Scutellaria leonardii	**E**		**S2**	**G4T4**
Shale-barren Skullcap				
P: diabase glades (Durham, Granville, Moore, Orange)				

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Scutellaria nervosa	**E**		**S1**	**G5**
Veined Skullcap				
P: alluvial forests (Chatham*, Durham*, Granville, Halifax, Jackson*, Northampton, Person, Wake, Warren*)				
Scutellaria ovata ssp. rugosa var. 1	**SR-T**		**S1**	**G1?Q**
Appalachian Skullcap				
M: rocky forests, boulderfields (Buncombe, Madison, Rutherford)				
Scutellaria saxatilis	**SR-T**		**S2**	**G3**
Rock Skullcap				
MP: northern hardwoods forests, rocky woodlands (Alleghany, Ashe, Cherokee, Graham, Mitchell, Watauga*, Yancey)				
Sedum glaucophyllum	**SR-P**		**S2**	**G4**
Cliff Stonecrop				
PM: rock outcrops, mainly calcareous or mafic (Jackson, Macon, Montgomery, Rockingham, Stokes)				
Sedum pusillum	**E**		**S1**	**G3**
Puck's Orpine				
P: granite flatrocks (Anson)				
Senecio suaveolens	**SC-H**		**S1**	**G4**
Sweet Indian-plantain				
M: bottomlands (Buncombe*, Henderson, Transylvania*)				
Sesuvium maritimum	**SR-O**		**S1?**	**G5**
Slender Sea-purslane				
T: seabeaches, marshes (Brunswick, Dare, New Hanover)				
Sesuvium portulacastrum	**SR-P**		**S1**	**G5**
Shoreline Sea-purslane				
T: seabeaches (Brunswick, Carteret, Dare, New Hanover, Onslow)				
Seymeria pectinata ssp. pectinata	**SC-H**		**SH**	**G4G5TNR**
Comb Seymeria				
C: dry pinelands, longleaf pine sandhills (Brunswick*)				
Shortia galacifolia var. brevistyla	**E**		**S2**	**G3T2**
Northern Oconee Bells				
M: streambanks, slopes, and outcrops in humid gorges (McDowell)				
Shortia galacifolia var. galacifolia	**SC-V**		**S2**	**G3T2T3**
Southern Oconee Bells				
M: streambanks, slopes, and outcrops in humid gorges (Jackson*, Macon, Swain*, Transylvania)				

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Sida elliottii var. elliottii	**SR-P**		**S1**	**G4G5TNR**
Coastal Plain Sida				
P: stream banks, sandy woodlands (Iredell)				
Sideroxylon tenax	**T**		**S1**	**G3?**
Tough Bumelia				
T: maritime forests and scrub (Brunswick, New Hanover)				
Silene ovata	**SC-V**		**S3**	**G3**
Mountain Catchfly				
M: rich slopes, cove forests, montane oak-hickory forests (Buncombe, Cherokee, Graham, Haywood, Henderson, Jackson, Macon, Madison, Mitchell, Rutherford*, Swain, Yancey)				
Silphium connatum	**SC-V**		**S2**	**G5T3T4**
Virginia Cup-plant				
MP: floodplains, rich alluvial woods (Alleghany, Ashe, Iredell, Rockingham, Stokes, Surry, Yadkin)				
Silphium perfoliatum	**T**		**S1**	**G5**
Northern Cup-plant				
PM: floodplains (Alleghany, Ashe, Cabarrus, Forsyth, Iredell*, Mecklenburg, Stokes, Surry)				
Silphium terebinthinaceum	**SR-P**		**S2**	**G4G5**
Prairie Dock				
P: diabase glades, other open or semi-open sites over mafic rock (Cabarrus, Davie, Durham, Granville, Mecklenburg, Person, Stanly, Union, Wake*)				
Sisyrinchium dichotomum	**E**	**E**	**S2**	**G2**
White Irisette				
M: thin woods, especially over amphibolite, in the escarpment region (Burke, Henderson, McDowell, Polk, Rutherford)				
Smilax hugeri	**SR-P**		**S3**	**G4**
Huger's Carrion-flower				
MP: deciduous forests (Anson, Clay, Cumberland, Graham, Macon, Richmond, Swain)				
Smilax lasioneura	**SR-P**		**S1**	**G5**
Blue Ridge Carrion-flower				
MP: oak-hickory forests over mafic rocks (Guilford*, Henderson, McDowell, Polk, Rutherford)				
Solanum pseudogracile	**SR-T**		**S1**	**GNR**
Graceful Nightshade				
T: dunes (Brunswick, Carteret, New Hanover*, Onslow, Pamlico)				

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Solidago leavenworthii	**T**		**S1**	**G3G4**
Leavenworth's Goldenrod				
C: savannas, pocosin borders, clay-based Carolina bays, peaty seeps (Carteret*, Columbus, Robeson, Sampson, Scotland*)				
Solidago plumosa	**T**		**S1**	**G1**
Yadkin River Goldenrod				
P: riverside rocks (Montgomery, Stanly)				
Solidago ptarmicoides	**E**		**S1**	**G5**
Prairie Goldenrod				
P: diabase glades (Granville, Rowan*)				
Solidago radula	**E**		**S1**	**G5?**
Western Rough Goldenrod				
P: dry woodlands over mafic rocks (Montgomery, Stanly, Wake*)				
Solidago rigida var. glabrata	**SR-P**		**S2**	**G5T4**
Southeastern Bold Goldenrod				
P: diabase glades, other open sites over mafic rock (Cabarrus, Durham, Granville, Mecklenburg*, Person, Rockingham, Union)				
Solidago rigida var. rigida	**T**		**S1**	**G5T5**
Prairie Bold Goldenrod				
M: forest openings, presumably on mafic or calcareous rocks (Buncombe*, Haywood*, Macon, Madison*, McDowell)				
Solidago simulans	**SR-L**		**S2**	**G2**
Granite Dome Goldenrod				
M: high and low elevation granitic domes south of the Asheville Basin (Buncombe, Graham, Jackson, Macon, Rutherford, Swain, Transylvania)				
Solidago spithamaea	**T**	**T**	**S2**	**G2**
Blue Ridge Goldenrod				
M: high elevation rocky summits (Ashe, Avery, Buncombe, Mitchell, Watauga)				
Solidago squarrosa	**SR-P**		**S1**	**G4G5**
Squarrose Goldenrod				
M: moist forests at high elevations (Buncombe*, Jackson, Watauga)				
Solidago tortifolia	**E**		**S1**	**G4G5**
Twisted-leaf Goldenrod				
CS: dry savannas and and mesic flats (Bladen, Brunswick*, Hoke, Jones*, New Hanover*, Pender, Robeson*, Scotland*)				

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Solidago uliginosa var. uliginosa	**SR-P**		**S1S2**	**G5T4T5**
Bog Goldenrod				
MSP: bogs, seeps (Ashe, Clay*, Haywood, Macon*, Madison*, Transylvania, Watauga, Yancey)				
Solidago ulmifolia	**SR-D**		**S1?**	**G5**
Elm-leaf Goldenrod				
PM: wooded stream banks (Burke, Durham*, Jackson, McDowell, Rockingham, Rutherford)				
Solidago verna	**SR-O**		**S3**	**G3**
Spring-flowering Goldenrod				
CS: mesic to moist pinelands, pocosin ecotones (Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Duplin, Harnett, Hoke, Johnston, Jones, Moore, New Hanover, Onslow, Pamlico, Pender, Richmond, Sampson, Scotland)				
Solidago villosicarpa	**E**		**S1**	**G1**
Coastal Goldenrod				
C: edges and openings in maritime upland forests (Brunswick, Craven, Dare, New Hanover*, Onslow, Pender)				
Sparganium emersum	**T**		**S1**	**G5**
Greenfruit Bur-reed				
M: pondshores (Avery, Jackson*, Macon, Watauga)				
Spartina pectinata	**SC-V**		**S1**	**G5**
Freshwater Cordgrass				
MCS: freshwater marshes, spray zones of waterfalls, other moist sites (Alleghany, Ashe, Chowan*, Mitchell*, Montgomery*, Pasquotank, Transylvania)				
Spigelia marilandica	**T**		**S1**	**G4**
Pink-root				
M: open woods (Cherokee)				
Spiraea corymbosa	**E**		**S1**	**G5T4?**
Shinyleaf Meadowsweet				
P: open woods, thin soil over rock (Alexander, Alleghany, Catawba, Stokes)				
Spiraea virginiana	**T**	**T**	**S2**	**G2**
Virginia Spiraea				
M: riverbanks (Ashe, Buncombe, Graham, Macon, Mitchell, Swain, Transylvania, Yancey)				
Spiranthes eatonii	**E**		**S2**	**G2G4**
Eaton's Ladies'-tresses				
CS: pine savannas and pine-oak sandhills (Beaufort*, Bladen*, Brunswick, Carteret, Craven, Cumberland*, Moore, Onslow, Pamlico*, Pender)				

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Spiranthes floridana	**SR-P**		**S1**	**G1**
Florida Ladies'-tresses				
C: wet savannas and other moist sites (Brunswick, Pender*)				
Spiranthes lacera var. lacera	**E**		**S1**	**G5T5**
Northern Slender Ladies'-tresses				
M: mountain balds (Clay*, Jackson)				
Spiranthes laciniata	**SC-V**		**S2**	**G4G5**
Lace-lip Ladies'-tresses				
C: moist wet habitats (Beaufort*, Bladen, Brunswick, Carteret, Columbus, New Hanover, Onslow, Pender)				
Spiranthes longilabris	**E**		**S1**	**G3**
Giant Spiral Orchid				
C: savannas (Bladen, Brunswick, Carteret, Onslow, Pender)				
Spiranthes lucida	**E**		**S1**	**G4**
Shining Ladies'-tresses				
M: seepage over amphibolite (Alleghany)				
Spiranthes ochroleuca	**T**		**S1**	**G4**
Yellow Ladies'-tresses				
M: grassy balds, meadows, wooded slopes (Ashe, Avery, Buncombe*, Haywood*, Rutherford, Watauga, Yancey*)				
Sporobolus heterolepis	**T**		**S1**	**G5**
Prairie Dropseed				
M: olivine barrens (Clay, Jackson)				
Sporobolus teretifolius	**T**		**S1**	**G2**
Wireleaf Dropseed				
C: wet savannas (Brunswick, Columbus)				
Sporobolus virginicus	**T**		**S1**	**G5**
Saltmarsh Dropseed				
T: brackish marshes (Brunswick)				
Stachys appalachiana	**SR-L**		**S1**	**GNR**
Appalachian Hedge-nettle				
M: fens, usually over mafic or ultramafic rocks (Alleghany, Ashe*, Watauga*)				
Stachys cordata	**SR-P**		**S1**	**G5?**
Heartleaf Hedge-nettle				
M: rich forests, especially over calcareous rock (Madison, Montgomery)				

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Stachys eplingii	**SR-T**		**S1**	**GNR**
Epling's Hedge-nettle				
M: bogs (Burke*, Henderson, Jackson*, Watauga)				
Stachys matthewsii	**SR-T**		**S1**	**G1G2**
Yadkin Hedge-nettle				
P: sandy edges of forested floodplains (Durham*, Granville, Montgomery)				
Stachys tenuifolia	**SR-D**		**S1**	**G5**
Smooth Hedge-nettle				
C: swamp forests, edges of bottomlands (Bertie, Burke, Jackson, Macon, Martin, Northampton)				
Stenanthium gramineum var. robustum	**T**		**S1**	**G4G5T3**
Bog Featherbells				
M: bogs and wet meadows (Alleghany, Ashe, Avery)				
Stenanthium leimanthoides	**T**		**S1**	**G4Q**
Pinebarren Death-camas				
M: high elevation rocky summits, thin soil at high elevations (Ashe, Avery, Burke, Yancey)				
Stewartia ovata	**SR-P**		**S3**	**G4**
Mountain Camellia				
MP: bluffs and forests, usually with rhododendrons (Catawba, Cherokee, Clay, Graham, Granville, Haywood, Macon, Madison*, Montgomery, Randolph, Rutherford, Stokes, Swain, Transylvania, Wilkes)				
Streptopus amplexifolius var. amplexifolius	**SC-V**		**S1**	**G5T5**
White Mandarin				
M: spruce-fir forests (Buncombe, Haywood, Jackson, Mitchell, Swain*, Yancey)				
Stylisma aquatica	**E**		**S2**	**G4**
Water Dawnflower				
C: clay-based Carolina bays, pineland pools (Brunswick, Columbus*, Cumberland, Moore, Robeson, Scotland)				
Stylisma pickeringii var. pickeringii	**SC-V**		**S3**	**G4T3**
Pickering's Dawnflower				
SC: sandhills (Bladen, Carteret, Cumberland, Harnett, Hoke, Moore, New Hanover, Richmond, Sampson, Scotland)				
Symphyotrichum concinnum	**T**		**S2**	**G5T4**
Narrow-leaved Smooth Aster				
P: forests, woodland borders especially over mafic rocks (Alamance*, Alexander*, Caswell, Clay, Davie*, Durham, Granville, Iredell*, Orange*, Rutherford, Stanly, Union, Wake*)				

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Symphyotrichum depauperatum	**E**		**S1**	**G2**
Serpentine Aster				
P: diabase glades (Granville)				
Symphyotrichum georgianum	**T**	**C**	**S3**	**G3**
Georgia Aster				
P: open woods, roadsides, and other rights-of-way (Davidson, Gaston, Lincoln, Mecklenburg, Montgomery, Randolph, Rowan, Stanly, Union)				
Symphyotrichum laeve	**SR-P**		**S1S2**	**G5**
Smooth Blue Aster				
P: forests, woodland borders especially over mafic rocks (Ashe, Clay, Gaston*, Graham, Jackson, Macon, Orange*, Polk*)				
Symphyotrichum oblongifolium	**T**		**S1**	**G5**
Aromatic Aster				
M: thin soils around limestone outcrops (Madison)				
Symphyotrichum rhiannon	**T**		**S1**	**G1**
Buck Creek Aster				
M: serpentine pine barrens (Clay)				
Symphyotrichum shortii	**SR-P**		**S2**	**G5**
Short's Aster				
M: bluffs and rocky banks (Cherokee, Transylvania*)				
Synandra hispidula	**E**		**S1**	**G4**
Synandra				
M: rich cove forests (Jackson*, Swain)				
Taxus canadensis	**T**		**S1**	**G5**
Canada Yew				
M: bogs, swamp forests under spruce (Ashe, Watauga)				
Thalictrum cooleyi	**E**	**E**	**S1**	**G1**
Cooley's Meadowrue				
C: wet savannas (Brunswick, Columbus, New Hanover, Onslow, Pender)				
Thalictrum macrostylum	**SR-T**		**S2**	**G3G4**
Small-leaved Meadowrue				
CSPM: bogs and wet woods (Alleghany, Ashe, Beaufort, Carteret, Cherokee, Clay, Cumberland, Gates, Graham, Henderson, Hertford, Hyde*, Jones, Macon, McDowell, Moore, Nash, New Hanover, Northampton, Pender, Richmond, Rutherford, Transylvania)				

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Thaspium pinnatifidum	**T**		**S1**	**G2G3**
Mountain Thaspium				
M: calcareous slopes (Jackson*, Macon, Madison, McDowell, Swain*)				
Thelypteris simulata	**E**		**S1**	**G4G5**
Bog Fern				
M: bogs (Alleghany, Avery)				
Thermopsis fraxinifolia	**SC-V**		**S2?**	**G3?**
Ash-leaved Golden-banner				
MP: dry ridges (Buncombe, Burke, Henderson, Jackson, Macon, McDowell, Polk, Stokes, Surry, Transylvania, Yancey)				
Thermopsis mollis	**SC-V**		**S2**	**G3G4**
Appalachian Golden-banner				
PM: dry ridges and open woodlands (Alexander, Buncombe*, Burke, Cabarrus*, Caldwell, Catawba, Chatham*, Cleveland, Columbus*, Durham*, Forsyth*, Franklin*, Gaston, Granville, Guilford*, Henderson, Iredell*, Lincoln, McDowell, Orange, Polk, Rutherford, Stokes, Surry, Vance*, Wake, Warren)				
Tomostima reptans	**SR-P**		**SH**	**G5**
Creeping Draba				
P: dry soil (Lincoln*)				
Torreyochloa pallida var. pallida	**SR-P**		**S1**	**G5**
Pale Mannagrass				
CM: blackwater pools, old millponds, and small stream swamps (Avery*, Columbus*, Currituck, Duplin*, Gates, Harnett, Henderson, Martin)				
Tradescantia virginiana	**T**		**S2**	**G5**
Virginia Spiderwort				
P: rich woods on circumneutral soils (Ashe, Burke, Caswell, Harnett, Lincoln, McDowell, Mecklenburg, Montgomery*, Moore, Orange, Randolph, Rockingham, Rutherford, Stanly, Surry, Wake)				
Triantha glutinosa	**SC-V**		**S1**	**G5**
Sticky Bog Asphodel				
MP: bogs, seepages (Ashe, Caldwell*, Haywood, Henderson*, Jackson, Transylvania)				
Trichophorum cespitosum	**SR-D**		**S2S3**	**G5**
Deerhair Bulrush				
M: high elevation rocky summits, moist cliffs (Ashe, Avery, Buncombe, Burke, Caldwell*, Haywood, Henderson, Jackson, Macon, Mitchell, Rutherford, Transylvania, Watauga, Yancey)				

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Trichostema brachiatum	**E**		**S1**	**G5**
Glade Bluecurls				
PM: diabase glades, other dry calcareous or mafic outcrops (Buncombe, Granville, Madison, Orange*, Rockingham, Yancey*)				
Trichostema setaceum	**SR-T**		**S2**	**G5**
Narrowleaf Bluecurls				
SPC: dry woodlands, granite flatrocks (Alexander, Bladen, Burke, Cleveland, Hoke, Macon, McDowell, Moore, Richmond, Robeson, Rutherford, Wake, Wilkes)				
Trichostema sp. 1	**SR-L**		**S2**	**G2**
Dune Bluecurls				
T: dunes, openings in maritime forest and scrub (Brunswick, Carteret, Dare, Hyde, New Hanover)				
Tridens ambiguus	**E**		**S1**	**G4**
Pineland Triodia				
C: clay-based Carolina bays (Scotland)				
Tridens chapmanii	**T**		**S1S2**	**G5T3**
Chapman's Redtop				
CP: dry pine and oak woods, sandy roadsides (Bladen, Carteret*, Craven, Dare, Durham*, Hoke, Jones, Martin*, Montgomery, Moore, Orange*, Pender, Richmond, Scotland*)				
Tridens strictus	**SC-H**		**SH**	**G5**
Spike Triodia				
C: pine flatwoods (Duplin*, Hoke*, Pender*, Robeson*)				
Trientalis borealis	**E**		**S1**	**G5**
Starflower				
M: coves, northern hardwood forest (Buncombe, Cherokee, Graham, Haywood)				
Trifolium carolinianum	**SC-H**		**SH**	**G5**
Carolina Clover				
C: savannas, sandy open areas (Duplin*, New Hanover*, Onslow*)				
Trifolium reflexum	**T**		**S1S2**	**G3G4**
Buffalo Clover				
PMSC: open woods and clearings (Ashe, Buncombe*, Caswell, Chatham*, Durham*, Granville, Halifax*, Harnett, Iredell, Madison, Montgomery, Moore, Randolph*, Wake, Yadkin)				
Trillium discolor	**T**		**S1**	**G4**
Mottled Trillium				
M: rich coves in the Savannah River drainage (Jackson, Transylvania)				

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Trillium flexipes	**SC-H**		**S1**	**G5**
Bent White Trillium				
M: rich coves (Cherokee, Henderson, Swain*)				
Trillium pusillum var. ozarkanum	**E**		**S1**	**G3T3**
Alabama Least Trillium				
M: rich cove forests (Clay, Haywood*, Macon)				
Trillium pusillum var. pusillum	**E**		**S2**	**G3T2Q**
Carolina Least Trillium				
CP: ecotones between savannas and nonriverine wet hardwood forests, over marl (Anson, Onslow, Pender)				
Trillium pusillum var. virginianum	**E**		**S1**	**G3T2**
Virginia Least Trillium				
C: mesic to swampy hardwood forests (Camden, Currituck, Gates, Halifax, Johnston, Nash, Wake)				
Trillium recurvatum	**SR-P**		**S1**	**G5**
Prairie Trillium				
M: rich coves (Catawba)				
Trillium sessile	**T**		**S1**	**G4G5**
Sessile-flowered Trillium				
C: rich alluvial levees and slopes (Halifax, Northampton)				
Trillium simile	**T**		**S2**	**G3**
Sweet White Trillium				
MP: rich coves (Buncombe, Burke, Cherokee, Graham, Haywood*, Henderson, Jackson, Macon, Madison, McDowell, Polk, Rutherford, Swain*, Yancey)				
Trisetum spicatum	**SC-H**		**SH**	**G5**
Soft Trisetum				
M: grassy balds and/or high elevation rocky summits (Mitchell*)				
Turritis glabra	**E**		**S1**	**G5**
Tower Mustard				
M: mountain forests and meadows (Avery, Madison*, Watauga)				
Urtica chamaedryoides	**E**		**S2**	**G4G5**
Dwarf Stinging Nettle				
C: rich blackwater and brownwater levee forests (Bertie, Halifax, Johnston, Northampton)				
Utricularia cornuta	**T**		**S1S2**	**G5**
Horned Bladderwort				
CM: bogs, limesink ponds (Ashe, Brunswick, Columbus, Franklin, New Hanover, Robeson*, Rutherford, Watauga)				

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Utricularia floridana	**SR-T**		**SH**	**G3G5**
Florida Bladderwort				
C: natural lakes (Bladen*, Wayne*)				
Utricularia geminiscapa	**SC-V**		**S1**	**G4G5**
Two-flowered Bladderwort				
SC: seepage areas on Suffolk Scarp, beaver ponds (Beaufort, Cumberland, Hoke, Moore, Pender)				
Utricularia macrorhiza	**SR-O**		**S1?**	**G5**
Greater Bladderwort				
C: pools and ponds (Dare, Hyde)				
Utricularia minor	**SC-H**		**SH**	**G5**
Small Bladderwort				
M: bogs (Watauga*)				
Utricularia olivacea	**T**		**S2**	**G4**
Dwarf Bladderwort				
C: limesink ponds, beaver ponds (Brunswick, Carteret, Craven*, Cumberland, Hoke, New Hanover, Onslow, Pender)				
Utricularia resupinata	**E**		**S1**	**G4**
Northeastern Bladderwort				
C: natural lakes (Columbus, Washington)				
Vaccinium angustifolium	**SR-P**		**S1**	**G5**
Northern Lowbush Blueberry				
M: High elevation acidic forests and woodlands (Graham, Swain)				
Vaccinium macrocarpon	**T**		**S2**	**G5**
Cranberry				
MC: bogs, seeps, pocosins (Alleghany, Ashe, Avery, Bladen*, Brunswick, Burke, Caldwell*, Cumberland, Currituck*, Dare, Haywood, Hyde, Transylvania, Tyrrell, Watauga)				
Vandenboschia boschiana	**E**		**S1**	**G4**
Appalachian Filmy-fern				
M: spray zone of waterfalls, seeps over rock (Graham, Henderson*, Jackson, Macon, Polk*, Rutherford*)				
Veratrum woodii	**T**		**S1**	**G5**
Ozark Bunchflower				
M: circumneutral soil of woodlands over mafic rocks such as amphibolite or other calcareous substrates (Polk)				

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Verbesina walteri	**SR-T**		**S1**	**G4**
Walter's Crownbeard				
M: rich cove forests (Henderson, Macon, Mitchell, Polk, Transylvania, Yancey)				
Veronica americana	**T**		**S2**	**G5**
American Speedwell				
MC: seeps, bogs (Alleghany, Ashe*, Avery, Craven*, Madison, Mitchell*, Watauga, Yancey*)				
Viola appalachiensis	**SC-V**		**S2**	**G4**
Appalachian Violet				
M: olivine barrens and alluvial forests (Clay, Jackson, Macon, Swain)				
Viola walteri	**SR-T**		**S1**	**G4G5**
Prostrate Blue Violet				
MP: rich cove forests and other rich forests (Jackson, Montgomery, Richmond, Stanly, Transylvania)				
Warea cuneifolia	**E**		**S1**	**G4**
Carolina Pineland-cress				
S: sandhills (Harnett*, Hoke)				
Woodsia appalachiana	**SR-P**		**S2**	**G4**
Appalachian Cliff Fern				
M: cliffs, rock outcrops (Alleghany, Ashe, Buncombe*, Burke, Caldwell, Henderson, McDowell, Polk, Rutherford, Surry, Transylvania, Wilkes*)				
Woodsia ilvensis	**E**		**S1**	**G5**
Rusty Cliff Fern				
M: cliffs, rock outcrops (Alleghany, Ashe, Surry)				
Xyris chapmanii	**SC-V**		**S3**	**G3**
Chapman's Yellow-eyed-grass				
S: mucky sandhill seeps (Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)				
Xyris floridana	**T**		**S1**	**G5T4T5**
Florida Yellow-eyed-grass				
C: savannas (Brunswick, Carteret, Columbus, Hoke, Onslow, Pender, Robeson*)				
Xyris scabrifolia	**SC-V**		**S2**	**G3**
Harper's Yellow-eyed-grass				
S: sandhill seeps and bogs (Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)				
Xyris serotina	**T**		**S1**	**G3G4**
Acid-swamp Yellow-eyed-grass				
C: savannas (Columbus*)				

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Xyris stricta **Pineland Yellow-eyed-grass** C: savannas (Brunswick, Carteret, Pender*)	**E**		**S1**	**G4**
Yucca gloriosa **Moundlily Yucca** T: dunes (Brunswick, Carteret, Dare, Hyde, New Hanover, Onslow, Pender)	**SR-P**		**S2?**	**G4?**
Zephyranthes simpsonii **Rain Lily** C: roadsides, calcareous coastal fringe forest (Brunswick)	**E**		**S1**	**G2G3**
Mosses				
Aphanorrhegma serratum **A Moss** P: soil or clay in places subject to inundation (Durham*)	**SR-O**		**SH**	**G4G5**
Archidium donnellii **Donnell's Archidium** P: sandy or gravelly soil along roadsides, in fields, near granitic outcrops (Wake)	**SR-O**		**S1**	**G3G5**
Archidium tenerrimum **An Earth Moss** C: dunes, maritime grasslands (Dare*)	**SR-O**		**SH**	**G5?**
Astomum ludovicianum **A Moss** CP: moist soil, fields, among grasses, roadside banks (Durham*, Johnston*, Rowan, Sampson*)	**SR-T**		**S1?**	**G3G4**
Bellibarbula recurva **Recurved bryoerythrophyllum moss** M: thin soil over moist rock	**SR-P**		**S1?**	**G3G5**
Brachydontium trichodes **Peak Moss** M: on moist rocks in spruce-fir forests (Mitchell, Swain)	**SR-D**		**S1**	**G2G4**
Brachymenium andersonii **Anderson's Melon-moss** M: on humus in acidic cove forests - mixed hardwood-hemlock (Macon)	**SR-L**		**SH**	**GH**
Brachymenium systylium **Mexican Melon-moss** M: on humus in acidic cove forests mixed hardwood-hemlock (Macon*, Rutherford)	**SR-D**		**S1**	**G5**

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Brachythecium populeum	**SR-P**		**S1**	**G5**
Matted Feather Moss				
M: mountain forests (Avery*, Caldwell*, Rutherford, Watauga*)				
Brachythecium rotaeanum	**SR-D**		**S1**	**G5**
Rota's Feather Moss				
CMP: on bark or rock in cove forests (Avery*, Caldwell*, Camden*, Craven*, Durham*, Graham, Haywood, Jackson*, Jones*, Martin*, McDowell*, Mitchell*, Pasquotank*, Rowan*, Rutherford, Swain*, Transylvania, Watauga*)				
Bruchia brevifolia	**SR-T**		**S1?**	**G3G4**
A Pygmy Moss				
C: soil of disturbed habitats (Harnett*, Pender*, Sampson)				
Bruchia carolinae	**SR-L**		**S1?**	**G3?**
A Pygmy Moss				
S: sandy soil of roadsides, old fields, or other disturbed areas (Lee*)				
Bruchia fusca	**SR-T**		**SH**	**G1?**
A Pygmy Moss				
S: sandy soil (Harnett*)				
Bruchia hallii	**SR-T**		**SH**	**G2**
A Pygmy Moss				
C: sandy soil in open places (Pender*)				
Bryocrumia vivicolor	**SR-T**		**SH**	**G1G2**
Gorge Moss				
M: rocks and streambanks in humid gorges, spray zones of waterfalls (Jackson, Transylvania)				
Bryoerythrophyllum ferruginascens	**SR-D**		**S1**	**G3G4**
Rust Foot Moss				
M: on moist rocks or soil at high elevations (Jackson, Rutherford*)				
Bryoerythrophyllum inaequalifolium	**SR-D**		**S1**	**G4?**
A Foot Moss				
M: on thin soil over shale (McDowell*)				
Bryoxiphium norvegicum	**SR-O**		**S1**	**G5?**
Sword Moss				
M: rocks in humid gorges, spray zones of waterfalls (Jackson, Macon, McDowell*, Transylvania)				
Bryum limbatum	**SR-D**		**S1?**	**G5?**
A Moss				
P: low elevation rocky summits (Rutherford)				

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Bryum riparium	**SR-D**		**SH**	**G2G4**
Riverside Bryum				
M: spray zones of waterfalls (Transylvania*)				
Buxbaumia aphylla	**SR-O**		**SH**	**G5**
Bug-on-a-stick				
M: forests, roadside banks (Haywood*)				
Buxbaumia minakatae	**SR-T**		**SH**	**G2G4**
Hump-backed Elves				
M: on rotten logs and stumps in mountain forests (Avery*, Watauga*)				
Campylium stellatum	**SC-V**		**S1**	**G5**
Yellow Starry Fen Moss				
M: fens (Ashe)				
Campylopus atrovirens var. atrovirens	**SR-D**		**S1?**	**G4G5TNR**
Black Fish Hook Moss				
M: near crevices and seepage zones on exposed granite (Ashe*, Buncombe*, Haywood, Jackson*, Macon*, Transylvania)				
Campylopus carolinae	**SR-T**		**S1S2**	**G2**
Savanna Campylopus				
C: Obscure in xeric sandy soils or compact tufts of other mosses (Bladen, Brunswick, Carteret, Columbus, Cumberland, Sampson, Scotland)				
Campylopus oerstedianus	**SR-D**		**S1**	**G2G3**
Oersted's Campylopus				
P: granite flatrocks (Rutherford, Wake)				
Campylopus paradoxus	**SR-D**		**S1**	**G5**
Paradoxical Campylopus				
M: high elevation rock outcrops (Avery*)				
Cirriphyllum piliferum	**SR-P**		**S1**	**G5**
Long Leaf Mustache Moss				
M: moist rocks, wet by seepage or waterfall spray (Alleghany*, Jackson, McDowell*, Swain*, Transylvania)				
Cleistocarpidium palustre	**SR-D**		**S1**	**G5?**
Prairie Pleuridium				
P: wet soil, sandy swamps (McDowell, Wake)				
Coscinodon cribrosus	**SR-T**		**S1**	**G3G4**
Copper Grimmia				
MP: rock outcrops and cliffs (Alleghany*, Burke)				

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Cryphaea nervosa	**SR-T**		**S1?**	**G4?**
A Thread Cedar Moss				
MP: trunks of trees in humid forests, sometimes in swamp forests (Macon*, Moore*, Orange, Swain*)				
Cyrto-hypnum pygmaeum	**SR-O**		**S1?**	**G4G5**
Pygmy Cyrto-hypnum Moss				
M: moist woods, over moist rocks (Rutherford*, Swain*)				
Dichelyma capillaceum	**SR-P**		**S1?**	**G5**
Hair Claw Moss				
P: bases of trees, stumps, or on rocks in places submerged at high water (McDowell, Mecklenburg*, Orange)				
Dichodontium pellucidum	**SR-P**		**S2**	**G5**
Transparent Fork Moss				
M: seepage or spray zones of waterfalls on mafic or calcareous rocks (Ashe*, Buncombe*, Haywood*, Jackson*, Macon, McDowell*, Mitchell*, Swain*, Transylvania*, Yancey*)				
Dicranella rufescens	**SR-O**		**S1?**	**G5?**
Red Fork Moss				
MP: wet soil on banks of roads and streams (Burke, Durham*, Jackson, Macon*, Rutherford, Transylvania)				
Dicranella varia	**SR-O**		**S1?**	**G5**
Variable Fork Moss				
MP: wet, calcareous soil, in open, disturbed places (Durham*, Granville, Macon*, Rutherford)				
Dicranum undulatum	**SR-D**		**S1**	**G5**
Bog Broom-moss				
M: bogs, seeps (Avery, Buncombe*, Burke*, Haywood*, McDowell*, Yancey*)				
Didymodon fallax	**SR-O**		**SH**	**G5**
Fallacious Screw Moss				
M: soil, silt, sandstone, concrete, calcareous rock (McDowell*)				
Didymodon tophaceus	**SR-O**		**S1?**	**G5**
Three-ranked Didymodon				
MP: on limestone, limy shale, clay in moist areas, seepages, waterfalls (McDowell*, Rowan)				
Ditrichum ambiguum	**SR-P**		**S1**	**G4?**
Ambiguous Ditrichum				
M: acidic cove forests (Macon)				

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Ditrichum rhynchostegium	**SR-T**		**S1?**	**G3G5**
Ditrichum Moss				
MP: sandy or clay soil, clearings in woods, over rocks and along streams (Jackson*, Macon, Surry*, Transylvania*)				
Encalypta procera	**SR-D**		**S1**	**G5**
Extinguisher Moss				
M: on moist calcareous rocks (Macon, McDowell)				
Entodon compressus	**SR-P**		**S1**	**G4**
Flattened Entodon				
MP: on moist calcareous rocks (Macon, McDowell*, Person*, Rockingham*)				
Entodon concinnus	**SR-P**		**S1**	**G4G5**
Lime Entodon				
M: on moist calcareous rocks (McDowell*)				
Entodon sullivantii	**SR-O**		**S2**	**G3G4**
Sullivant's Entodon				
M: on rocks or bark in humid gorges and cove forests (Buncombe*, Burke, Caldwell*, Graham*, Jackson, Macon, McDowell, Polk*, Swain, Transylvania)				
Ephemerum cohaerens	**SR-T**		**SH**	**G4G5**
Northern Short-lived Moss				
P: moist or drying disturbed soil (Durham*)				
Eucladium verticillatum	**SR-O**		**S1**	**G4**
Lime-seep Eucladium				
M: on moist calcareous rocks (McDowell)				
Fissidens asplenioides	**SR-O**		**SH**	**G3G5**
A Plume Moss				
P: sandstone ledges and crevices in moist ravines and grottoes, along streams and waterfalls (Stokes*)				
Fissidens hallianus	**SR-O**		**SH**	**GNRQ**
A Plume Moss				
C: on bark in cypress-gum swamps (Beaufort*)				
Fissidens hallii	**SR-T**		**S1**	**G2**
Hall's Pocket Moss				
C: on bark in cypress-gum swamps (Jones*)				
Fissidens scalaris	**SR-O**		**SH**	**GNR**
A Plume Moss				
P: bare, disturbed soil of stream banks and roadsides (Mecklenburg*)				

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Fontinalis sphagnifolia	**SR-O**		**S1?**	**G3G5**
A Water Moss				
M: on rocks in flowing water (Macon)				
Fontinalis welchiana	**SR-T**		**S1?**	**GU**
Welch's fontinalis moss				
P: submerged rocks (Orange)				
Grimmia longirostris	**SR-D**		**S1?**	**G5**
A Beard Moss				
M: waterfall spray zones (Transylvania*)				
Herzogiella turfacea	**SR-P**		**S1?**	**G5**
Flat Stump Moss				
M: on bases of trees and rotten logs in coniferous and hardwood forests (Burke, Jackson, Swain, Transylvania, Yancey)				
Homalia trichomanoides	**SR-P**		**S1**	**G5**
Lime Homalia				
M: in spray zones of waterfalls, on rocks in humid gorges (Avery, Jackson, Macon*, McDowell, Transylvania)				
Homaliadelphus sharpii	**SR-P**		**SH**	**G3?**
Sharp's Homaliadelphus				
M: on dry mafic or calcareous rocks in gorges (Jackson*, Transylvania*)				
Hygrohypnum closteri	**SR-T**		**S1**	**G3**
Closter's Brook-hypnum				
MP: on rocks submersed in streams (McDowell*, Orange, Polk*, Swain*)				
Hylocomiastrum umbratum	**SR-P**		**S1?**	**G5**
Shaded Feather Moss				
M: on trees and rocks in moist forests, especially under spruce-fir (Macon, Swain*, Yancey*)				
Hypnum pratense	**SR-P**		**S1?**	**G5**
Meadow Feather Moss				
M: terrestrial in damp open sites, swampy and peatland areas (Ashe, Jackson)				
Leptodontium excelsum	**SR-L**		**S1**	**G2**
Grandfather Mountain Leptodontium				
M: on bark of Fraser Firs and Red Spruces in spruce-fir forests (Avery, Caldwell, Haywood, Jackson, Mitchell, Swain, Transylvania*, Watauga)				

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Leptodontium flexifolium	**SR-D**		**S1**	**G5**
Pale-margined Leptodontium				
M: high elevation rocky summits and moist calcareous rocks (Ashe*, Avery, Caldwell, Haywood*, Swain*, Transylvania*, Watauga, Yancey*)				
Leptohymenium sharpii	**SR-L**		**S1**	**G1**
Mount Leconte Moss				
M: moist rocks in spruce-fir forests (Haywood*, Jackson, Mitchell*, Swain*, Yancey)				
Leskeella nervosa	**SR-O**		**SH**	**G5**
Common Fine Moss				
M: dry or moist, shaded substrates (Haywood*)				
Lindbergia brachyptera	**SR-P**		**S1**	**G5**
Lindberg's Maple-moss				
M: bark of hardwoods (Ashe*, Cherokee*, McDowell, Watauga)				
Macrocoma sullivantii	**SR-D**		**S2**	**G3G5**
Sullivant's Maned-moss				
MP: bark of cedar or hardwoods (Burke, Clay*, Jackson, Macon, Rutherford, Swain, Transylvania, Wilkes)				
Micromitrium synoicum	**SR-O**		**S1?**	**G4**
A Moss				
P: drying or dried ponds, edges of lakes or streams, bare soil in open forests (Durham)				
Neckera complanata	**SR-O**		**S1**	**G5**
Flat Feather Moss				
M: on calcareous rocks in humid gorges (Jackson, Transylvania)				
Orthodontium pellucens	**SR-O**		**S1**	**G5**
Translucent Orthodontium				
MP: moist felsic or calcareous rocks (Stokes*, Swain*)				
Orthotrichum exiguum	**SR-O**		**SH**	**G3?**
Small Wood-bark Moss				
P: base of trees or on tree trunks (Union*)				
Orthotrichum keeverae	**SR-L**		**S2**	**G2**
Keever's Bristle-moss				
MP: on trees around low elevation granitic domes (Alexander, Alleghany, Wilkes)				
Orthotrichum obtusifolium	**SR-P**		**S1**	**G5**
Blunt Bristle-moss				
M: bark of hardwoods (Ashe*)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C.	Rank Global
Orthotrichum strangulatum	**SR-P**		**SH**	**G4**
Drummond Moss				
MP: exclusively on dry, exposed, calcareous or dolomitic bluffs and rock faces (Forsyth*, Madison*, McDowell*)				
Oxyrrhynchium pringlei	**SR-D**		**S1**	**G2G3**
Pringle's Water Feather Moss				
M: rocks and streambanks in humid gorges, spray zones of waterfalls (Burke, Macon, McDowell, Polk, Transylvania)				
Palamocladium leskeoides	**SR-D**		**S1**	**G3G5**
Palamocladium				
M: calcareous rocks in humid gorges (Jackson*)				
Philonotis cernua	**SR-D**		**S1**	**G4?**
Dwarf Apple Moss				
M: in spray zones of waterfalls, moist rocks in humid gorges (Jackson, Macon, Rutherford*, Transylvania)				
Philonotis uncinata	**SR-P**		**SH**	**G5**
An Apple Moss				
M: rocks and soil in open habitats (Transylvania*)				
Pilosium chlorophyllum	**SR-D**		**S1?**	**GNR**
A Moss				
M: moist area on trees (Jackson, Transylvania)				
Plagiomnium carolinianum	**SR-L**		**S2**	**G3**
Carolina Star-moss				
M: rocks and streambanks in humid gorges (Jackson, Macon*, Swain*, Transylvania, Yancey)				
Plagiomnium ellipticum	**SR-P**		**S1?**	**G5**
Marsh Magnificent Moss				
M: rocks in moist areas (Graham)				
Plagiomnium rostratum	**SR-P**		**S1?**	**G5**
Long-beaked Thread Moss				
M: wet rocks (Buncombe, Macon, McDowell*, Transylvania)				
Platydictya confervoides	**SR-P**		**S1**	**G4G5**
Alga-like Matted-moss				
M: calcareous rocks (Madison*, McDowell*)				
Platyhypnidium riparioides	**SR-O**		**S1?**	**G4**
Long-beaked Water Feather Moss				
M: streams (Graham, Haywood, Jackson, Macon*, Rutherford, Transylvania)				

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Pleuridium sullivantii	**SR-O**		**SH**	**G3G5**
A Moss				
S: sandy soil in open weedy habitats, openings in woods, disturbed roadsides (Harnett*)				
Pleurochaete luteola	**SR-O**		**S1?**	**G5?**
Spring-leaved Screw Moss				
P: exposed clay or sandy soil over calcareous rock (Durham)				
Pogonatum dentatum	**SR-P**		**S1?**	**G5**
Hair-like Hair-cap				
M: dry, sunny habitats, sandy or gravelly soil, rocks (Mitchell)				
Pohlia lescuriana	**SR-T**		**S1?**	**G4G5**
Spherical Bulb Nodding Moss				
MP: on wet, noncalcareous soil in open areas (Ashe*, Burke, Forsyth*, Jackson, Macon, Rutherford, Watauga)				
Pohlia melanodon	**SR-D**		**S1?**	**G4?**
Pink-fruited Thread-moss				
P: moist, clay soils (Durham, Yancey*)				
Polytrichastrum alpinum	**SR-D**		**S1?**	**G5**
Alpine Hair Moss				
M: open areas on rocks or humus (Mitchell)				
Racomitrium aciculare	**SR-P**		**S1?**	**G5**
Dark Mountain Fringe Moss				
M: wet, shaded, acid rocks (Burke, Jackson, Macon, Transylvania)				
Rhabdoweisia crenulata	**SR-D**		**S1**	**G3G5**
Himalayan Ribbed-weissia				
M: moist rocks in cove forests in humid gorges (Jackson, McDowell)				
Rhachithecium perpusillum	**SR-D**		**S1S2**	**G4G5**
Budding Tortula				
PM: bark of hardwoods (Ashe*, Cleveland*, Iredell*, McDowell*, Mecklenburg*, Surry*, Watauga*, Wilkes*)				
Rhytidiadelphus subpinnatus	**SR-T**		**S1?**	**G5**
Subpinnate Gooseneck Moss				
M: damp to wet substrates in swamps and moist forests, along streams, spray of waterfalls (Macon)				
Rhytidium rugosum	**SR-P**		**S2**	**G5**
Golden Tundra-moss				
M: high elevation rocky summits, grassy balds, glades, over mafic rocks (Ashe, Avery, Buncombe*, Caldwell, Mitchell, Watauga, Yancey*)				

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Schlotheimia lancifolia	**SR-O**		**S1**	**G2**
Highlands Moss				
M: on bark of hardwoods in cove forests (Clay, Graham, Jackson, Macon, Transylvania)				
Scopelophila cataractae	**SR-D**		**S1**	**G3**
Agoyan Cataract Moss				
MP: copper-rich soils (Burke, Cabarrus, Davidson, Jackson, McDowell, Montgomery, Rowan)				
Scopelophila ligulata	**SR-O**		**S1**	**G5?**
Copper Moss				
MP: copper-rich soils and rock faces (Buncombe, Burke, Cabarrus, Clay*, Graham, Haywood, Jackson*, McDowell, Rowan, Swain, Transylvania)				
Sphagnum angustifolium	**SR-D**		**S1**	**G5**
Narrowleaf Peatmoss				
M: bogs (Alleghany, Ashe, Jackson, Mitchell, Transylvania, Watauga)				
Sphagnum capillifolium	**SR-P**		**S1**	**G5**
Northern Peatmoss				
M: bogs, heath bald (Ashe, Avery*, Buncombe, Burke, Caldwell*, Henderson*, Jackson, Macon*, Watauga)				
Sphagnum contortum	**T**		**S1**	**G5**
Contorted Peatmoss				
M: bogs (Ashe, Burke, Watauga)				
Sphagnum fallax	**SR-P**		**S2**	**G5**
Pretty Peatmoss				
CM: bogs (Ashe, Avery, Brunswick*, Burke, Catawba, Jackson, McDowell)				
Sphagnum flavicomans	**SR-T**		**SH**	**G5**
Peatmoss				
M: spray cliff, spruce-fir forest, or high elevation rocky summit (Macon*, Mitchell*)				
Sphagnum flexuosum	**SR-P**		**S1**	**G5**
Flexuous Peatmoss				
M: bogs (Jackson, McDowell, Watauga)				
Sphagnum fuscum	**SR-P**		**S1**	**G5**
Brown Peatmoss				
M: bogs (Ashe, Watauga)				
Sphagnum pylaesii	**SR-D**		**S1**	**G4**
Simple Peatmoss				
M: seepage cliffs, natural pools (Burke, Jackson)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C.	 Global
Sphagnum russowii **Russow's Peatmoss** M: bogs (Bertie, Macon*, Watauga)	**SR-D**		**S1**	**G5**
Sphagnum squarrosum **Squarrose Peatmoss** M: spray zones of waterfalls, seepage in spruce-fir forests (Burke, Macon, Watauga*, Yancey)	**SR-P**		**S1**	**G5**
Sphagnum subsecundum **Orange Peatmoss** M: bogs and rock ledges (Ashe, Avery, Burke*, Catawba, Haywood*, Jackson, Macon, McDowell, Mitchell, Swain, Transylvania, Wake, Watauga)	**SR-P**		**S1**	**G5**
Sphagnum tenellum **Delicate Peatmoss** M: high elevation granitic domes (Jackson)	**SR-D**		**S1**	**G5**
Sphagnum torreyanum **Giant Peatmoss** C: beaver ponds and old mill ponds on blackwater creeks (Craven, Dare, Harnett*, Hoke, Jones, Richmond, Scotland, Tyrrell)	**SR-P**		**S1**	**G5**
Sphagnum warnstorfii **Fen Peatmoss** M: bogs and fens (Alleghany, Burke, McDowell, Watauga)	**SR-D**		**S1**	**G5**
Splachnum pennsylvanicum **Southern Dung Moss** M: bogs (Avery*, Macon*)	**SR-O**		**SH**	**G4?**
Syrrhopodon incompletus **Cuban Schliessmund** T: on treetrunks in maritime forests (Brunswick*)	**SR-P**		**S1**	**G5**
Taxiphyllum alternans **Japanese Yew-moss** M: on limestone in spray zones of waterfalls (Macon)	**SR-O**		**S1**	**G3?**
Taxiphyllum cuspidifolium **A Moss** M: on limestone in spray zones of waterfalls (Macon*)	**SR-T**		**S1**	**G2G4**
Tetrodontium brownianum **Little Georgia** M: shady recesses of rock overhangs (Jackson, Transylvania)	**SR-T**		**S1**	**G3G4**

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Tortula ammonsiana	**SR-O**		**S1**	**G1G3**
Ammons's Tortula				
M: shaded rock faces, probably with nutrient-rich seepage (Jackson)				
Tortula fragilis	**SR-D**		**S1**	**G5**
Fragile Tortula				
M: shaded rock faces, probably with nutrient-rich seepage (Jackson*)				
Tortula papillosa	**SR-P**		**S1**	**G5**
Papillose Tortula				
PM: bark of hardwoods (Davie*, Haywood, Madison*, Orange, Surry*, Watauga)				
Tortula plinthobia	**SR-O**		**S1?**	**G4G5**
A Chain-teeth Moss				
CMP: calcareous rocks, concrete or mortared walls (Carteret, Craven*, Madison*, Wake*)				
Warnstorfia fluitans	**SR-D**		**S1**	**G5**
Floating Sickle-moss				
M: in spray zones of waterfalls (Avery, Jackson*, Transylvania*)				
Weissia sharpii	**SR-O**		**S1?**	**G3**
A Moss				
P: calcareous rock, cedar-oak bluffs, cedar barrens (Davidson, Rutherford)				
Zygodon viridissimus var. 1	**SR-L**		**SH**	**GU**
A Moss				
M: bark of hardwoods in dry oak-hickory forests (Alleghany*)				

Liverworts

Acrobolbus ciliatus	**SC-V**		**S1**	**G3?**
A Liverwort				
M: on moist rocks, in spray zones of waterfalls in humid gorges or in high elevation spruce-fir forests (Buncombe, Haywood*, Jackson, Macon, Transylvania, Yancey*)				
Anastrophyllum saxicola	**SR-D**		**S1**	**G3G4**
A Liverwort				
M: high elevation rocky summits (Mitchell*)				
Aneura sharpii	**SR-T**		**S1**	**G1G2**
A Liverwort				
MP: in spray zones of waterfalls (Alleghany, Durham*, Jackson*, Macon*, McDowell, Rutherford, Swain, Transylvania*, Watauga)				

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Barbilophozia barbata	**SR-D**		**S1**	**G5**
A Liverwort				
M: on high elevation rocky summits (Alleghany*, Ashe, Wilkes*)				
Barbilophozia hatcheri	**SR-D**		**S1**	**G5**
A Liverwort				
M: on high elevation rocky summits (Ashe, Yancey*)				
Bazzania nudicaulis	**SR-T**		**S2**	**G2G3**
A Liverwort				
M: on bark of Fraser Fir or on shaded rock in spruce-fir forests (Avery, Buncombe*, Caldwell, Mitchell, Swain, Watauga, Yancey)				
Cephalozia connivens var. bifida	**SR-T**		**S1**	**G5T1Q**
A Liverwort				
C: moist riverbank (New Hanover*, Pender*)				
Cephalozia pleniceps var. caroliniana	**SR-L**		**SH**	**G5T1**
A Liverwort				
M: edge of stream (Transylvania*)				
Cephalozia pleniceps var. pleniceps	**SR-D**		**SH**	**G5T5**
A Liverwort				
M: moist soil near a spring (Yancey*)				
Cephaloziella hampeana	**SR-D**		**S1**	**G5**
A Liverwort				
M: fens (Ashe*, Rutherford)				
Cephaloziella spinicaulis	**SR-P**		**S1**	**G3G4**
A Liverwort				
M: in crevices of high elevation rocky summits (Alleghany*, Ashe*, Buncombe, Haywood, Macon, Madison, McDowell, Transylvania)				
Cheilolejeunea discoidea	**SR-P**		**SH**	**GU**
A Liverwort				
MC: on tree bark in sandhills or mountain forests (Sampson*, Transylvania*)				
Cheilolejeunea evansii	**SR-L**		**S1**	**G1G2**
A Liverwort				
M: on bark of hardwoods in humid gorges (Jackson, Macon, Transylvania)				
Cheilolejeunea rigidula	**SR-P**		**S2**	**G5**
A Liverwort				
CT: on bark in maritime forests, and in blackwater swamp forests (Brunswick, Columbus*, Hyde*)				

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Chiloscyphus appalachianus	**SC-V**		**S1**	**G1G2Q**
A Liverwort				
M: on rock faces in spray zone of waterfalls (Burke, Cherokee, Graham, Jackson, Macon, McDowell, Rutherford)				
Chiloscyphus muricatus	**SC-V**		**S1**	**G5**
A Liverwort				
M: on rocks or bark in humid gorges (Burke, Jackson, Macon*, Transylvania)				
Cololejeunea ornata	**SR-T**		**SH**	**G2G4**
A Liverwort				
M: on bark of trees, sometimes over other liverworts (Macon*)				
Cylindrocolea rhizantha	**SR-P**		**SH**	**G3?**
A Liverwort				
C: on marl outcrops (Columbus*)				
Diplophyllum obtusatum	**SR-D**		**S1**	**G2?**
A Liverwort				
M: on rock outcrops (Buncombe*, Burke*, McDowell*)				
Diplophyllum taxifolium var. mucronatum	**SR-L**		**S1**	**G5T1**
A Liverwort				
M: high elevation rocky summits (Haywood*, Jackson*, Transylvania*)				
Drepanolejeunea appalachiana	**SC-V**		**S1**	**G2?**
A Liverwort				
M: on moist rock, rhododendron bark, and rhododendron leaves in humid gorges (Burke, Clay*, Graham, Haywood, Jackson, Macon, Transylvania)				
Frullania appalachiana	**SR-L**		**S1?**	**G2?**
A Liverwort				
M: on bark of hardwoods in spruce-fir forests (Avery*, Burke, Clay*, Graham, Haywood*, Jackson*, Macon*, Rutherford, Transylvania)				
Frullania donnellii	**SR-T**		**SH**	**G3?**
A Liverwort				
C: on bark of *Ilex* in marshes (Carteret*)				
Lejeunea bermudiana	**SR-P**		**S1**	**G3G4**
A Liverwort				
C: on marl outcrops or on decaying logs in blackwater swamps, or tree bases in swamps (Brunswick*, Carteret, Columbus, Craven, Jones)				

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Lejeunea blomquistii	**SC-V**		**S1**	**G1G2**
A Liverwort				
M: on dead tree bark or vertical rock faces in spray zone of waterfalls (Burke, Jackson, Macon*, McDowell, Transylvania)				
Lejeunea cavifolia	**SR-P**		**S1**	**G5**
A Liverwort				
M: on shaded mafic rocks (Ashe*, Polk*, Swain)				
Lejeunea dimorphophylla	**SR-L**		**S1**	**G2G3**
A Liverwort				
TC: on bark in maritime forests (Carteret*)				
Lejeunea glaucescens var. acrogyna	**SR-L**		**SX**	**G5TH**
Raven Rock Liverwort				
C: Endemic to one historical location on shaded rock at the piedmont/coastal plain fall line (Harnett*)				
Leptoscyphus cuneifolius	**SR-D**		**S2**	**G4G5T4**
A Liverwort				
M: on bark of Fraser Firs or on moist rock, in spruce-fir forests (Haywood*, Jackson*, Mitchell*, Swain, Yancey)				
Lopholejeunea muelleriana	**SR-D**		**SH**	**G4G5**
A Liverwort				
C: on bark of gums and cypresses in blackwater swamp forests (Columbus*)				
Lophozia excisa	**SR-D**		**S1**	**G5**
A Liverwort				
M: on high elevation rocky summits (Ashe*)				
Lophozia heterocolpos	**SR-D**		**S1**	**G5**
A Liverwort				
M: on high elevation rocky summits (Ashe)				
Mannia californica	**SR-T**		**S1**	**G3?**
A Liverwort				
M: on mineral-rich, dry rock outcrops (Jackson*, McDowell, Polk*, Rutherford)				
Marsupella funckii	**SR-D**		**S1**	**G4G5**
A Liverwort				
M: on high elevation, sulphur-bearing rock (Swain*)				

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Metzgeria temperata	**SR-D**		**S1S2**	**G4**
A Liverwort				
M: Fraser fir forests and hemlock forests (Avery, Caldwell, Clay*, Graham, Haywood, Jackson, Macon*, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Metzgeria violacea	**SR-D**		**S1S2**	**G4**
A Liverwort				
M: bark of trees (Haywood, Jackson)				
Mylia taylorii	**SR-D**		**S1**	**G5**
A Liverwort				
M: moist rock outcrops at high elevations, spray zone of waterfalls (Avery, Caldwell, Jackson, Watauga)				
Nardia scalaris ssp. botryoidea	**SR-O**		**S1**	**G5T1**
A Liverwort				
P: exposed rock ledges sometimes wet from seepage (Burke)				
Nardia scalaris ssp. scalaris	**SR-D**		**S1**	**G5T5**
A Liverwort				
M: on high elevation rocky summits and on moist rocks in spruce-fir forests (Buncombe, Haywood*, Jackson*)				
Plagiochasma intermedium	**SR-O**		**S1**	**G3G5**
A Liverwort				
M: on moist limestone (McDowell*)				
Plagiochasma wrightii	**SR-D**		**S1**	**G3?**
A Liverwort				
M: on moist calcareous rocks (McDowell, Rutherford)				
Plagiochila austinii	**SR-T**		**S1S2**	**G3**
A Liverwort				
M: moist rocks (Avery, Burke, Graham, Jackson, Macon*, Madison, Wilkes)				
Plagiochila corniculata	**SR-D**		**S2**	**G4?**
A Liverwort				
M: on bark of Fraser Firs in spruce-fir forests, rarely on hardwoods (Avery, Buncombe*, Haywood*, Jackson*, Mitchell, Swain, Transylvania*, Yancey)				
Plagiochila dubia	**SR-P**		**S1**	**G4G5**
A Liverwort				
CP: on bark at bases of trees in swamps (Brunswick, Columbus*)				

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Plagiochila echinata	**SR-L**		**S1**	**G2**
A Liverwort				
M: rocks and streambanks in humid gorges, spray zone of waterfalls (Graham, Jackson, Macon*, Transylvania)				
Plagiochila ludoviciana	**SR-P**		**S1**	**G5**
A Liverwort				
CPM: on bark or moist rock in swamps and mountain gorges (Beaufort, Bladen, Brunswick*, Burke, Carteret, Cherokee*, Clay*, Craven, Durham*, Jackson*, Macon*, McDowell, Onslow, Orange, Rutherford*, Stokes*, Transylvania, Washington*, Yadkin*)				
Plagiochila miradorensis var. miradorensis	**SR-P**		**SH**	**G4T4**
A Liverwort				
T: on bark in maritime forests and swamps (Carteret*)				
Plagiochila sullivantii var. spinigera	**SR-L**		**S1**	**G2T1**
A Liverwort				
M: on moist rocks in spray zones of waterfalls (Burke*, Jackson*, McDowell*, Transylvania*)				
Plagiochila sullivantii var. sullivantii	**SR-T**		**S2**	**G2T2**
A Liverwort				
M: on moist rocks, in spray zones of waterfalls and in spruce-fir forests (Avery, Burke, Caldwell*, Cherokee*, Clay*, Graham, Haywood*, Jackson*, Macon*, McDowell, Mitchell*, Swain*, Transylvania, Watauga*, Yancey*)				
Plagiochila virginica var. caroliniana	**SR-T**		**S1**	**G3T2**
A Liverwort				
M: moist rock faces, including spray zone of waterfalls (Avery*, Buncombe, Caldwell, Graham, Jackson*, Macon*, Mitchell, Transylvania*)				
Plagiochila virginica var. virginica	**SR-L**		**S1**	**G3T3**
A Liverwort				
CM: on limestone (Ashe, Jackson, Martin*, McDowell, Pitt*, Wilkes*)				
Porella wataugensis	**SR-L**		**S1**	**G1G2Q**
A Liverwort				
M: on rocks in humid gorges (Burke, Graham, Macon, McDowell, Transylvania, Watauga*)				
Ptilidium ciliare	**SR-D**		**S1**	**G5**
A Liverwort				
M: on soil in high elevation forests (Mitchell)				
Radula voluta	**SR-D**		**S1**	**G3**
A Liverwort				
M: on moist rocks in spray zones of waterfalls (Macon)				

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Riccardia jugata	**SR-L**		**S1?**	**G2**
A Liverwort				
M: on fallen logs in humid areas, especially gorges (Graham, Haywood, Macon*)				
Scapania mucronata	**SR-D**		**S1**	**G5**
A Liverwort				
M: high elevation rocky summits (Ashe*)				
Sphenolobopsis pearsonii	**SR-O**		**S2**	**G2?**
A Liverwort				
M: on bark of Fraser Firs in spruce-fir forests (Avery, Caldwell, Haywood, Jackson, Mitchell, Swain, Watauga, Yancey)				
Tritomaria exsectiformis ssp. exsectiformis	**SR-D**		**SH**	**G5T5**
A Liverwort				
M: on high elevation rocky summits (Ashe*)				
Hornworts				
Aspiromitus appalachianus	**SR-L**		**S1**	**G1**
A Hornwort				
M: on rocks on streambeds (Transylvania*)				
Lichens				
Anaptychia crinalis	**SR-D**		**S1**	**G5**
Hanging Fringe Lichen				
M: high elevation rocky summits and exposed tree twigs on dry ridges (Mitchell)				
Anzia americana	**SR-T**		**S1**	**G3G5**
A Black-foam Lichen				
M: on bark of trees in humid gorges (Transylvania*)				
Anzia ornata	**SR-T**		**S2**	**G1G3**
A Black-foam Lichen				
C: on bark of deciduous trees where humidity is fairly high (Brunswick, Camden, Dare, Duplin*, Gates, Jones, Pender, Tyrrell, Washington)				
Canoparmelia amabilis	**SC-V**		**SNA**	**G1**
Worthy Shield Lichen				
(now lumped in *Canoparmelia caroliniana*)				

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Cetraria arenaria	**SC-V**		**S2**	**G4**
Sand-loving Iceland Lichen				
M: high elevation rocky summits, sandy soil, or thin soil over bedrock (Ashe, Avery, Mitchell*, Watauga)				
Cetrelia cetrarioides	**SR-D**		**S2**	**G4G5**
Sea Storm Lichen				
M: on trees and mossy rocks in forests with an open understory; may prefer old growth or very mature forests (Buncombe*, Haywood, Jackson*, Mitchell*, Swain*, Yancey*)				
Cladonia psoromica	**T**		**S1**	**G1**
Bluff Mountain Reindeer Lichen				
M: rock outcrops and fens and glades over amphibolite rock (Ashe)				
Ephebe americana	**SR-T**		**S1**	**G2G3**
A Rockshag Lichen				
M: high elevation rocky summits (Caldwell*, Haywood*, Jackson*, Transylvania)				
Ephebe lanata	**SR-D**		**S1**	**G5**
Rockshag Lichen				
MP: on rocks in rapidly flowing water and grottoes around mountain spray cliffs (Jackson*, Macon*, Stokes*, Transylvania*)				
Gymnoderma lineare	**E**	**E**	**S3**	**G3**
Rock Gnome Lichen				
M: high elevation rock outcrops, outcrops in humid gorges (Ashe, Avery, Buncombe, Burke, Clay, Graham, Haywood, Jackson, Macon, Mitchell, Rutherford, Swain, Transylvania, Yancey)				
Heterodermia appalachensis	**SR-O**		**S1S2**	**G2?**
Appalachian Fringe Lichen				
MP: hardwood bark or rock faces (Graham, Haywood, Henderson, Macon, Stokes*, Swain)				
Hypotrachyna sinuosa	**SR-D**		**S1**	**G3G5**
Green Loop Lichen				
M: on twigs or small branches in humid but open forests (Haywood*, Jackson*, Yancey*)				
Hypotrachyna virginica	**SR-T**		**S1S2**	**G1G2**
Virginia Loop Lichen				
M: on twigs or rocks in open forests at high elevations (Buncombe*, Haywood, Jackson*, Swain, Yancey)				
Lobaria scrobiculata	**SR-P**		**S2?**	**G5**
Textured Lungwort				
M: on bark of hardwoods at high elevations (primarily spruce-fir zone) (Buncombe*, Graham, Haywood, Jackson*, Macon, Swain, Yancey*)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C.	Rank Global
Melanelia stygia	**SR-D**		**S1S2**	**G5**
Alpine Camouflage Lichen				
M: high elevation rocky summits (Avery, Buncombe, Macon, McDowell, Mitchell, Yancey)				
Pannaria conoplea	**SR-D**		**S1**	**G4G5**
Mealy-rimmed Shingle Lichen				
M: on bark at high elevations (Buncombe, Haywood, Henderson, Macon, Transylvania)				
Physcia pseudospeciosa	**SR-T**		**S1**	**G1G2**
A Rosette Lichen				
M: mossy rocks in open woods and high elevation granitic and sandstone rock outcrops (Jackson)				
Porpidia contraponenda	**SR-T**		**S1**	**G2G3**
Boulder Lichen				
M: high elevation rocky summits (Swain)				
Sticta limbata	**SR-D**		**S1**	**G3G4**
Powdered Moon Lichen				
M: on bark and over mosses on trees and rocks (Haywood)				
Teloschistes flavicans	**SR-P**		**S1**	**G4G5**
Sunrise Lichen				
C: on branches of trees and shrubs or on the ground in open areas, especially near the coast (Brunswick, Carteret, Onslow)				
Usnea angulata	**SR-P**		**S1**	**G3G5**
Old Man's Beard				
M: on branches of juniper on high elevation granitic domes (Jackson, Macon, Swain*)				
Xanthoparmelia monticola	**SR-L**		**S2?**	**G2?**
A Rock-shield Lichen				
MP: high elevation rocky summits and mafic glades (Buncombe*, Haywood*, Jackson*, Mitchell*, Montgomery, Transylvania*)				

NORTH CAROLINA PLANT WATCH LIST

The North Carolina Plant Watch List includes species that are rare or uncommon, are not well studied, or are otherwise threatened with serious decline but for which current information does not justify placement on the Rare List by the NCNHP. Watch List species can be indicators of significant habitats, and their presence should be considered in planning natural area protection efforts, though obviously with less weight than higher priority rare species and natural communities. The NCNHP maintains files on these species but does not include them in its GIS maps or database files. Plants placed on this list fall into a number of categories, discussed below. The NCNHP requests additional information about these species in order to clarify their status and reclassify them into other appropriate and more specific categories. Counties of known occurrence are listed for most groups

Reasons for the current placement of species on the Watch List rather than at a high rarity status (Endangered, Threatened, Special Concern, or Significantly Rare) vary. The taxonomic validity of some of these species is currently in doubt. For many of them, the NCNHP lacks adequate documentation of their historic or present extent in North Carolina. Others are known to be rare or uncommon in North Carolina but may not be native to the state, and they may or may not be declining. Some others may not necessarily be rare yet, but they are undergoing significant losses of or disturbances to their habitats. For most species, however, their actual rarity is poorly known and we are **requesting more data for every Watch List category** before such species receive a higher, and more formal, rarity status. A field survey form is provided online at http://www.ncnhp.org/share-data/contribute/plant-survey-form. We request that people fill out this survey form and mail it to NCNHP after visiting occurrences of these species.

The Watch List has been divided into categories, which have been devised to indicate the reasons for each species' current placement. These categories and their descriptions have been developed by the NCNHP. A number of species have been placed in two Watch categories because it is believed they may be at risk for at least two reasons.

CATEGORY	DESIGNATION	DESCRIPTION
W1	Rare but Relatively Secure	Species whose status in N.C. is relatively well known and appear to be relatively secure at this time. While still notably rare, these species do not currently require site-specific monitoring and so are not on the Rare List. Many of these species were formerly on the Rare List; they are retained in this category because they require a lower level of continued monitoring to ensure their long-term security.
W2	Rare but Questionable Taxonomy	Species including taxa of dubious validity and taxa under study and potentially to be named. If further study reveals that these are valid taxa, they would warrant addition to the Rare List. This category has been used for named and unnamed taxa that currently appear to have some significant chance of being proven valid.
W3	Rare but Questionable Documentation	Species that have been reported from N.C. without adequate documentation. These species should be listed at a higher level when their reported occurrence in N.C. is verified. This category includes sight records, old and vague reports for which no documentation has appeared, and, in a few cases, more recent literature reports for which we have not yet received documentation.
W4	Rare but Possibly Not Native	Species known to occur in N.C. that current data suggest are not native to N.C. but whose native occurrence is plausible. Some of

CATEGORY	DESIGNATION	DESCRIPTION
		these species were previously listed at a higher level, but field investigations suggest that all known N.C. occurrences are introductions.
W5	Rare because of Severe Decline to Population or Habitat	Species that have declined sharply in N.C. but do not appear yet to warrant site-specific monitoring. Most species in this category have undergone declines of more than 50% (in many cases more than 90%) from their pre-Columbian status. Reasons for decline include exotic pests or pathogens, massive modification of the landscape, suppression of natural fires, and failure of reproduction. Because many of these species were once abundant or even dominant in parts of N.C., they may still be fairly common or frequently encountered, despite the strong decline. If current trends continue, however, many of these species will be threatened with extirpation in all or a major part of their ranges in N.C.
W6	Regionally Rare	Species that are rare in one region of North Carolina while being uncommon to abundant within another region. These regional rarities, generally within-state disjuncts, are significant for protection of genetic variation and long-term viability of species. **W6 plants are listed immediately following the Watch List in this volume**.
W7	Poorly Known in NC	Species with inadequate information about their distribution and rarity in N.C. These are generally species not previously listed as rare in N.C. but which appear to be so based on herbarium or museum records and field experience of NCNHP staff, consultants, and cooperating scientists. Further information is needed to determine the true status of these species in N.C.

Scientific Name
Common Name — Status — Rank
Region: Habitat Comments (Counties of Occurrence) — N.C. U.S. — N.C. Global

NORTH CAROLINA PLANT WATCH LIST

Vascular Plants

Abies fraseri — **W5** — **S2** — **G2**
Fraser Fir
M: spruce-fir forests (Ashe, Avery, Buncombe, Caldwell, Clay, Jackson, Mitchell, Swain, Transylvania, Watauga, Yancey)

Acer nigrum — **W7** — **S1?** — **G5**
Black Maple
M: rich cove forests (Ashe, Macon, Madison, Swain*, Watauga*, Yancey*)

Agalinis aphylla — **W1** — **S3** — **G3G4**
Scale-leaf Gerardia
CS: wet savannas and Sandhills streamhead pocosin ecotones (Brunswick, Carteret, Columbus, Craven, Cumberland, Duplin*, Harnett, Hoke, Jones*, New Hanover*, Onslow, Pender, Richmond)

Agalinis decemloba — **W1** — **S3** — **G3G4**
Piedmont Gerardia
PMS: dry, open sites (Buncombe*, Burke, Caswell, Durham, Forsyth*, Granville, Harnett, Henderson*, Hoke, Montgomery, Orange, Person, Randolph, Richmond, Rutherford*, Scotland, Stanly, Swain*, Transylvania*, Wake, Warren, Wilkes*)

Agalinis linifolia — **W1** — **S3** — **G4?**
Flaxleaf Gerardia
C: savannas, clay-based Carolina bays, depression ponds, and other wet, open habitats (Bladen, Brunswick, Carteret*, Columbus, Craven, Cumberland*, Hoke, New Hanover, Onslow, Pender, Robeson, Sampson, Scotland*)

Agalinis obtusifolia — **W1** — **S2S3** — **G4G5**
Blunt-leaf False-foxglove
C: savannas, seepage bogs, and wet ecotones (Bladen, Brunswick, Carteret, Columbus, Craven, Onslow, Pender)

Agarista populifolia — **W3** — **SNR** — **G4G5**
Agarista
C: blackwater swamps (Columbus*)

Amelanchier sanguinea — **W1** — **S3** — **G5**
Roundleaf Serviceberry
M: thin soils around mafic rock outcrops at lower and middle elevations (Buncombe, Burke, Graham, Haywood, Henderson, Jackson, Macon, McDowell, Rutherford, Swain, Transylvania)

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Amorpha schwerinii	**W1**		**S3**	**G3G4**
Piedmont Indigo-bush				
P: dry forests (Anson, Burke, Catawba, Cleveland, Davidson, Iredell*, Montgomery, Randolph, Rowan, Rutherford*, Stanly)				
Ampelopsis cordata	**W7**		**S2**	**G5**
Heartleaf Peppervine				
PM: floodplain forests (Anson, Burke, Madison*, Richmond, Wake)				
Amphicarpum amphicarpon	**W1**		**S3**	**G4**
Pinebarrens Goober Grass				
C: pine savannas, pocosins, shallow peat burns in pocosin/savanna ecotones (Beaufort*, Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Duplin*, Hoke, Martin*, Onslow, Pender, Pitt*, Robeson*, Sampson, Scotland, Wilson*)				
Andropogon arctatus	**W3**		**SU**	**G3**
Pinewoods Bluestem				
C: marsh (Pamlico*)				
Andropogon perangustatus	**W1**		**S2S3**	**G5T4**
Narrowleaf Bluestem				
CS: clay-based Carolina bays, upland depressions (Brunswick, Carteret, Columbus, Cumberland, Harnett, Hoke, Moore, Onslow, Pender, Richmond, Sampson, Scotland)				
Andropogon tracyi	**W7**		**S2**	**G4?**
Tracy's Bluestem				
SCP: sandhills, other dry soils (Gates*, Granville*, Harnett*, Hoke, Johnston*, Moore, Richmond, Scotland*)				
Andropogon virginicus var. decipiens	**W7**		**S1S2**	**G5T4**
Deceptive Bluestem				
C: pinelands and disturbed areas (Bertie*, Bladen*, Craven, Dare*, Duplin*, Hyde, Martin*, Nash*, Onslow, Pender)				
Anemone minima	**W3**		**S2?**	**G5T3**
Dwarf Thimble-weed				
M: forests, openings (Burke)				
Angelica atropurpurea	**W4**		**S2S3**	**G5**
Purple-stem Angelica				
M: roadsides (Alleghany, Haywood*, Wilkes)				
Antennaria howellii ssp. petaloidea	**W7**		**S1?**	**G5T4T5**
Field Pussytoes				
M: dry woodlands (Rutherford)				

Scientific Name Common Name Region: Habitat Comments (Counties of Occurrence)	Status N.C.	 U.S.	Rank N.C.	 Global
Anthenantia rufa	**W1**		**S2**	**G5**
Purple Silkyscale				
CS: savannas (Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Duplin*, Jones, Moore, New Hanover*, Onslow, Pender)				
Arabidopsis lyrata ssp. lyrata	**W1**		**S2**	**G5**
Lyre-leaf Rockcress				
CM: calcareous or mafic rocks (Alleghany*, Ashe, Avery, Buncombe*, Caldwell, Jackson, Jones*, Madison, McDowell*, Watauga*)				
Aronia prunifolia	**W1**		**S2**	**GNA**
Purple Chokeberry				
M: bogs, seepages, and swamp forests (Ashe, Avery, Burke, Jackson, Macon, McDowell, Watauga)				
Asclepias longifolia	**W1**		**S2S3**	**G4G5**
Longleaf Milkweed				
CS: savannas and sandhill seeps (Brunswick, Carteret*, Columbus, Craven, Cumberland*, Dare*, Johnston, Onslow, Pender, Pitt)				
Asclepias tomentosa	**W1**		**S3**	**G4**
Sandhills Milkweed				
SC: sandhills (Bladen, Cumberland, Harnett, Hoke, Lee, Moore, Richmond, Sampson, Scotland*)				
Asplenium resiliens	**W1**		**S2**	**G5**
Blackstem Spleenwort				
MP: calcareous rock outcrops (Avery, Haywood, Jackson*, Macon*, Madison, McDowell, Rutherford*, Stanly*, Swain*, Transylvania, Yadkin)				
Baccharis angustifolia	**W1**		**S2**	**G4**
Saltwater False-willow				
CT: brackish marshes, shrubby marsh edges (Brunswick, Carteret, Currituck, Dare, Hyde, New Hanover, Onslow, Pender)				
Baptisia albescens	**W1**		**S3**	**G4**
Thin-pod White Wild Indigo				
MPS: open woodlands, clearings (Anson, Burke*, Chatham*, Cleveland, Iredell*, McDowell, Mecklenburg, Montgomery, Moore, Person*, Polk*, Richmond, Rockingham*, Rowan*, Rutherford, Stanly*, Stokes, Surry*, Transylvania*, Union)				
Bartonia paniculata ssp. paniculata	**W1**		**S2S3**	**G5T5**
Twining Screwstem				
CMPS: bogs, wet savannas, sandhill seeps, other open wet areas (Alleghany, Brunswick*, Burke, Carteret, Craven, Duplin*, Gates*, Jones, Moore, New Hanover, Pender, Scotland, Wake*, Yancey)				
Bartonia verna	**W1**		**S2**	**G5?**
White Screwstem				
C: savannas, limesink ponds (Bladen*, Brunswick, Carteret, New Hanover*, Onslow, Pender)				

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Bidens mitis	**W7**		**S2?**	**G4?**
Coastal Plain Tickseed				
CM: freshwater marshes, brackish marshes, and mountain bogs (Brunswick*, Buncombe*, Chowan*, Currituck*, Dare, Jackson, Onslow)				
Bigelowia nudata var. australis	**W7**		**S1?**	**G5T4T5**
Rayless-goldenrod				
C: wet depressions and limesink ponds (Carteret)				
Boechera burkii	**W7**		**SH**	**G5T3T5**
Porter's Rockcress				
M: dry, rocky calcareous areas and shale barrens (Madison*)				
Boykinia aconitifolia	**W1**		**S3**	**G4**
Brook Saxifrage				
M: stream banks, meadows, and seepage slopes (Alleghany, Ashe, Avery, Burke, Jackson*, Macon, Mitchell*, Transylvania, Wilkes*)				
Bromus nottowayanus	**W7**		**S1?**	**G3G5**
Nottoway Valley Brome				
P: rich woods (Ashe, Buncombe, Cherokee, Henderson, Madison, Polk, Rockingham*, Surry*)				
Burmannia biflora	**W1**		**S2S3**	**G4G5**
Northern Bluethreads				
CS: limesinks, cypress savannas, and sandhill seeps (Beaufort*, Bladen, Brunswick, Carteret, Cumberland, Dare*, Harnett*, Hoke, Moore, New Hanover*, Onslow, Pender, Pitt, Scotland)				
Calamovilfa brevipilis	**W1**		**S3**	**G4**
Pinebarren Sandreed				
CS: savannas, sandhill seeps (Brunswick, Carteret, Columbus*, Craven, Cumberland, Duplin*, Harnett, Hoke, Johnston*, Montgomery, Moore, Nash, New Hanover, Onslow, Pender, Pitt, Richmond, Sampson*, Scotland)				
Calystegia spithamaea ssp. stans	**W1**		**S2S3**	**G4G5TNR**
Shale Barren Bindweed				
MP: shale barrens and woodlands (Burke*, Forsyth*, Henderson, Orange*, Rowan*)				
Carex albursina	**W7**		**S2**	**G5**
White Bear Sedge				
M: rich cove forests, over mafic or calcareous rocks (Ashe, Buncombe, Graham, Haywood*, Macon, Madison*, Mitchell*, Rutherford, Transylvania, Wilkes, Yancey)				
Carex aquatilis	**W7**		**S1**	**G5**
Aquatic Sedge				
M: mafic fens at high elevation (Ashe*, Avery, Macon)				

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Carex biltmoreana	**W1**		**S3**	**G3**
Biltmore Sedge				
M: cliffs, outcrops, and granitic domes (Buncombe, Cherokee, Graham, Haywood, Henderson, Jackson, Macon, McDowell, Polk, Rutherford, Transylvania)				
Carex bromoides ssp. montana	**W7**		**S3?**	**G5T3?**
Blue Ridge Brome Sedge				
M: bogs, moist areas along streams, seepages in coves (Ashe, Avery*, Buncombe*, Haywood, Henderson, Macon, Rutherford*, Transylvania, Watauga)				
Carex chapmanii	**W1**		**S3**	**G3**
Chapman's Sedge				
C: moist bottomlands and slopes, perhaps associated with marl (Bladen*, Brunswick*, Carteret, Columbus, Craven, Gates, Jones, New Hanover*, Onslow, Pender)				
Carex collinsii	**W1**		**S3**	**G4**
Collins's Sedge				
SM: white cedar swamps, bogs (Cumberland, Harnett, Henderson, Hoke, Lee, Moore, Richmond, Scotland, Transylvania)				
Carex echinata ssp. echinata	**W1**		**S2S3**	**G5T5**
Star Sedge				
M: bogs and seeps (Alleghany, Ashe, Avery, Clay, Henderson, Jackson, Macon, Transylvania, Watauga, Wilkes*, Yancey)				
Carex fraseriana	**W1**		**S3**	**G4**
Fraser's Sedge				
M: forests (Ashe, Avery, Caldwell, Clay, Graham, Haywood*, Jackson, Macon, McDowell*, Mitchell*, Swain, Watauga, Wilkes, Yancey*)				
Carex gholsonii	**W7**		**S1S2**	**G4G5**
Gholson's Sedge				
C: along creeks and springs (Brunswick, Craven, Jones, Onslow, Pender)				
Carex granularis	**W7**		**S1?**	**G5**
Limestone Meadow Sedge				
PC: piedmont bottomlands, coastal plain marl forests (Bladen*, Caswell*, Craven*, Durham*, Granville*, Guilford*, Henderson, Jones, Mecklenburg*, Orange*, Pender, Person*, Rowan*, Stokes*, Wilson*)				
Carex hyalinolepis	**W1**		**S2**	**G4G5**
Shoreline Sedge				
C: marshes (Beaufort*, Brunswick, Carteret, Craven, Hyde*, New Hanover, Perquimans*, Richmond, Warren*)				

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Carex leavenworthii	**W7**		**S1?**	**G5**
Leavenworth's Sedge				
PM: dry woods (Durham*, Lee, Madison*, Randolph*, Richmond, Rutherford, Warren*)				
Carex leptonervia	**W1**		**S3**	**G5**
A Wood Sedge				
M: rich cove forests and seepage slopes (Alleghany, Avery*, Buncombe, Cherokee, Clay*, Graham, Haywood, Henderson, Jackson, Macon, Madison*, Swain*, Transylvania, Watauga, Yancey)				
Carex lucorum var. austrolucorum	**W7**		**S2?**	**G5T3T4**
Appalachian Woodland Sedge				
M: medium to high elevation forests, especially over calcareous or mafic rocks (Alleghany, Ashe, Buncombe*, Clay*, Jackson, Macon*, Swain*, Transylvania*, Watauga*)				
Carex manhartii	**W1**		**S3**	**G3G4**
Manhart's Sedge				
M: rich cove forests (Ashe, Avery, Cherokee, Clay, Graham, Haywood, Henderson, Jackson, Macon, Swain, Transylvania)				
Carex misera	**W1**		**S3**	**G3**
Wretched Sedge				
M: high elevation rock outcrops (Ashe, Avery, Buncombe, Burke, Clay, Graham, Haywood, Henderson, Jackson, Macon, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Carex mitchelliana	**W1**		**S2**	**G4**
Mitchell's Sedge				
CMPS: swampy woodlands and forests (Alleghany, Anson*, Beaufort*, Brunswick, Carteret, Cherokee*, Clay, Craven, Cumberland, Dare*, Gaston*, Harnett*, Hoke, Iredell*, Jones, Lenoir*, Moore, New Hanover, Pasquotank*, Pender, Richmond, Scotland*, Stokes*, Tyrrell*)				
Carex oklahomensis	**W7**		**S1?**	**G4**
Oklahoma Sedge				
M: seeps (Graham)				
Carex physorhyncha	**W1**		**S2S3**	**G5T5**
Bellow's-beak Sedge				
CP: somewhat shaded dry to mesic woods (Columbus, Duplin, Edgecombe, Halifax, Harnett, Jones, Macon, Moore, Pender, Richmond, Washington)				
Carex ruthii	**W1**		**S3**	**G3**
Ruth's Sedge				
M: seeps and bogs (Ashe, Avery, Buncombe*, Clay*, Graham*, Haywood, Jackson*, Macon, Mitchell*, Swain*, Transylvania*, Watauga, Yancey*)				

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Carex sparganioides	**W7**		**S2?**	**G5**
Bur-reed Sedge				
MP: rich cove forests (Alleghany*, Ashe*, Jackson*, Macon, Madison*, Mitchell*, Randolph*)				
Carex tenera var. tenera	**W7**		**S1?**	**G5**
Quill Sedge				
P: low woods (Cabarrus, Durham*, Richmond)				
Carex turgescens	**W1**		**S3**	**G4G5**
Pinebarren Sedge				
S: seepage bogs (Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)				
Carex woodii	**W1**		**S3**	**G4**
Wood's Sedge				
MPC: forested slopes, cove forests, and northern hardwoods (Alleghany, Ashe, Avery, Cherokee, Clay, Henderson, Jackson, Jones*, Macon, Mitchell*, Orange*, Transylvania, Watauga)				
Celtis occidentalis	**W7**		**S2**	**G5**
Mountain Hackberry				
CMP: rocky woodlands and mafic cliffs (Buncombe*, Burke, Caswell, Durham, Haywood, Jackson*, Macon*, Madison, McDowell, Polk, Rutherford, Swain*, Wake, Warren*, Yancey*)				
Cerastium nutans	**W7**		**S3?**	**G5**
Nodding Chickweed				
MP: alluvial forests, bottomlands, moist forests (Ashe*, Buncombe, Clay, Macon, Mitchell, Rockingham*, Transylvania)				
Ceratophyllum echinatum	**W7**		**S2**	**G4**
Prickly Hornwort				
CT: pools, lakes, and estuaries (Beaufort*, Brunswick*, Dare, Perquimans*, Richmond, Wayne*)				
Chasmanthium sessiliflorum var. sessiliflorum	**W1**		**S2S3**	**G5TNR**
Longleaf Spikegrass				
CMP: hardwood forests (Anson, Bertie*, Bladen, Brunswick*, Craven*, Cumberland, Davidson, Gates*, Graham, Harnett, Jones, Martin, Montgomery, Moore, Onslow, Pender, Polk, Richmond, Rowan, Stanly, Union)				
Chrysopogon pauciflorus	**W4**		**S1**	**G4G5**
Goldenbeard				
C: sandhills (New Hanover*)				
Chrysopsis trichophylla	**W1**		**S2**	**G5T5**
Naked Golden-aster				
C: xeric sandhills and sandhill scrub (Bladen, Cumberland, New Hanover, Pender, Sampson)				

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Chrysosplenium americanum	**W1**		**S3**	**G5**
Golden Saxifrage				
M: seeps (Ashe, Avery, Haywood, Jackson, Macon, Madison*, Mitchell, Polk*, Swain, Transylvania, Watauga*, Wilkes*, Yancey)				
Cinna latifolia	**W7**		**S1S2**	**G5**
Slender Wood-reed				
M: high elevation forests and openings (Buncombe*, Graham, Haywood, Macon*, Mitchell*, Swain*, Watauga*, Yancey*)				
Cladrastis kentukea	**W1**		**S2S3**	**G4**
Yellowwood				
M: forests (Cherokee, Clay, Graham, Haywood, Macon, Madison, Swain*)				
Cleistesiopsis bifaria	**W1**		**S3**	**G4?**
Small Spreading Pogonia				
MPC: savannas, dry meadows (Brunswick, Buncombe*, Burke, Carteret, Catawba, Cherokee*, Cleveland, Craven, Graham, Harnett*, Henderson*, Hoke, Madison*, McDowell, New Hanover, Onslow, Robeson*, Rutherford, Scotland*, Transylvania)				
Cleistesiopsis divaricata	**W1**		**S3**	**G4**
Spreading Pogonia				
C: pine savannas (Brunswick, Carteret, Columbus, Hoke, Moore, Onslow, Pender)				
Cleistesiopsis oricamporum	**W7**		**S2**	**G3?**
Small Coastal Plain Spreading Pogonia				
C: Savannas (Brunswick, Craven, New Hanover, Onslow, Pender)				
Coelorachis rugosa	**W1**		**S3**	**G5**
Wrinkled Jointgrass				
CS: limesink ponds, clay-based Carolina bays, wet savannas (Brunswick, Carteret, Columbus, Craven, Cumberland*, Dare*, Harnett*, Hoke, Moore*, New Hanover, Onslow, Pender, Richmond, Robeson, Sampson, Scotland)				
Comptonia peregrina	**W1**		**S3**	**G5**
Sweet Fern				
CMPS: open dry sites, often fire-maintained (Alleghany, Burke, Caldwell, Gaston, Henderson, Hoke, Johnston*, Lee*, McDowell*, Moore, Transylvania, Wake*, Wilkes)				
Corallorhiza odontorhiza	**W1**		**S4?**	**G5**
Autumn Coral-root				
CMP: forests (Alleghany, Ashe*, Avery*, Buncombe*, Burke, Caswell, Catawba, Chatham*, Cherokee, Davidson*, Davie*, Franklin*, Gaston*, Graham, Granville, Guilford*, Haywood*, Henderson*, Iredell*, Jackson, Jones*, Macon, Madison*, Martin*, McDowell, Mecklenburg*, Mitchell*, Montgomery*, Moore*, Nash*, Northampton*, Orange, Person*, Randolph, Rowan*, Rutherford, Stanly*, Stokes*, Vance*, Wake, Warren*, Watauga*, Yancey)				

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Coreopsis delphiniifolia	**W3**		**SNR**	**G3?Q**
Larkspur Coreopsis				
P: dry woodlands (not yet documented in North Carolina)				
Coreopsis latifolia	**W1**		**S3**	**G3**
Broadleaf Coreopsis				
M: cove forests and other rich woods (Avery, Buncombe, Caldwell, Haywood, Henderson, McDowell, Mitchell, Polk, Rutherford, Yancey)				
Coreopsis pubescens var. robusta	**W7**		**S2?**	**G5?T3T5**
Blue Ridge Coreopsis				
MP: rich woodlands, glades, outcrops (Alleghany*, Ashe*, Cherokee*, Clay*, Haywood*, Iredell*, Jones*, Macon, Polk*, Rutherford, Watauga*)				
Crataegus aestivalis	**W1**		**S2**	**G5**
May Hawthorn				
C: swamp forests (Brunswick*, Columbus*, Craven*, Duplin, Onslow*, Pender, Sampson, Wayne*)				
Crataegus oreophila	**W7**		**S2**	**GNR**
Balsam Mountain Hawthorn				
M: high elevation grassy balds, openings, or hardwood forests (Haywood, Jackson)				
Crataegus schuettei	**W1**		**S2?**	**G5?**
Schuette's Hawthorn				
M: mesic hardwood forests (Graham, Macon)				
Crataegus spathulata	**W1**		**S1S2**	**G5**
Littlehip Hawthorn				
CPM: bottomlands (Anson, Ashe, Bladen*, Columbus, Cumberland, Davidson, Macon*, Stanly)				
Cuthbertia rosea	**W7**		**S1?**	**G5**
Roseling				
P: dry woodlands (Cleveland*, Rutherford)				
Cynanchum laeve	**W7**		**S1?**	**G5**
Smooth Swallowwort				
C: bottomlands and disturbed areas (Bertie, Halifax*, Northampton*, Warren*)				
Cyperus distans	**W4**		**SH**	**G5**
A Flatsedge				
C: marshes (New Hanover*)				
Cyperus houghtonii	**W3**		**SH**	**G4?**
Houghton's Flatsedge				
P: dry soil (Iredell*)				

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Cyperus hystricinus	**W7**		**SH**	**G4**
Bristly Flatsedge				
PC: dry woodlands and forests (Cumberland*, Durham*)				
Cyperus odoratus var. engelmannii	**W7**		**S1?**	**G4Q**
Engelmann's Flatsedge				
C: alluvial and other damp to wet soils (Brunswick, New Hanover)				
Cyperus squarrosus	**W7**		**S2**	**G5**
Awned Flatsedge				
P: granite flatrocks, other rock outcrops (Durham*, Franklin*, Rowan*, Rutherford)				
Cyperus surinamensis	**W4**		**S1**	**G5**
Tropical Flatsedge				
C: marshes, pond edges, disturbed wet areas (Dare)				
Cypripedium reginae	**W4**		**SNA**	**G4G5**
Showy Ladyslipper				
M: the only specimen from NC is from implausible habitat - highly acid humus under rhododendron (Jackson*)				
Cystopteris bulbifera	**W7**		**S1S2**	**G5**
Bulblet Bladder Fern				
MP: calcareous rocks (Avery, Buncombe, Madison, McDowell, Orange, Swain*, Transylvania)				
Dalea pinnata	**W1**		**S2**	**G5**
Eastern Prairie-clover				
SC: sandhills and dryish pinelands (Bladen, Cumberland, Harnett*, Hoke, Lenoir*, Moore*, Pender, Richmond, Robeson*, Sampson, Scotland, Wayne*)				
Desmodium cuspidatum var. cuspidatum	**W7**		**S2?**	**G5T5?**
Large-bract Tick-trefoil				
CPM: roadsides and wooded banks of rivers and streams (Avery*, Brunswick*, Caswell, Clay*, Gaston*, Guilford*, Henderson*, Jones*, Madison*, Mitchell*)				
Diamorpha smallii	**W1**		**S3**	**G4**
Elf Orpine				
PM: granite flatrocks (Alexander, Anson, Forsyth*, Franklin, Gaston, Granville, Iredell*, Nash*, Rowan, Rutherford, Wake, Yadkin*)				
Dichanthelium dichotomum var. roanokense	**W1**		**S2**	**G5T4?**
Roanoke Witch Grass				
CS: savannas, open swampy woods, wet peaty meadows (Bladen, Brunswick, Columbus, Dare, Hyde*, Moore, Pender)				

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Dichanthelium erectifolium	**W1**		**S2**	**G4**
Erectleaf Witch Grass				
C: pond shores (Bladen, Brunswick, Columbus, Hoke, New Hanover, Onslow, Robeson, Sampson, Scotland)				
Dichanthelium linearifolium	**W7**		**S1?**	**G5**
Low White-haired Witch Grass				
PM: dry open woods and rock outcrops (Ashe, Durham*, Gaston*, Macon)				
Dichanthelium malacon	**W7**		**S1?**	**G3**
Dehiscent Witch Grass				
C: dry pine/scrub oak woodlands (New Hanover*, Pender)				
Dichanthelium oligosanthes var. scribnerianum	**W7**		**S1?**	**G5T5**
Scribner's Witch Grass				
CP: calcareous, coastal-fringe forests and dry, thin woods on basic soils (Carteret, Granville, Onslow)				
Dichanthelium ovale var. ovale	**W1**		**S2S3**	**G5T5**
Elliott's Witch Grass				
C: dry to damp, sandy pinelands (Brunswick*, Carteret, Gates*, Pender)				
Dichanthelium webberianum	**W1**		**S3**	**GNR**
Webber's Witch Grass				
C: moist pine savannas and flatwoods (Brunswick, Carteret, Columbus, New Hanover, Onslow)				
Dirca palustris	**W1**		**S3**	**G4**
Leatherwood				
PM: rich woods, either alluvial or over mafic or calcareous rocks (Anson*, Ashe, Burke, Caswell, Catawba, Chatham*, Clay*, Cleveland, Durham, Haywood, Jackson, Lee, Macon, Madison*, McDowell, Mecklenburg*, Moore, Person, Polk, Randolph, Rockingham, Rutherford, Stanly, Swain*, Wake)				
Dryopteris carthusiana	**W7**		**S2**	**G5**
Spinulose Woodfern				
MCP: swampy woods (Avery, Cabarrus*, Camden*, Chowan*, Gates, Haywood*, Jackson*, Macon*, Mecklenburg*, Mitchell*, Moore, Perquimans, Yancey*)				
Dryopteris cristata	**W1**		**S3**	**G5**
Crested Woodfern				
MCP: bogs, wet woods (Alamance*, Alleghany, Ashe, Avery, Buncombe, Burke, Camden*, Durham*, Franklin, Gates*, Guilford, Haywood, Henderson*, Macon, Madison*, McDowell, Mecklenburg*, Mitchell*, Orange*, Person, Transylvania, Wake, Warren, Watauga, Yancey)				

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Dryopteris goldiana	**W1**		**S3**	**G4G5**
Goldie's Woodfern				
MP: rich, moist woods (Alleghany, Ashe, Buncombe, Burke, Cherokee, Clay, Graham, Haywood, Jackson, Macon, Madison, Mitchell*, Orange*, Swain, Transylvania, Watauga*, Yancey)				
Dryopteris ludoviciana	**W1**		**S2**	**G4**
Southern Woodfern				
C: acid swamps (Brunswick*, Carteret, Chowan, Columbus*, Craven, Jones, New Hanover*, Onslow, Pender, Washington)				
Echinocystis lobata	**W7**		**S1**	**G5**
Wild Mock Cucumber				
M: alluvial forests (Alleghany*, Ashe, Watauga)				
Elatine americana	**W4**		**SNA**	**G4**
American Waterwort				
M: the only known site for this species in NC is an artificial lake; it is uncertain whether it should be considered native or introduced (Burke, Jackson*)				
Elatine minima	**W4**		**SNA**	**G5**
Tiny Waterwort				
P: lakes (Granville)				
Eleocharis engelmannii	**W7**		**S1?**	**G4G5**
Englemann's Spikerush				
PCM: marshes (Alexander*, Henderson*, Hoke, Northampton*, Rowan*, Stanly*)				
Eleocharis equisetoides	**W1**		**S3**	**G4**
Horsetail Spikerush				
CP: limesink ponds, lakes, borrow pits, ditches (Bladen, Brunswick, Carteret, Columbus, Craven*, Cumberland, Harnett, Hoke, Moore, New Hanover*, Onslow, Pender, Randolph, Richmond, Scotland, Wake, Washington)				
Eleocharis erythropoda	**W7**		**S1**	**G5**
Bald Spikerush				
MC: stream banks and marshes (Ashe*, Madison*)				
Eleocharis palustris	**W3**		**S1**	**G5**
Small's Spikerush				
M: open, wet places (Macon*)				
Eleocharis tricostata	**W1**		**S2S3**	**G4**
Three-angle Spikerush				
CP: bogs and savannas (Bladen, Brunswick, Cabarrus, Carteret*, Cumberland, Dare*, Hoke, New Hanover, Northampton*, Onslow, Richmond, Robeson, Sampson, Scotland, Stanly*)				

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Elodea canadensis	**W7**		**S1?**	**G5**
Canada Waterweed				
CPM: lakes, ponds, and stagnant waters of streams (Alleghany, Ashe, Craven*, Gates, McDowell*, Orange*, Perquimans*, Wake*, Watauga*)				
Elodea nuttallii	**W7**		**S2?**	**G5**
Nuttall's Elodea				
CPM: lakes, ponds, and streams (Avery*, Currituck*, Dare*, Franklin*, Haywood*, Jones*, McDowell*, Perquimans*, Tyrrell*, Wake*, Wilson*, Yancey*)				
Elymus canadensis var. canadensis	**W7**		**S1**	**G5T5**
Great Plains Wild-Rye				
M: rich woods (Buncombe*, Cherokee, Macon, Swain*)				
Elymus riparius	**W7**		**S1S2**	**G5**
Riverbank Wild Rye				
MP: riverbanks and low, rich woods (Alleghany, Ashe*, Avery*, Henderson, Jackson, Madison*, Orange*, Watauga*)				
Epilobium leptophyllum	**W1**		**S3**	**G5**
Narrowleaf Willowherb				
MP: bogs and seeps (Alleghany, Ashe, Avery, Burke, Guilford*, Jackson, Macon, Madison, Mitchell, Watauga, Wilkes)				
Eragrostis frankii	**W7**		**S1**	**G5**
Frank's Lovegrass				
P: open, disturbed sites (Granville*)				
Eragrostis lugens	**W7**		**S1**	**G5**
Mourning Lovegrass				
P: open, wet areas (Mecklenburg*)				
Eriophorum virginicum	**W1**		**S3**	**G5**
Cottongrass				
MSCP: peaty sites - bogs, fens, pocosins, seeps (Alleghany, Ashe, Bladen, Brunswick, Burke, Cumberland, Currituck*, Edgecombe*, Forsyth*, Harnett, Henderson*, Jackson, Macon*, Moore*, Richmond, Scotland, Transylvania*, Tyrrell*, Watauga, Yancey)				
Eryngium yuccifolium var. synchaetum	**W2**		**S2**	**G5T5**
Southern Rattlesnake-master				
C: wet savannas (Bladen*, Brunswick, Columbus, Onslow, Pender)				

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Euonymus atropurpureus var. atropurpureus	**W7**		**S2**	**G5T5**
Eastern Wahoo				
PMC: levee forests and rich forests with circumneutral soils (Caswell, Cherokee*, Franklin, Guilford*, Halifax, Lee, Moore, Northampton, Orange*, Person, Polk, Rockingham*, Rutherford*, Stokes*, Swain*)				
Eupatorium altissimum	**W1**		**S2**	**G5**
Tall Boneset				
P: woodlands, openings, and old fields over mafic rocks (Burke, Cabarrus, Caswell, Chatham, Davidson*, Granville, McDowell, Mecklenburg, Moore, Person, Randolph, Rowan*, Stanly, Wake*)				
Eupatorium godfreyanum	**W1**		**S3**	**G4**
Godfrey's Thoroughwort				
PM: woodlands, especially over mafic rocks (Burke, Caldwell, Caswell, Catawba, Cleveland, Durham, Granville, Henderson*, McDowell, Orange*, Person, Rutherford, Swain*, Vance*, Wake*)				
Eupatorium recurvans	**W7**		**S1?**	**G3G4Q**
Recurved Eupatorium				
C: wet savannas (Pender)				
Eupatorium sessilifolium var. brittonianum	**W7**		**S1?**	**G5T3T5**
Britton's Eupatorium				
M: rocky woodlands over mafic rocks (Buncombe*, Burke, Macon, McDowell, Rutherford)				
Eurybia avita	**W3**		**SNA**	**G3**
Alexander's Rock Aster				
M: thin soil around granitic outcrops (Transylvania)				
Eurybia surculosa	**W1**		**S3?**	**G4G5**
Creeping Aster				
M: rock outcrops, glades, rocky woodlands (Buncombe, Cherokee, Graham, Jackson, Macon, Madison, McDowell, Rutherford, Transylvania)				
Euthamia graminifolia var. nuttallii	**W7**		**S1?**	**G5T5?Q**
Nuttall's Flat-top Goldenrod				
M: moist to dry riverbanks, bottomlands, and bog margins (Alleghany, Avery, Buncombe*, Henderson, Macon, Watauga)				
Eutrochium maculatum var. maculatum	**W7**		**S3?**	**G5T5**
Spotted Joe-pye Weed				
M: wet calcareous meadows, cove forests, grassy balds (Ashe*, Avery*, Buncombe*, Haywood*, Jackson, Macon*, Mitchell, Polk*, Watauga*, Yancey*)				

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Fallopia cristata	**W7**		**S2?**	**G5T5**
Crested Climbing Buckwheat				
PMC: moist forests, especially alluvial forests (Alexander*, Ashe, Burke, Granville*, Haywood*, Iredell*, Macon*, McDowell, Onslow*, Orange*, Polk, Rutherford, Stokes*, Wake*, Wilkes*)				
Fragaria vesca var. americana	**W4**		**S1**	**G5T5**
Woodland Strawberry				
M: rich forests (Watauga*)				
Frangula caroliniana	**W1**		**S3**	**G5**
Carolina Buckthorn				
PMC: rich bottomlands and slopes (Beaufort*, Buncombe, Burke, Cabarrus, Catawba, Cleveland*, Graham, Iredell*, Lincoln*, Madison, McDowell, Mecklenburg, Polk, Rutherford, Union, Watauga)				
Galactia minor	**W1**		**S2?**	**G4**
Little Milkpea				
S: sandy fields and roadsides (Hoke*)				
Galium asprellum	**W7**		**S2**	**G5**
Rough Bedstraw				
M: bogs (Alleghany, Ashe, Avery, Haywood*, Watauga)				
Galium lanceolatum	**W7**		**S2**	**G5**
Lanceleaf Wild Licorice				
M: rich cove forests (Ashe, Buncombe, Caldwell, Clay*, Graham, Haywood, Jackson, Macon, Madison, Mitchell*, Watauga)				
Gaylussacia bigeloviana	**W7**		**S2**	**G5T4T5**
Northern Dwarf Huckleberry				
C: pocosins (Bladen, Brunswick, Carteret, Dare, Jones, Pender)				
Gentiana austromontana	**W1**		**S2S3**	**G3**
Appalachian Gentian				
M: high elevation forests and balds (Alleghany, Ashe, Avery, Buncombe*, Burke*, Caldwell, Clay, Jackson*, Mitchell, Stokes*, Transylvania*, Watauga*, Yancey)				
Gentiana clausa	**W7**		**S3?**	**G5**
Closed Gentian				
MP: forests				
Geum fragarioides	**W1**		**S2S3**	**G5T5**
Northern Barren-strawberry				
P: forests and streambanks (Burke, Catawba, Graham)				

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Glandularia canadensis	**W7**		**S1?**	**G5**
Rose Mock-vervain				
CPS: sandhills, diabase glades, and other dry woods (Alamance*, Beaufort*, Brunswick*, Granville, Randolph*, Richmond*, Washington*)				
Goodyera repens	**W1**		**S2S3**	**G5**
Lesser Rattlesnake Orchid				
MP: moist, acid forests, especially under rhododendrons and conifers (Alleghany, Ashe, Avery, Buncombe, Burke, Graham, Haywood, Macon*, Madison, Mitchell, Rutherford, Surry, Swain*, Transylvania, Watauga, Wilkes, Yancey)				
Habenaria repens	**W1**		**S2**	**G5**
Water-spider Orchid				
CS: in stagnant, blackwater pools and impoundments (Anson, Bladen*, Brunswick, Carteret, Columbus, Cumberland, Dare, Duplin*, Hoke, Moore, New Hanover*, Pender*, Richmond, Scotland)				
Heteranthera dubia	**W3**		**S1?**	**G5**
Water Stargrass				
M: sluggish streams (Alleghany*)				
Heteranthera reniformis	**W7**		**S2?**	**G5**
Kidneyleaf Mud-plantain				
CP: muddy shores, bars, pools (Bertie, Chowan, Davidson*, Franklin*, Gates*, Halifax*, Pasquotank*, Perquimans*, Pitt*, Wake, Washington*)				
Heuchera caroliniana	**W7**		**S3**	**G3**
Carolina Alumroot				
P: rich, rocky woods (Alexander*, Anson*, Burke, Cabarrus*, Cleveland, Davidson*, Forsyth*, Gaston*, Iredell*, Lincoln*, Mecklenburg*, Moore, Randolph*, Rockingham, Rowan*, Rutherford, Stanly, Stokes*, Surry*, Union*)				
Heuchera longiflora	**W7**		**S2**	**G4**
Long-flower Alumroot				
M: rich and rocky cove forests, especially over calcareous or mafic rocks (Buncombe, Haywood*, Madison)				
Heuchera parviflora var. parviflora	**W1**		**S3**	**G4T4**
Grotto Alumroot				
MP: in deep shade under overhanging cliffs (Avery, Buncombe, Burke, Haywood, Henderson*, Jackson, Macon, McDowell, Polk*, Rutherford, Stokes, Surry*, Transylvania)				
Heuchera parviflora var. saurensis	**W7**		**SH**	**G4TH**
Sauratown Grotto Alumroot				
MP: Shaded cliff bases (Burke*, Stokes*, Surry*)				

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Hexastylis lewisii	**W1**		**S3**	**G3**
Lewis's Heartleaf				
PSC: mesic mixed hardwood forests, streamhead pocosin ecotones (Anson, Bladen, Burke, Chatham, Cumberland*, Duplin*, Durham, Granville, Halifax, Harnett, Johnston, Lenoir*, Nash, Northampton, Orange, Pender, Person, Sampson, Vance, Wake)				
Houstonia longifolia var. glabra	**W1**		**S3**	**G5T3Q**
Granite Dome Bluet				
M: high elevation granitic domes, rarely other outcrops (Clay, Haywood, Henderson, Jackson, Macon, Madison, Transylvania)				
Houstonia purpurea var. calycosa	**W7**		**S2?**	**G5T5**
Summer Bluet				
MP: rocky forests, often dry (Burke, Jackson, Macon, Madison)				
Humulus lupulus var. lupuloides	**W7**		**S1?**	**G5T5**
Hops				
CP: alluvial forests and bottomlands (Caswell, Randolph*, Rockingham*, Stokes*, Wake*)				
Humulus lupulus var. pubescens	**W4**		**S1**	**G5T4?**
Hops				
P: bottomlands (Randolph*, Rockingham*, Stokes*)				
Huperzia appressa	**W1**		**S3**	**G5**
Appalachian Fir-clubmoss				
M: high elevation rocky summits, seeps, fens (Ashe, Avery, Buncombe, Haywood, Jackson, Macon, McDowell, Mitchell, Rutherford, Transylvania, Watauga, Yancey)				
Hydrangea cinerea	**W7**		**S2**	**G4**
Ashy Hydrangea				
M: shady ledges and cliffs, upslope of alluvial forests (Cherokee, Clay*, Cleveland, Graham, Henderson, Jackson*, Macon*, McDowell, Polk, Rutherford, Swain*, Transylvania)				
Hydrophyllum macrophyllum	**W1**		**S3**	**G5**
Largeleaf Waterleaf				
M: rich woods, especially rocky calcareous forests and cliffs (Buncombe, Haywood, Jackson, Madison, Watauga, Yancey)				
Hypericum buckleyi	**W1**		**S3**	**G3**
Blue Ridge St. John's-wort				
M: high elevation rocky summits, granitic domes, grassy balds (Buncombe, Clay, Haywood, Jackson, Macon, Transylvania)				
Hypericum ellipticum	**W3**		**SNR**	**G5**
Pale St. John's-wort				
M: habitat in North Carolina not known				

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Hypericum graveolens	**W1**		**S2S3**	**G3**
Mountain St. John's-wort				
M: high elevation balds, outcrops, seeps (Buncombe*, Haywood, Jackson, Macon, McDowell*, Mitchell, Swain*, Transylvania, Yancey*)				
Hypericum mitchellianum	**W1**		**S2S3**	**G3**
Mitchell's St. John's-wort				
M: high elevation balds, outcrops, seeps (Ashe, Avery, Buncombe*, Burke, Graham, Haywood, Jackson, Macon*, McDowell, Mitchell, Watauga, Yancey)				
Hypericum tubulosum	**W7**		**S2?**	**G4?**
Marsh St. John's-wort				
C: wet sites, pools (Anson, Bertie, Davidson, Gaston, Mecklenburg, Watauga)				
Ilex amelanchier	**W1**		**S3**	**G4**
Sarvis Holly				
CS: blackwater swamps and riverbanks, clay-based Carolina bays (Bladen, Brunswick, Columbus, Cumberland, Harnett*, Hoke, Montgomery, Pender, Richmond, Robeson, Sampson, Scotland)				
Ilex cassine	**W1**		**S2**	**G5**
Dahoon				
C: blackwater swamps and pocosins (Brunswick, Carteret, New Hanover)				
Ipomoea brasiliensis	**W4**		**S1**	**G5T5**
Railroad Vine				
C: ocean beaches (Carteret)				
Ipomopsis rubra	**W7**		**S1S2**	**G4G5**
Standing Cypress				
CMPS: sandy soils (Cumberland*, Harnett*, Henderson, Hoke, Moore, Richmond, Robeson*, Rutherford*, Scotland)				
Iresine rhizomatosa	**W1**		**S2S3**	**G5**
Rootstock Bloodleaf				
TC: low wet places, interdune swales, damp woods, edges of brackish marshes (Brunswick, Carteret, Cumberland, Dare, New Hanover, Onslow, Pender*, Sampson*)				
Isoetes hyemalis	**W7**		**S2S3**	**G2G3**
Wintergreen Quillwort				
CPS: beds of blackwater and other streams (Brunswick*, Columbus, Cumberland, Duplin, Harnett, Johnston*, Jones, Moore, Orange, Pender, Sampson*, Scotland)				

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Isotria verticillata	**W1**		**S2S3**	**G5**
Large Whorled Pogonia				
CMPS: forests (Alleghany, Ashe*, Bertie*, Buncombe*, Burke, Caldwell, Carteret, Catawba, Cherokee, Cumberland, Gates*, Graham, Greene*, Guilford, Harnett*, Haywood*, Henderson, Hertford*, Macon, Madison*, McDowell, Montgomery*, Moore, Orange*, Polk*, Randolph, Richmond, Rowan*, Sampson*, Scotland*, Stokes*, Transylvania, Yancey)				
Juglans cinerea	**W5**		**S2S3**	**G4**
Butternut				
MP: cove forests, rich woods (Alleghany, Ashe, Avery, Buncombe*, Burke, Caldwell*, Cherokee, Clay, Durham*, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell*, Orange*, Polk, Rutherford, Sampson*, Stanly*, Stokes*, Swain, Transylvania, Watauga, Wilkes*, Yancey)				
Juncus brachycarpus	**W7**		**S2?**	**G4G5**
Whiteroot Rush				
PC: wet sandy soil (Cabarrus, Chatham*, Duplin*, Durham*, Granville*, Hertford*, Hyde*, Iredell*, Montgomery*, Moore, Nash*, Northampton*, Orange*, Stanly*, Union, Wake*)				
Juncus brevicaudatus	**W7**		**S1?**	**G5**
Mountain Rush				
M: bogs and seeps at high elevations (Alleghany, Clay*, Haywood*, Jackson*, Swain*, Transylvania*, Watauga*, Yancey*)				
Juncus georgianus	**W7**		**S1?**	**G4**
Georgia Rush				
P: shallow depressions in granitic flatrocks and domes (Alexander, Franklin*, Gaston, Rowan*)				
Juncus longii	**W7**		**S1S2**	**G3Q**
Long's Rush				
CP: wet, clayey soil (Cumberland, Dare*, Graham*, Harnett, Henderson, Hoke, Iredell*, Jackson*, Lee*, McDowell, Montgomery, Moore, Rutherford, Union*, Wayne*)				
Juncus secundus	**W7**		**S1S2**	**G5?**
Nodding Rush				
PM: rock outcrops and glades (Alexander, Alleghany*, Buncombe, Burke, Caswell*, Davie*, Forsyth*, Franklin*, Gaston*, Granville*, Madison*, Mitchell*, Orange*, Person*, Rockingham*, Union, Wake*)				
Juncus torreyi	**W3**		**SNR**	**G5**
Torrey's Rush				
M: bogs (Clay*)				

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Kalmia cuneata	**W1**		**S3**	**G3**
White Wicky				
CS: low and high pocosins, streamhead pocosins, and ecotones (Bladen, Cumberland, Hoke, Moore, Pender, Richmond, Scotland)				
Krigia biflora var. biflora	**W7**		**S2?**	**G5T5**
Two-flower Dwarf-dandelion				
MP: rich mesic woods (Ashe, Avery*, Buncombe*, Caldwell*, Chatham*, Clay, Graham*, Haywood*, Transylvania*)				
Lathyrus japonicus var. maritimus	**W3**		**SNR**	**G5T5**
Beach Pea				
C: beaches (Dare?)				
Lathyrus palustris	**W7**		**S2?**	**G5**
Marsh Peavine				
C: bottomlands, streambanks and marshes (Beaufort*, Chowan*, Gates, Hertford, Martin*, Washington*)				
Lathyrus venosus	**W1**		**S3**	**G5**
Smooth Peavine				
PM: rich bottomlands and rocky slopes, generally over mafic rocks (Buncombe, Burke, Caswell, Catawba, Cleveland, Durham, Graham, Granville*, Haywood*, Jackson, Macon, Madison, Montgomery, Moore, Orange*, Richmond, Transylvania, Wake*, Watauga*, Wilkes*)				
Lespedeza frutescens	**W7**		**S2?**	**G5**
Violet Lespedeza				
CP: woodlands and woodland borders (Anson, Edgecombe, Montgomery, Orange, Randolph, Richmond, Stanly)				
Leucospora multifida	**W4**		**SU**	**G5**
Cliff Conobea				
C: sandy margins of ponds and wetlands (Carteret)				
Liatris scariosa var. scariosa	**W7**		**S2**	**G5?TNR**
New England Blazing-star				
MP: rock outcrops, glades, dry woodlands; mostly over mafic rocks? (Cherokee, Clay, Haywood, Henderson, Jackson, Macon, McDowell, Swain)				
Liatris secunda	**W7**		**S2**	**G4G5**
Sandhill Blazing-star				
SC: sandhills (Anson*, Bladen, Brunswick*, Hoke, New Hanover, Pender, Richmond, Scotland, Wake)				

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Lilium sp. 1	**W2**		**S1**	**G1G3Q**
Blackwater Turk's Cap Lily				
C: blackwater swamps (Chowan, Gates, Nash*)				
Lindernia monticola	**W1**		**S2**	**G4**
Flatrock Pimpernel				
PM: seepages on granitic flatrocks and other rock outcrops (Alexander, Cherokee*, Forsyth*, Franklin, Gaston, Granville, Henderson, Nash*, Rowan*, Rutherford, Stokes*, Wake, Yadkin*)				
Listera australis	**W1**		**S3**	**G4**
Southern Twayblade				
CM: moist hardwood forest, swamps, wet woods with acidic soils (Avery*, Beaufort, Bertie, Bladen, Brunswick, Columbus, Craven*, Currituck, Dare, Gates, Halifax, Henderson, Hoke, Hyde, Jones, Moore, Nash, Onslow, Pender, Richmond, Robeson, Sampson, Transylvania*, Tyrrell, Wake, Washington, Wayne)				
Listera cordata var. cordata	**W3**		**SH**	**G5T5**
Heartleaf Twayblade				
M: habitat in North Carolina not known (Avery*)				
Lobelia sp. 1	**W1**		**S3**	**G3**
Cedar Swamp Lobelia				
SC: wet streamheads and seepage slopes (Cumberland, Hoke, Moore, Richmond, Scotland)				
Lonicera flava	**W1**		**S3**	**G5?**
Yellow Honeysuckle				
MP: thin soils around rock outcrops, mainly mafic (Buncombe, Burke, Henderson, Jackson, Macon, McDowell, Polk, Rutherford)				
Ludwigia maritima	**W7**		**S2S3**	**G5**
Seaside Seedbox				
C: savannas, dunes, and ditches (Brunswick, Carteret, Dare, Onslow, Pender)				
Luzula multiflora var. multiflora	**W7**		**S2?**	**G5**
Heath Woodrush				
MP: moist woods (Burke*, Caldwell, Durham, Jackson, Macon, Madison*, Stokes*)				
Lycopodiella prostrata	**W7**		**S2?**	**G5**
Featherstem Clubmoss				
C: wet savannas (Bladen*, Brunswick, Columbus*, Onslow, Pender, Richmond)				
Lycopus amplectens	**W1**		**S3**	**G5**
Clasping Bugleweed				
CS: clay-based Carolina bays, cypress savannas (Cumberland*, Hoke, Moore, Onslow, Pender, Richmond, Robeson, Scotland)				

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Lysimachia loomisii	**W1**		**S3**	**G3?**
Loomis's Loosestrife				
C:pine savannas and pocosins (Beaufort*, Brunswick, Carteret, Columbus*, Craven, Cumberland, Duplin, Johnston*, Jones, Lenoir*, Martin*, Onslow, Pamlico, Pender, Robeson, Wayne*)				
Magnolia acuminata var. subcordata	**W7**		**S1?**	**G5T3Q**
Piedmont Cucumber-tree				
P: moist slopes (Anson*, Montgomery*, Moore*, Stanly)				
Magnolia grandiflora	**W1**		**S2?**	**G5**
Southern Magnolia				
C: mainland forests with maritime influence on the southeastern coast of North Carolina; introduced elsewhere (Brunswick, Carteret, Jones*, New Hanover*, Pender)				
Manfreda virginica	**W1**		**S3**	**G5**
Eastern Agave				
PMCS: granite flatrocks, mafic glades, dry outcrops, dry woodlands (Anson, Burke, Cabarrus, Cherokee, Clay*, Cleveland*, Cumberland*, Granville, Iredell*, Mecklenburg, Montgomery, Orange*, Randolph, Richmond, Rowan*, Rutherford, Stanly, Union)				
Matelea flavidula	**W3**		**SNR**	**G3?**
Yellow Carolina Milkvine				
P: habitat in North Carolina not known (Person*)				
Mertensia virginica	**W7**		**S2**	**G5**
Virginia Bluebells				
PCM: rich forests on slopes and bottomlands (Alamance, Bertie*, Caswell, Halifax, Person, Rockingham, Watauga*)				
Micranthes careyana	**W1**		**S3**	**G3**
Carey's Saxifrage				
M: seepy rock faces (Avery, Buncombe, Burke, Graham, Haywood, Henderson*, Jackson, Macon, Madison, McDowell, Mitchell, Polk, Rutherford, Transylvania, Watauga, Yancey*)				
Monarda austroappalachiana	**W7**		**S1**	**G1**
Ocoee Beebalm				
M: Glades, talus slopes, roadsides				
Monarda punctata var. arkansana	**W7**		**S1?**	**G5TNR**
Arkansas Horsemint				
M: dry forests over mafic rock (Haywood, Polk)				
Muhlenbergia glabrifloris	**W7**		**SH**	**G4?**
Clay-pan Muhly				
P: clay soils (Durham*)				

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Muhlenbergia mexicana	**W7**		**S1?**	**G5**
Mexican Muhly				
M: forests and openings (Alleghany, Ashe, Buncombe, Macon*, Mitchell*, Rutherford)				
Muhlenbergia sylvatica	**W7**		**S1S2**	**G5**
Woodland Muhly				
PM: rich alluvial forests (Avery*, Buncombe, Cherokee, Durham*, Forsyth*, Franklin*, Gaston*, Graham, Granville*, Montgomery*, Orange*, Person*, Rutherford, Swain*)				
Nabalus roanensis	**W1**		**S3**	**G3**
Roan Rattlesnakeroot				
M: grassy balds, high elevation forests and outcrops (Alleghany, Ashe, Avery, Buncombe, Clay, Graham, Haywood, Jackson, Macon, Madison, McDowell, Mitchell, Swain, Transylvania, Watauga, Yancey)				
Najas gracillima	**W7**		**S2**	**G5?**
Slender Waternymph				
CPM: pools and lakes (Avery*, Buncombe*, Chowan*, Forsyth*, Iredell*, Jackson*, Madison*, McDowell*, Orange*, Randolph*, Wake*, Washington*)				
Nelumbo lutea	**W7**		**S2**	**G4**
American Lotus				
CS: ponds, slow streams, natural lakes, estuarine rivers (Anson, Bertie*, Columbus*, Craven, Halifax*, Johnston*, Perquimans*, Pitt, Richmond*, Robeson*, Stanly, Wake, Wilson*)				
Nuphar sagittifolia	**W1**		**S2**	**G5T2**
Cape Fear Spatterdock				
CS: blackwater streams, rivers, and lakes (Beaufort*, Bladen, Brunswick*, Columbus, Cumberland, Duplin, Harnett, Hoke, Jones*, Moore, Nash*, New Hanover, Pender, Pitt, Richmond, Robeson, Sampson, Scotland)				
Nymphoides cordata	**W7**		**S2**	**G5**
Little Floating-heart				
S: blackwater streams and pools, Carolina bays, vernal pools (Cumberland*, Hoke, Moore, Richmond, Scotland)				
Oenothera fruticosa var. unguiculata	**W7**		**S2S3**	**G5T2T3**
Southern Sundrops				
CP: wet clay savannas (Brunswick, Carteret, Columbus, Jones, Onslow, Pender)				
Onosmodium virginianum	**W1**		**S3**	**G4**
Virginia Marbleseed				
CTSP: sandhills, dry mafic sites, shell middens (Brunswick*, Burke, Catawba, Cleveland*, Cumberland, Durham*, Harnett, Hoke, Jones*, McDowell, Moore, Polk*, Richmond, Robeson*, Rutherford, Scotland, Wake*)				

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Ophioglossum crotalophoroides	**W7**		**S1?**	**G5**
Bulbous Adder's-tongue				
C: moist ditchbanks and grassy roadside flats (Beaufort*, Brunswick*, Carteret*, Craven*, Dare*, Hyde*, Martin*, Pamlico*, Washington*)				
Ophioglossum nudicaule	**W7**		**S1?**	**G5**
Slender Adder's-tongue				
C: moist sandy flats (Brunswick*)				
Ophioglossum petiolatum	**W7**		**S2?**	**G5**
Long-stem Adder's-tongue				
CT: maritime wet grasslands, moist ditchbanks, grassy roadside flats (Beaufort*, Brunswick*, Carteret, Craven*, Dare*, Washington*)				
Orbexilum lupinellum	**W1**		**S3**	**G3G4**
Lupine Scurfpea				
CS: sandhills (Bladen*, Craven, Cumberland*, Harnett, Hoke, Moore, Pamlico*, Richmond, Scotland)				
Panax quinquefolius	**W1**		**S3S4**	**G3G4**
Ginseng				
MPS: cove forests, other rich forests (Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Caswell, Catawba, Cherokee, Clay, Cleveland, Davidson*, Durham, Graham, Granville, Haywood, Henderson, Jackson, Lee, Macon, Madison, Martin*, McDowell, Mecklenburg*, Mitchell, Moore, Orange, Person, Polk, Randolph, Rockingham, Rutherford, Stokes, Surry, Swain, Transylvania, Wake, Watauga, Wilkes, Yancey)				
Panax trifolius	**W1**		**S3**	**G5**
Dwarf Ginseng				
MP: cove forests, northern hardwoods, other rich forests (Ashe, Buncombe, Caldwell*, Caswell, Cherokee, Clay, Durham, Graham, Haywood, Jackson, Macon, Orange, Rockingham*, Swain*, Wake, Watauga*)				
Panicum tenerum	**W1**		**S3**	**G4**
Southeastern Panic Grass				
CST: wet savannas, sandhill seeps, limesink ponds (Brunswick, Carteret, Columbus, Moore*, New Hanover, Onslow, Sampson, Scotland)				
Parietaria floridana	**W4**		**S1**	**G5**
Florida Pellitory				
TC: shell middens, disturbed sites, maritime forests (Beaufort*, New Hanover*, Onslow)				
Parietaria pensylvanica	**W7**		**S2**	**G5**
Pennsylvania Pellitory				
PMC: slopes and bottomlands, usually over calcareous or mafic rocks (Alleghany, Anson*, Bertie*, Buncombe*, Harnett, Haywood, Madison, Martin*, Mitchell*, Wilkes)				

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Paronychia fastigiata var. fastigiata	**W7**		**S1S2**	**G5T5**
Forked Whitlow-wort				
PS: dry woods and open areas (Burke, Moore*, Stanly)				
Paronychia montana	**W7**		**S1?**	**G4**
Mountain Nailwort				
MP: rocky slopes (Alexander, Cherokee*, Henderson*, McDowell, Rutherford, Transylvania*)				
Parthenium integrifolium var. mabryanum	**W1**		**S3**	**G5T3**
Mabry's Wild Quinine				
SPC: savannas, pocosin edges, upland pine-oak woods (Alexander*, Beaufort*, Bladen*, Craven*, Cumberland, Harnett, Hoke, Johnston*, Lee*, Mecklenburg*, Montgomery*, Moore, Nash*, Pitt*, Scotland, Union, Wake*, Warren*)				
Paspalum bifidum	**W1**		**S3**	**G5**
Pitchfork Crown Grass				
SC: sandhills and savannas (Brunswick*, Craven, Cumberland, Harnett, Hoke, Jones*, Montgomery*, Moore, Richmond, Scotland)				
Paspalum praecox	**W1**		**S2S3**	**G4**
Early Crown Grass				
CS: limesink ponds and savannas (Bertie*, Bladen*, Brunswick, Carteret, Columbus, Craven, Cumberland, Dare*, Harnett, Hoke, Lee*, Martin*, New Hanover, Onslow, Pamlico*, Pender, Richmond)				
Paspalum pubiflorum var. glabrum	**W7**		**S1?**	**G5T5**
Hairy-seed Crown Grass				
MP: open areas (Haywood*, Madison*, Stokes*, Yadkin*)				
Paxistima canbyi	**W4**		**SNA**	**G2?**
Canby's Mountain-lover				
M: rock outcrops (Mitchell*)				
Pediomelum canescens	**W1**		**S3**	**G3G4**
Buckroot				
SC: sandhills (Bladen*, Brunswick, Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)				
Pellaea atropurpurea	**W1**		**S3**	**G5**
Purple-stem Cliff-brake				
MPC: limestone outcrops (Ashe, Buncombe, Cherokee, Forsyth*, Haywood*, Jackson, Jones*, Macon*, Madison, McDowell, Mitchell*, Rutherford, Swain, Transylvania, Wake*, Yadkin*)				
Persea borbonia	**W7**		**S2**	**G5**
Upland Red Bay				
TC: sandy upland soils in maritime forests (Brunswick, Carteret, Columbus, Craven, Hyde, Lenoir, New Hanover, Onslow, Pender, Washington)				

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Persicaria densiflora	**W1**		**S3**	**G5**
Dense-flower Smartweed				
C: Swamp forests (Carteret, Chowan, Dare, Halifax, Hyde, New Hanover, Wake)				
Phaseolus sinuatus	**W1**		**S3**	**G5T3?**
Sandhills Bean				
SC: sandhills (Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)				
Philadelphus hirsutus	**W1**		**S2**	**G5**
Hairy Mock-orange				
MP: bluffs, cliffs, and rocky woods, mainly over mafic or calcareous rocks (Buncombe, Cleveland, Graham*, Madison, McDowell, Mitchell*, Polk, Rutherford, Transylvania)				
Philadelphus inodorus	**W1**		**S3**	**G4G5**
Scentless Mock-orange				
MP: bluffs, cliffs, and rocky woods, mainly over mafic or calcareous rocks (Avery*, Bladen*, Buncombe*, Burke, Cabarrus*, Caswell, Catawba, Cherokee*, Cleveland*, Durham, Forsyth*, Haywood, Iredell*, Macon, Madison, McDowell, Mecklenburg, Orange, Polk, Randolph, Rutherford, Stanly, Swain*, Wilkes)				
Phlox amplifolia	**W1**		**S2**	**G3G5**
Largeleaf Phlox				
M: hardwood forests on mafic rock (Buncombe*, Burke, Graham, Haywood*, Jackson, Macon, Madison, McDowell, Mitchell*, Rutherford, Swain, Watauga*, Yancey*)				
Phlox divaricata	**W1**		**S3**	**G5**
Wild Blue Phlox				
CM: rich deciduous forests and slopes (Burke, Halifax, Henderson*, Madison*, Northampton, Rutherford*, Swain, Transylvania*, Watauga*)				
Phragmites americanus	**W7**		**S1?**	**G5T5**
American Reed				
C: Freshwater marshes (Currituck)				
Physalis lanceolata	**W1**		**S2?**	**G3Q**
Sandhill Ground Cherry				
SC: sandhills (Cumberland*, Harnett*, Hoke, Lee*, Montgomery*, Moore, New Hanover*, Richmond, Robeson*, Sampson, Scotland, Wayne*)				
Phytolacca rigida	**W7**		**S2**	**G5T5**
Maritime Pokeweed				
T: dunes, edges of brackish or salt marshes (Beaufort, Brunswick, Carteret, Dare, Hyde, New Hanover, Onslow, Pender)				

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Pieris floribunda	**W1**		**S2S3**	**G4**
Fetterbush				
MP: acid wooded slopes, heath balds at high elevations and summits of Piedmont monadocks (Buncombe*, Burke*, Haywood*, Jackson*, Macon*, Stokes*, Surry*, Transylvania, Watauga*)				
Piriqueta caroliniana var. caroliniana	**W4**		**S1?**	**G4?TNR**
Pitted Stripeseed				
C: Sandy soils of roadsides, woodland edges, and disturbed areas (Brunswick)				
Platanthera blephariglottis	**W1**		**S3?**	**G4G5**
White-fringed Orchid				
CMPS: bogs or depressions (Bladen*, Brunswick*, Carteret, Craven, Cumberland, Dare, Duplin*, Gates*, Henderson*, Hoke, Johnston*, Martin*, Moore, Onslow*, Pender, Richmond, Robeson*, Scotland*, Transylvania, Tyrrell*, Wake*)				
Polygonella americana	**W4**		**SU**	**G5**
Southern Jointweed				
S: sandhills (Hoke, Richmond, Scotland, Stanly)				
Polygonum erectum	**W7**		**S1S2**	**G5**
Erect Knotweed				
MP: open places (Alamance*, Alleghany, Ashe, Avery*, Caswell, Cherokee*, Clay*, Henderson, Jackson*, Madison*, Surry*, Wake*, Watauga*, Yancey*)				
Polygonum pinicola	**W4**		**S1?**	**G4G5**
Wireweed				
S: dry sandy areas (Hoke)				
Polygonum prolificum	**W7**		**S1?**	**G5T4T5**
Bushy Knotweed				
T: brackish marshes (Dare)				
Polygonum tenue	**W7**		**S2?**	**G5**
Glade Knotweed				
MP: glades and other thin soil over mafic rock (Alexander, Alleghany, Ashe*, Buncombe*, Burke, Durham*, Forsyth*, Granville, Henderson*, Jackson, Macon*, Mecklenburg*, Mitchell*, Orange*, Rockingham*, Stanly*, Wilkes)				
Polymnia canadensis	**W7**		**S2**	**G5**
Canada Leaf-cup				
M: moist, rich forests, especially over calcareous rock (Graham, Haywood, Madison, Mitchell*, Surry*, Yancey)				

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Populus grandidentata **Bigtooth Aspen** M: dry ridges and rocky woods (Alleghany*, Ashe, Haywood*, Macon, Polk, Swain, Wilkes, Yancey)	**W7**		**S2**	**G5**
Potamogeton foliosus var. foliosus **Leafy Pondweed** CMP: lakes, streams, and ponds (Alleghany*, Brunswick*, Buncombe*, Carteret, Cherokee*, Currituck*, Gates*, Jones*, Madison*, Tyrrell*)	**W1**		**S2**	**G5T5**
Prunus nigra **Canada Plum** MP: rich forests (Davie*, Mecklenburg*, Montgomery*, Orange*, Polk*, Stanly*)	**W7**		**S1?**	**G4G5**
Prunus umbellata **Hog Plum** PSC: rocky or sandy woodlands (Anson, Bladen, Brunswick*, Burke, Cabarrus*, Cleveland*, McDowell, Moore*, Robeson*, Rutherford, Stanly, Union*)	**W7**		**S2**	**G4G5**
Prunus virginiana var. virginiana **Choke Cherry** M: oak and northern hardwood forests (Ashe, Buncombe, Graham)	**W7**		**S2**	**G5T5**
Psilotum nudum **Whiskfern** C: acid swamp (Chowan)	**W4**		**S1**	**G5**
Ptelea trifoliata **Wafer-ash** MPC: rich woods, cliffs and rock exposures mainly over mafic or calcareous rocks (Alexander*, Alleghany, Ashe, Brunswick*, Burke, Cabarrus, Caldwell, Cleveland, Cumberland*, Forsyth*, Franklin*, Granville, Guilford, Harnett, Jones, Madison, McDowell, Montgomery, New Hanover*, Northampton, Polk*, Rockingham, Rutherford, Wake, Wilkes)	**W1**		**S3**	**G5**
Pycnanthemum clinopodioides **Basil Mountain-mint** MP: forests, woodland borders (Burke, Catawba, Graham, McDowell, Rutherford)	**W7**		**S1?**	**G1G2**
Pyrola americana **American Shinleaf** MPC: forests (Alleghany, Ashe, Caswell, Davidson, Durham*, Guilford, Iredell*, Mitchell*, Orange, Person, Rockingham*, Rowan, Wake*, Warren*, Wilkes)	**W1**		**S2S3**	**G5**

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Quercus bicolor	**W1**		**S2**	**G5**
Swamp White Oak				
P: upland swamp forests (Burke, Davie*, Durham, Granville, Guilford*, McDowell, Mecklenburg, Nash*, Person, Rockingham, Rowan, Wake*, Wilson*)				
Quercus muehlenbergii	**W1**		**S2**	**G5**
Chinquapin Oak				
MP: calcareous forests and bluffs (Ashe*, Beaufort*, Burke, Cabarrus*, Caswell, Chatham, Cherokee, Guilford*, Jackson, Madison, McDowell, Montgomery, Person, Polk, Rockingham, Rutherford, Swain, Vance, Wake)				
Quercus palustris	**W1**		**S2**	**G5**
Pin Oak				
MP: swamps (Caswell*, Chatham*, Davidson*, Davie*, Durham, Granville, Hertford*, Lee*, Lincoln*, McDowell, Mecklenburg*, Orange*, Person, Rowan*, Rutherford)				
Ranunculus allegheniensis	**W7**		**S2**	**G4G5**
Allegheny Mountain Buttercup				
M: rich cove forests (Alleghany, Ashe, Avery, Haywood*, Macon, Mitchell*, Watauga)				
Ranunculus laxicaulis	**W7**		**S2**	**G5?**
Swamp Buttercup				
C: swamp forests, open wet areas (Bladen, Columbus, Halifax, Northampton)				
Rhexia cubensis	**W1**		**S3**	**G4G5**
West Indies Meadow-beauty				
C: limesink ponds (Bladen, Brunswick, Carteret, Columbus, New Hanover, Onslow, Pender, Sampson)				
Rhynchospora careyana	**W1**		**S2**	**G4?Q**
Carey's Beaksedge				
C: limesink ponds, clay-based bays (Brunswick, Columbus, Craven, Hoke, New Hanover, Onslow, Robeson, Scotland)				
Rhynchospora cephalantha var. attenuata	**W1**		**S3**	**G5T3?**
Small Bunched Beaksedge				
S: boggy openings in streamhead pocosins (Cumberland, Harnett, Hoke, Moore, Scotland)				
Rhynchospora inundata	**W1**		**S3**	**G4?**
Narrowfruit Beaksedge				
SC: limesink ponds, clay-based Carolina bays (Bladen, Brunswick, Carteret, Hoke, New Hanover, Onslow, Pender, Robeson, Scotland)				

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Rhynchospora leptocarpa	**W1**		**S3**	**G3**
Brownish Beaksedge				
S: boggy openings in streamhead pocosins, boggy beaverponds (Cumberland, Hoke, Moore, Richmond, Scotland)				
Rhynchospora nitens	**W1**		**S3**	**G4?**
Shortbeak Baldsedge				
C: savannas, limesinks, other wet open places (Bladen, Brunswick, Carteret, Columbus, Craven, Cumberland, Harnett, Hyde*, Johnston*, Onslow, Pender, Richmond, Scotland)				
Rhynchospora oligantha	**W1**		**S3**	**G4**
Feather-bristle Beaksedge				
CSP: savannas, seepage bogs (Brunswick, Carteret, Columbus, Craven, Cumberland, Harnett, Hoke, Moore, Onslow, Pender, Richmond)				
Rhynchospora pallida	**W1**		**S3**	**G3**
Pale Beaksedge				
CS: savannas, sandhill seeps, and pocosins (Beaufort*, Bladen*, Brunswick, Carteret, Columbus, Craven*, Cumberland, Duplin*, Edgecombe, Harnett*, Hoke, Jones*, Nash*, New Hanover, Onslow, Pamlico*, Pender, Richmond, Sampson, Scotland*, Wilson*)				
Rhynchospora scirpoides	**W1**		**S3**	**G4**
Long-beak Baldsedge				
C: beaver ponds, limesink ponds, wet savannas (Brunswick, Carteret, Columbus, Craven, Cumberland, Dare, Harnett, Hoke, Moore, New Hanover, Onslow, Richmond, Tyrrell*, Washington)				
Rhynchospora sp. 2	**W7**		**S1?**	**G1?**
Croatan Beaksedge				
C: ecotone between savanna and pocosin (Carteret*)				
Rhynchospora stenophylla	**W1**		**S3**	**G4**
Littleleaf Beaksedge				
CS: savannas, seepage bogs (Carteret*, Cumberland, Harnett, Hoke, Moore, Onslow, Pender*, Sampson, Scotland)				
Rhynchospora wrightiana	**W1**		**S3**	**G5**
Wright's Beaksedge				
C: savannas (Brunswick, Carteret, Cumberland, Harnett, Hoke, New Hanover, Onslow, Pender, Sampson, Scotland, Wayne*)				
Robinia hispida var. rosea	**W7**		**S2?**	**G4T3?**
Boynton's Locust				
MP: open woods (Alexander*, Alleghany, Buncombe*, Burke*, Catawba, Henderson*, Macon*, Stanly*, Wilkes*)				

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Rubus setosus	**W7**		**S1?**	**G4G5**
Bristly Blackberry				
M: bogs and wet thickets (Clay, Macon)				
Rudbeckia laciniata var. humilis	**W7**		**S2?**	**G5T3?**
Blue Ridge Cutleaf Coneflower				
CMP: seeps, stream banks, and boulderfield forests (Ashe*, Brunswick*, Buncombe, Burke, McDowell, Moore*)				
Rudbeckia triloba var. rupestris	**W7**		**S2?**	**G5T3?**
Blue Ridge Three-lobed Coneflower				
M: forests at high elevations				
Rumex altissimus	**W7**		**S2?**	**G5**
Pale Dock				
CPM: low wet places (Dare*, Durham*, Guilford*, Iredell*, Johnston*, Madison*, McDowell*, Wake*, Warren*, Wilson*)				
Sabatia campestris	**W4**		**SH**	**G5?**
Prairie Sabatia				
M: forest edges (Haywood*)				
Sabatia capitata	**W3**		**SH**	**G2**
Rose Gentian				
M: habitat in North Carolina not known (Cherokee*)				
Sabatia dodecandra	**W1**		**S3?**	**G5?**
Large Marsh Pink				
C: tidal, brackish, and freshwater marshes (Beaufort*, Brunswick*, Carteret, Craven, Currituck*, Dare, Hyde*, Jones*, New Hanover*, Pamlico*, Pasquotank*, Tyrrell*)				
Sabatia quadrangula	**W7**		**S2**	**G4G5**
Four-angle Sabatia				
PCS: moist to mesic grassy glades, woodland borders, powerline clearings, often with hardpan soils (Bertie*, Durham*, Granville, Halifax*, Johnston*, Orange*, Person, Randolph*, Richmond, Rowan*, Scotland*, Stanly, Wake, Wayne*)				
Sagina procumbens	**W4**		**SNA**	**G5**
Northern Pearlwort				
M: high elevation disturbed sites (Mitchell)				
Sagittaria calycina var. spongiosa	**W3**		**SNR**	**G5T4**
Tidal Sagittaria				
TC: tidal freshwater to brackish marshes				

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Sagittaria engelmanniana	**W1**		**S2**	**G5?**
Engelmann's Arrowhead				
SCP: mostly blackwater streams and bogs (Carteret, Craven*, Cumberland, Harnett, Hoke, Moore, Onslow, Richmond, Scotland)				
Sagittaria platyphylla	**W4**		**SH**	**G5**
Delta Arrowhead				
P: marshes (Union*)				
Schizachyrium littorale	**W1**		**S2S3**	**G5T5**
Seaside Little Bluestem				
T: coastal dunes and maritime dry grasslands (Brunswick, Carteret, Dare, New Hanover, Onslow, Pender)				
Schoenolirion croceum	**W3**		**SH**	**G4**
Sunnybell				
S: wet pinelands (Richmond*)				
Schoenoplectus americanus	**W7**		**S1?**	**G5**
Olney Threesquare				
T: tidal marshes (Brunswick, Carteret, Dare, Hyde*, New Hanover, Onslow)				
Schoenoplectus californicus	**W3**		**SH**	**G5**
California Bulrush				
C: tidal marshes (New Hanover*)				
Schoenoplectus subterminalis	**W1**		**S3**	**G5**
Swaying Bulrush				
S: blackwater creeks (Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)				
Scleria georgiana	**W1**		**S3**	**G4**
Georgia Nutrush				
CS: savannas (Brunswick, Carteret, Columbus, Craven, Hoke, New Hanover, Onslow, Pender, Robeson, Sampson, Scotland)				
Scutellaria mellichampii	**W7**		**SH**	**G5TNR**
Mellichamp's Skullcap				
C: sandy deciduous forests (Brunswick*)				
Scutellaria ovata ssp. bracteata	**W7**		**S2?**	**G5T3T5**
A Heartleaf Skullcap				
CP: rich woods on circumneutral soil (Anson, Bladen*, Caswell, Chatham*, Granville, Halifax, Harnett, Northampton, Stanly, Union, Wake)				

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Scutellaria ovata ssp. ovata var. ovata	**W7**		**S1**	**G5TNR**
Heartleaf Skullcap				
M: rich woods on circumneutral soil (Ashe, Burke*, Macon, Madison, Polk*, Stanly*, Transylvania, Wilkes*)				
Scutellaria ovata ssp. rugosa	**W7**		**S1**	**G5TNR**
A Heartleaf Skullcap				
PM: rich woods on circumneutral soil (Haywood*, Mitchell*, Yancey*)				
Scutellaria serrata	**W1**		**S2S3**	**G4G5**
Showy Skullcap				
PM: deciduous forests (Alamance*, Alexander*, Alleghany, Ashe, Buncombe*, Burke, Caswell, Durham*, Granville, Harnett, Lee*, Macon, McDowell, Orange, Person, Rockingham*, Rutherford, Surry*, Wake)				
Senna hebecarpa	**W7**		**S2S3**	**G5**
Wild Senna				
PM: forests (Buncombe, Burke, Durham, Graham, Granville, McDowell, Moore, Orange, Rowan, Rutherford, Surry)				
Sideroxylon lycioides	**W1**		**S2S3**	**G5**
Buckthorn Bumelia				
TCP: maritime forests, bluffs or forests over calcareous or mafic rocks (Alexander*, Anson*, Beaufort*, Bladen, Brunswick, Cabarrus, Carteret*, Columbus, Craven*, Currituck*, Dare*, Johnston*, Jones*, Montgomery, New Hanover, Onslow, Pender, Polk, Richmond, Rowan, Stanly, Tyrrell*)				
Silene caroliniana var. caroliniana	**W7**		**S2S3**	**G5T4**
Rock Catchfly				
P: open, rocky slopes (Anson*, Gaston, Moore, Richmond*, Stanly, Union)				
Silene caroliniana var. pensylvanica	**W7**		**S1S2**	**G5T4T5**
Sticky Catchfly				
CMP: open woodlands with sandy or sandy-loamy soils (Cumberland*, Dare*, Franklin*, Harnett*, Hoke, Johnston, Lenoir*, Macon, Moore, Orange*, Scotland, Wake)				
Sisyrinchium montanum var. crebrum	**W7**		**S1?**	**G5T5**
Strict Blue-eyed Grass				
P: oak-hickory forests (Alleghany, McDowell, Rutherford)				
Smilax pseudochina	**W1**		**S3?**	**G4G5**
Long-stalk Greenbrier				
C: streamheads, ecotones, borders of blackwater creek floodplains (Cumberland*, Gates*, Harnett, Hoke*, Martin, Moore, Onslow*, Robeson*)				

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Solidago arguta var. arguta	**W7**		**S2?**	**G5T4T5**
Forest Goldenrod				
MPC: forests (McDowell)				
Solidago gracillima	**W1**		**S3**	**G4?**
Graceful Goldenrod				
CS: savannas, boggy sites, peaty places (Brunswick, Carteret, Columbus, Cumberland, Hoke, Jones, Montgomery, Moore, Onslow, Pender, Richmond)				
Solidago lancifolia	**W7**		**S1?**	**G3G4**
Lance-leaf Goldenrod				
M: moist forests over 5,000 ft., grassy balds, openings in Spruce-Fir forests (Avery*, Buncombe*, Macon*, Mitchell)				
Solidago puberula var. puberula	**W7**		**S2**	**G5T4T5**
Downy Goldenrod				
MP: dry, rocky areas (Alleghany, Avery*, Burke, Cabarrus*, Haywood*, Henderson*, Macon, Mitchell*, Surry*, Transylvania)				
Solidago pulchra	**W1**		**S3**	**G3**
Carolina Goldenrod				
C: savannas (Bladen*, Brunswick, Carteret, Craven, Cumberland, Jones, New Hanover*, Onslow, Pender)				
Solidago rugosa var. sphagnophila	**W7**		**S1?**	**G5T3T5**
Rough-leaved Goldenrod				
CM: Boggy habitats				
Solidago salicina	**W1**		**S2?**	**G5T5**
Round-leaved Goldenrod				
SPC: seeps, pocosins, peaty places (Brunswick*, Cumberland, Harnett, Hoke, Johnston*, Moore, Person, Richmond, Scotland, Wake)				
Solidago tarda	**W3**		**S1?**	**G4?Q**
Atlantic Goldenrod				
P: dry, disturbed roadside (Burke, McDowell, Rutherford)				
Spergularia salina	**W7**		**S1S2**	**G5**
Saltmarsh Sandspurrey				
T: salt marshes and tidal flats (Brunswick*, Carteret, Currituck*, Dare, Hyde*, Onslow, Pamlico*)				
Sphenopholis intermedia	**W7**		**S2**	**G5**
Prairie Wedgescale				
MPC: rich woods (Ashe*, Cabarrus*, Caldwell*, Graham*, Guilford*, Haywood*, Madison*, Martin*, Mitchell*, Rutherford, Stokes*)				

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Spiraea alba	**W1**		**S2**	**G5**
Narrow-leaf Meadowsweet				
M: bogs (Alleghany, Ashe, Avery, Buncombe*, Clay*, Henderson, Jackson*, Macon, Transylvania, Wilkes*)				
Spiraea latifolia	**W7**		**S2?**	**G5T5**
Broadleaf Meadowsweet				
M: bogs (Alleghany, Ashe, Avery*, Jackson*, Macon, Surry*, Transylvania*)				
Spirodela polyrrhiza	**W7**		**S2?**	**G5**
Common Water-flaxseed				
C: pools, stagnant waters (Bertie, Bladen, Currituck, Dare, Gates, Pender, Perquimans*, Washington)				
Sporobolus pinetorum	**W1**		**S3**	**G3**
Carolina Dropseed				
CS: wet savannas (Bladen, Brunswick, Columbus, Cumberland, Duplin, Greene*, Harnett, Hoke, Jones, Lenoir*, Onslow, Pender, Richmond, Robeson*, Sampson*, Scotland)				
Stachys aspera	**W7**		**S2?**	**G4?**
Rough Hedge-nettle				
PS: moist or wet sandy soil of savannas, marshes, or swamp forests (Moore, Person)				
Stachys clingmanii	**W2**		**S2?**	**G2**
Clingman's Hedge-nettle				
M: spruce-fir forests, northern hardwoods forests				
Stachys hyssopifolia var. hyssopifolia	**W7**		**S2**	**G5T4T5**
Hyssopleaf Hedge-nettle				
CP: moist soils of savannas, marshes, seasonally flooded sinkhole ponds, roadside ditches, utility easements (Burke*, Columbus*, Davidson*, Harnett, Hoke, Jones*, Onslow, Scotland*, Stanly*)				
Stellaria alsine	**W1**		**S3?**	**G5**
Longstalk Starwort				
MP: seeps and river banks (Buncombe, Graham, Haywood, Henderson, Madison, Polk, Transylvania)				
Stellaria corei	**W1**		**S3**	**G4**
Core's Starwort				
MP: coves, seeps, northern hardwood forests (Ashe, Avery, Buncombe, Burke, Caldwell*, Catawba*, Clay, Haywood, Jackson, Macon, Madison, Mitchell, Polk, Swain, Watauga, Yancey)				
Stuckenia pectinata	**W1**		**S2?**	**G5**
Sago Pondweed				
CT: Brackish and alkaline waters (Currituck*, Dare*)				

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Symphyotrichum elliottii	**W1**		**S2S3**	**G4**
Elliott's Aster				
C: freshwater to brackish marshes, swamps, and ditches (Beaufort*, Brunswick, Chowan*, Dare*, Duplin*, Jones, New Hanover*, Onslow*, Pasquotank*, Pender, Tyrrell*)				
Symphyotrichum firmum	**W7**		**S1?**	**G5**
Purple-stem Aster				
M: bogs and other wet places (Avery, Buncombe*, Clay, McDowell, Watauga, Yancey)				
Symphyotrichum lanceolatum var. lanceolatum	**W7**		**S2?**	**G5T5**
Panicled Aster				
P: sunny, wet meadows (Ashe, Hyde, McDowell)				
Symphyotrichum novae-angliae	**W1**		**S3**	**G5**
New England Aster				
M: wet meadows, bogs, prairies (Ashe*, Avery, Buncombe, Clay, Gaston, Graham*, Haywood*, Henderson, Jackson, Johnston*, Macon, Richmond*, Watauga)				
Symphyotrichum simmondsii	**W1**		**S2S3**	**G4G5**
Simmonds' Aster				
CP: wet ditches (Beaufort*, Brunswick, Carteret*, Columbus*, Currituck*, Dare, Hyde*, New Hanover*, Pender)				
Syngonanthus flavidulus	**W1**		**S3**	**G5**
Yellow Hatpins				
C: ditches, pocosin ecotones, savannas (Bladen, Brunswick, Carteret, Craven*, Cumberland, New Hanover*, Onslow, Pender, Sampson)				
Tetragonotheca helianthoides	**W1**		**S3?**	**G5**
Pineland Squarehead				
CMP: sandy woodlands, forests, roadsides (Burke, McDowell, Mecklenburg, Rutherford)				
Thermopsis villosa	**W7**		**S2?**	**G3?**
Aaron's-rod				
M: forests and openings (Avery, Cherokee*, Clay, Graham, Haywood, Jackson*, Macon, Madison*, Surry*, Swain, Transylvania)				
Thuja occidentalis	**W3**		**SNR**	**G5**
American Arborvitae				
M: calcareous rocks? (no known and documented native occurrences in North Carolina) (Alleghany, Ashe)				
Tilia americana var. americana	**W7**		**S1?**	**G5T5**
American Basswood				
MP: rich cove forests (Buncombe, Burke, Catawba, Cherokee, Davidson*, Person, Swain*, Wake*, Watauga*)				

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Tradescantia hirsuticaulis	**W7**		**S2**	**G5**
Hairy Spiderwort				
MP: dry rocky woodlands and rock outcrops (Catawba, Jackson, Macon, Madison, McDowell, Orange*, Rutherford, Wake)				
Tridens carolinianus	**W1**		**S3**	**G3G4**
Carolina Triodia				
S: sandhills and pine flatwoods (Brunswick*, Cumberland, Harnett, Hoke, Moore, Richmond, Scotland)				
Trillium rugelii	**W1**		**S3**	**G3**
Southern Nodding Trillium				
PM: rich woods and coves over mafic and calcareous rocks (Avery, Buncombe, Burke, Cherokee, Davie*, Guilford*, Haywood, Henderson, Macon, Madison, McDowell, Mecklenburg*, Mitchell*, Polk, Richmond, Rutherford, Transylvania, Yancey)				
Triosteum angustifolium	**W7**		**S2?**	**G5**
Narrowleaf Tinker's-weed				
P: thin woodlands over mafic rocks (Cabarrus*, Caswell, Durham, Granville, Guilford*, Mecklenburg*, Orange*, Randolph*)				
Triosteum aurantiacum var. aurantiacum	**W7**		**S2**	**G5T5**
Early Horse Gentian				
MP: rich cove forests over mafic rocks (Ashe, Graham, Granville, Haywood, Jackson, Macon, Madison, McDowell*, Transylvania)				
Triphora trianthophoros var. trianthophoros	**W1**		**S2S3**	**G3G4T3**
Three Birds Orchid				
CMP: moist forests (Ashe*, Avery, Buncombe, Burke, Carteret, Cherokee, Clay, Dare, Graham, Haywood*, Henderson, Jackson*, Macon, McDowell, Polk*, Swain*, Transylvania, Yancey)				
Tsuga canadensis	**W5**		**S4S5**	**G5**
Eastern Hemlock				
MP: moist soils (Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Cherokee, Clay, Cleveland, Graham, Haywood, Henderson, Jackson, Macon, Madison, McDowell, Mitchell, Orange, Polk, Rutherford, Stokes, Surry, Swain, Transylvania, Wake, Watauga, Yancey)				
Tsuga caroliniana	**W5**		**S2**	**G3**
Carolina Hemlock				
MP: open forests on ridgetops, rocky bluffs, or gorge walls (Alexander, Ashe, Avery, Burke, Catawba, Cleveland, McDowell, Mecklenburg*, Rutherford, Stokes, Surry, Transylvania)				
Ulmus serotina	**W3**		**SH**	**G4**
September Elm				
M: Mesic limestone forests (Madison*)				

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Utricularia foliosa	**W3**		**SU**	**G5**
Leafy Bladderwort				
C: habitat in North Carolina not known				
Vaccinium hirsutum	**W1**		**S3**	**G3**
Hairy Blueberry				
M: ridgetop red oak forests, oak hickory forests, pine oak heath (Cherokee, Graham, Macon, Swain)				
Vaccinium virgatum	**W7**		**S2?**	**G4**
Small-flower Blueberry				
S: pocosins, blackwater swamps, mesic pine flatwoods, sandhill seeps (Brunswick, Craven, Cumberland, Hoke, Jones, Moore, Pender, Pitt, Richmond, Robeson, Scotland, Wake)				
Valerianella umbilicata	**W7**		**SH**	**G4G5**
Woodland Cornsalad				
PM: rich woods and disturbed sites (Forsyth*, Randolph*, Stokes*, Swain*)				
Verbena hastata	**W7**		**S2S3**	**G5**
Blue Vervain				
CMP: marshes, bogs, and fields (Alleghany, Ashe, Buncombe, Burke, Onslow, Wake)				
Verbena scabra	**W7**		**S2?**	**G5**
Sandpaper Vervain				
CT: marsh edges, shell middens (Bladen*, Brunswick*, Carteret*, Chowan*, Currituck*, Hyde*, New Hanover*, Onslow, Pender, Pitt)				
Verbesina helianthoides	**W3**		**SU**	**G5**
Ozark Crownbeard				
M: open woods and glades				
Verbesina virginica var. virginica	**W7**		**S2?**	**G5?T5?**
Frostweed				
CMPS: moist forests, especially over calcareous rocks (Jones, Macon, Richmond, Rockingham, Stanly, Wake)				
Veronica anagallis-aquatica	**W7**		**S1?**	**G5**
Blue Water Speedwell				
M: bogs, streambanks, rivulets (Avery, Madison*, Mitchell*)				
Veronicastrum virginicum	**W7**		**S2?**	**G4**
Culver's-root				
MP: bogs, wet meadows, dry soils over mafic rocks (Alleghany, Ashe, Avery*, Buncombe*, Durham*, Forsyth*, Graham, Granville, Jackson, Madison*, Orange*, Person*, Vance, Wake, Warren, Yancey*)				

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Vigna luteola	**W4**		**S1?**	**G5**
Wild Cowpea				
C: marsh edges, wet open areas (Brunswick, New Hanover*)				
Viola brittoniana	**W7**		**S2?**	**G4G5**
Northern Coastal Violet				
CSP: moist slopes and low wet places (Columbus, Cumberland, Currituck*, Gates, Harnett, Hertford*, Johnston, Jones, Moore*, Northampton*, Pender, Perquimans*, Richmond*, Robeson*, Scotland, Washington*)				
Viola labradorica	**W7**		**S2?**	**G5**
Alpine Violet				
MP: rich cove forests, bottomlands and seepage slopes (Alexander*, Alleghany, Ashe, Cherokee, Clay*, Haywood*, Henderson, Iredell, Macon, Swain, Vance*)				
Viola tripartita	**W7**		**S2?**	**G5**
Three-parted Violet				
MP: forests associated with basic soils (Buncombe*, Burke, Catawba*, Clay*, Davidson*, Forsyth*, Graham*, Henderson, Iredell*, Mitchell*, Orange*, Polk, Rockingham*, Rowan*, Stanly*, Stokes*, Transylvania, Yancey*)				
Viola villosa	**W7**		**S2**	**G5**
Carolina Violet				
CSP: moist places, especially pocosin edges (Anson*, Bladen*, Cumberland, Hoke, New Hanover*, Onslow*, Pender, Richmond, Scotland)				
Xyris brevifolia	**W1**		**S3**	**G4G5**
Shortleaf Yellow-eyed-grass				
C: savannas, other low wet areas (Bladen, Brunswick, Carteret, Columbus, Craven, Onslow, Pender, Sampson)				
Xyris flabelliformis	**W1**		**S3**	**G4**
Savanna Yellow-eyed-grass				
CPS: savannas, streamhead pocosins (Bladen, Brunswick, Carteret, Onslow, Pender)				
Xyris iridifolia	**W7**		**S2**	**G4G5T4**
Iris-leaf Yellow-eyed-grass				
CS: limesink ponds, pineland pools, marshes (Beaufort*, Bladen, Brunswick, Carteret, Columbus*, Craven, Cumberland, Jones*, Onslow, Pender, Richmond, Robeson)				
Xyris smalliana	**W1**		**S3**	**G5**
Small's Yellow-eyed-grass				
CS: pineland pools, limesink ponds, shores (Bladen, Brunswick, Carteret, Columbus, Craven*, Moore, New Hanover, Onslow, Richmond, Sampson, Scotland, Washington)				

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Xyris sp. 1	**W2**		**S2**	**G2**
Small-seeded Xyris				
SC: wet savannas and pond margins (Carteret, Onslow, Pender, Sampson, Scotland)				
Yucca aloifolia	**W1**		**S2?**	**G5**
Aloe Yucca				
T: dunes (Brunswick, Carteret, Dare, Hyde, New Hanover, Pender)				
Yucca flaccida	**W7**		**S1?**	**G5**
Weakleaf Yucca				
CSPM: open, dry woodlands (Alleghany, Burke, Catawba, Cherokee*, Lee*, Lenoir*, McDowell)				
Zannichellia palustris	**W7**		**S2?**	**G5**
Horned Pondweed				
TC: calcareous or brackish waters of pools and estuaries (Brunswick*, Craven, Currituck*, Dare*, Hyde*, Onslow, Pamlico*, Tyrrell*)				
Zizania aquatica var. aquatica	**W7**		**S2**	**G5T5**
Indian Wild Rice				
C: freshwater marshes (Brunswick, Carteret, Craven, Dare, Gates, Jones, New Hanover, Pender, Washington)				
Mosses				
Amblystegium humile	**W7**		**S2?**	**G5**
A Thin-net Moss				
CP: wet substrates (Bertie, Brunswick, Buncombe, Caswell*, Durham, Edgecombe, McDowell, Moore, Pasquotank, Tyrrell)				
Amphidium mougeotii	**W7**		**S2?**	**G5**
Mougeot's Yoke Moss				
M: Seasonally wet crevices of neutral to acidic cliffs (Ashe*, Haywood*, Jackson, Macon, Polk*, Transylvania*, Watauga*)				
Anacamptodon splachnoides	**W7**		**S2?**	**G3G5**
Knothole Moss				
MP: bark of trees (Burke*, Chatham*, Clay*, Durham*, Graham*, Haywood*, Henderson*, Jackson, Macon*, McDowell, Mitchell*, Moore*, Orange*, Stokes*, Yancey*)				
Andreaea rothii var. rothii	**W7**		**S2?**	**G5TNR**
Black Falcate Split Moss				
MP: shaded, calcium-free rocks (Burke, Haywood, Jackson, Macon, McDowell*, Mitchell, Stokes*, Swain*, Yancey)				

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Andreaea rupestris	**W1**		**S2?**	**G5**
Rock Split Moss				
MP: rock, typically acidic (Buncombe*, Burke, Jackson, Mitchell*, Rutherford)				
Anomobryum julaceum	**W7**		**SH**	**G5**
Common Silver Moss				
M: high elevations on soil and rocks (Ashe*, Jackson*, Macon*, Rutherford*, Transylvania*)				
Archidium ohioense	**W7**		**SH**	**G4G5**
Tokyo Soil Moss				
CMP: open ground of old fields or meadows (Cumberland*, Durham*, Forsyth*, Transylvania*)				
Atrichum altecristatum	**W7**		**S2?**	**G5**
A Catherinea Moss				
MP: open or semishaded soils, usually low elevations (Buncombe*, Burke, Jackson, Macon, Orange, Transylvania)				
Atrichum cylindricum	**W7**		**S2?**	**G5**
A Catherinea Moss				
CP: moist soils of ditches and stream banks in bottomlands and swamp forests (Bertie*, Columbus*, Craven, Currituck, Franklin*, Johnston, Moore*, Orange)				
Atrichum tenellum	**W7**		**S1?**	**G4G5**
A Catharinea Moss				
P: wet depressions and bogs (McDowell, Rutherford)				
Barbula indica var. indica	**W7**		**S2?**	**G5?T5?**
Small Twist Teeth Moss				
CMP: soil, clay, limestone, cement, walls (Beaufort*, Brunswick*, Columbus*, Forsyth*, Macon*, McDowell*, New Hanover*, Pender*)				
Blindia acuta	**W7**		**S2?**	**G5**
Sharp-pointed Weissia				
M: moist or dripping acidic rock faces (Graham*, Jackson, Transylvania*, Wilkes*)				
Brachelyma subulatum	**W7**		**S2?**	**G4G5**
A Moss				
CP: bases of trees or on hard surfaces in swampy areas (Bladen, Columbus, Greene*, Hertford*, McDowell, Mecklenburg*)				
Brachythecium acuminatum var. cyrtophyllum	**W7**		**S2?**	**G5TNR**
Acuminate Brachythecium				
bark at base of trees, logs; localities in NC have not been confirmed.				

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Brachythecium oedipodium	**W7**		**S2?**	**G5**
Sprawling Grass Moss				
M: on humus, rocks in moist, shaded areas, spruce-fir forest (Jackson*, Polk*, Swain*)				
Brachythecium plumosum	**W7**		**S2?**	**G5**
Rusty Feather Moss				
CM: moist, acid rocks in or near streams (Columbus*, Harnett*, Haywood, Jackson, McDowell, Rutherford, Transylvania, Watauga, Yancey*)				
Brachythecium reflexum	**W7**		**S2?**	**G5**
Reflexed Feather Moss				
M: on trees and boulders (Jackson, Watauga)				
Brachythecium rutabulum	**W7**		**S2?**	**G5**
Rough-stalked Feather Moss				
MP: trees, humus, rocks in wet forests (Avery*, Durham*, Jackson, Mecklenburg*, Rowan*, Swain*)				
Brachythecium salebrosum	**W7**		**S2?**	**G5**
Smooth-stalked Yellow Feather Moss				
MP: shaded sills, rocks, bases of trees, and logs in disturbed places (Forsyth*, Graham, Macon*, Watauga*, Yancey*)				
Brachythecium velutinum	**W7**		**S1?**	**G5**
Velvet Moss				
M: high elevation forests (Buncombe, Rutherford)				
Brothera leana	**W7**		**S2?**	**G3G4**
Boar Moss				
MP: on logs in forests; on thin soil around rock outcrops (Ashe, Avery, Burke*, Haywood*, Jackson*, McDowell*, Rutherford*, Stokes, Surry, Watauga*)				
Bruchia ravenelii	**W7**		**SH**	**G3?**
A Pygmy Moss				
S: sandy soil of old fields and open woods (Cumberland*, Harnett*, Hoke*, Johnston*, Richmond*, Wake*)				
Bruchia texana	**W7**		**SH**	**G3G5**
Texas Bruchia Moss				
CPS: moist clay or sandy soil in open areas (Durham*, Harnett*, Mecklenburg*, Pender*, Richmond*)				
Bryhnia novae-angliae	**W1**		**S2?**	**G5**
Arrowhead Moss				
CM: soil, humus, or rotten logs of shady, wet places (Haywood, Macon, Martin*, Transylvania, Tyrrell)				

Scientific Name / Common Name / Region: Habitat Comments (Counties of Occurrence)	Status N.C.	Status U.S.	Rank N.C.	Rank Global
Bryoerythrophyllum recurvirostrum	**W7**		**S2?**	**G5**
A Red Foot Moss				
M: on soil, rock, and bark in forested boggy areas and stream banks (Clay*, Jackson, Macon*, Transylvania*)				
Campylostelium saxicola	**W7**		**S2?**	**G3G5**
Sandstone Grimmia				
M: acidic sandstone boulders and cliffs, and sandstone rock shelters (Macon*, Swain*, Transylvania*, Watauga*)				
Cryphaea ravenelii	**W7**		**S2?**	**G3?**
A Thread Cedar Moss				
PC: on bark of trees (Anson*, Chatham*, Durham*, Halifax*, Harnett*, Hertford*, Person*)				
Cynodontium schisti	**W7**		**S1**	**G3G5**
Cynodontium Moss				
PM: rock crevices, thin soil over rock (Burke, McDowell*)				
Dicranum bonjeanii	**W7**		**S2?**	**G5**
Thin-rib Curved-tail Moss				
M: mainly in eutrophic fens, sometimes on calcareous soil or rock (Ashe*, Avery*, Haywood*, Jackson*, Macon*, Mitchell*, Transylvania*, Yancey*)				
Dicranum fuscescens	**W7**		**S2?**	**G5**
Fuscous Moss				
MP: on trees, logs, soil, rock, and humus in woodlands, spruce-fir forest, occasionally bogs (Avery*, Buncombe, Burke, Graham*, Haywood*, Jackson*, Mitchell*, Stokes*, Swain*, Transylvania*, Yancey)				
Dicranum spurium	**W7**		**S2?**	**G5**
Rusty Fork Moss				
CMP: sandy soil, decayed logs, acidic rock, humus over rock, pine woods, sometimes bogs (Alexander*, Alleghany*, Avery*, Burke*, Carteret*, Franklin*, Jackson*, Macon*, Stokes*, Surry*)				
Diphyscium mucronifolium	**W7**		**S1?**	**G4**
Grain o'Wheat Moss				
MP: wet rocks at spray cliffs and cove forests (Burke, Graham)				
Entosthodon drummondii	**W7**		**SH**	**G4G5**
A Cord Moss				
CPS: primarily sandy soils of disturbed, often wet areas (Durham*, Harnett*, Moore*, Pender*, Randolph*, Tyrrell*)				

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Ephemerum spinulosum	**W7**		**S2?**	**G4G5**
Emerald Dewdrops				
CP: moist or drying soil in disturbed, partly sunny areas, or on rotting wood (Columbus*, Durham, Mecklenburg*, Orange)				
Fabronia ciliaris var. polycarpa	**W7**		**S2?**	**G5T4T5**
A False Crushed-rice Moss				
CMPT: bark of trees, less commonly on rocks (Alexander*, Carteret*, Clay*, Cumberland*, Hyde*, Jackson*, Rowan*, Rutherford, Transylvania*, Washington*)				
Fissidens adianthoides	**W7**		**S1**	**G5**
Maiden Hair Moss				
MP: wet areas on soil, around bases of trees, on decaying wood or calcareous rocks (Ashe*, Avery*, Brunswick*, Durham*, Forsyth*, Granville*, Jackson, Johnston*, McDowell, Rutherford, Transylvania)				
Fissidens appalachensis	**W7**		**S2S3**	**G2G3**
Appalachian Pocket Moss				
M: submerged in rapids of moderate to high elevation mountain streams (Buncombe*, Caldwell*, Jackson*, Macon*, McDowell*, Rutherford, Swain*, Watauga*)				
Fissidens elegans	**W7**		**S2?**	**G5**
A Plume Moss				
CMP: sandy and clayey soils along roadsides and streams, on trees or stumps (Anson*, Columbus*, Cumberland*, Durham, Harnett, Hyde*, Jackson, Martin*, New Hanover*, Pender*, Rutherford, Sampson*, Stokes*)				
Fissidens exilis	**W4**		**SNA**	**G3G4**
Small Pocket Moss				
P: stream banks (Cleveland, Durham, Gaston*)				
Fissidens fontanus	**W7**		**S2?**	**G5**
Water Pocket Moss				
PC: attached to various substrata in stagnant and flowing water, and in coastal estuaries (Anson*, Craven*, Durham*, Franklin*, Gates*, Jackson, Jones*, Macon*, Mecklenburg*, New Hanover*, Orange, Pitt, Transylvania)				
Fissidens polypodioides	**W7**		**S2?**	**G4G5**
A Moss				
Calcareous soil, and limestone rocks along streams and in ravines; localities in NC have not been confirmed.				
Fontinalis flaccida	**W7**		**S2?**	**G4G5**
A Water Moss				
CMP: bases of trees in brooks or swamps, submerged (Bladen*, Brunswick*, Columbus*, Harnett, Jackson, Macon, Mitchell*, Wake*)				

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Fontinalis sullivantii	**W7**		**S2?**	**G3G5**
A Water Moss				
CM: rocks or trees in pools or streams (Brunswick*, Columbus*, Gates*, Macon, Mitchell*, Nash)				
Funaria serrata	**W7**		**SH**	**G4**
A Cord Moss				
CP: on soil of disturbed places, near streams or ditches (Chatham*, Durham*, Forsyth*, Gaston*, Hertford*, Johnston*, Nash*, Randolph*)				
Grimmia olneyi	**W7**		**S2?**	**G3G5**
A Beard Moss				
MP: faces of dry to periodically wet rocks, along streams or splash zones of lakes (Alexander*, Alleghany*, Burke*, Forsyth*, Jackson*, Macon*, Montgomery*, Polk*)				
Helodium paludosum	**W7**		**S2?**	**G3G5**
Pond Fern Moss				
CMP: on soil, humus, trees, or logs in swamps, marshes, or meadows (Anson*, Camden, Caswell*, Columbus*, Durham*, Gates*, Granville*, Haywood*, Martin*, McDowell, Mecklenburg*, Orange, Pasquotank*, Stokes*, Watauga*)				
Herpetineuron toccoae	**W7**		**S2?**	**G4G5**
Coiled Moss				
M: bark of trees or calcareous to noncalcareous rocks (Graham*, Jackson*, McDowell*, Transylvania)				
Hygroamblystegium fluviatile	**W7**		**S2?**	**G5**
Brookside Feather Moss				
CMP: wet, calcareous rocks (Avery*, Burke*, Harnett, McDowell*, Wake)				
Hypnum fauriei	**W7**		**S2?**	**G5**
A Cedar Moss				
MP: logs and tree bases in deciduous forest (Haywood, Jackson, Johnston*, Macon, Moore*, Orange, Swain*, Transylvania, Watauga, Yancey)				
Hypnum plicatulum	**W7**		**S2?**	**G5**
A Cedar Moss				
M: epiphytic, terrestrial, and on humus over rock (Haywood*, Jackson, Swain*, Transylvania*, Yancey*)				
Leskea australis	**W7**		**S2?**	**G4**
A Dusky Moss				
P: lower parts of hardwood trees and bald cypress and logs in woods along rivers, swamps (Orange)				

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Leucodon andrewsianus	**W7**		**S2?**	**G5T5**
Squirrel Tail Moss				
M: trunks of trees, occasionally on rocks (Ashe*, Haywood*, Jackson, Macon*, Rutherford*, Watauga)				
Micromitrium megalosporum	**W7**		**S2?**	**G4**
A Moss				
CMP: unfertilized bare soil, in sun or partial shade (Bladen*, Columbus*, Durham*, Mecklenburg*, Transylvania*, Wilson*)				
Philonotis longiseta	**W7**		**S2?**	**G3G4**
An Apple Moss				
CMP: soil or rock, often on wet embankments (Alleghany*, Forsyth*, Haywood*, Jackson*, Jones*, Lee*, McDowell*, Stokes*, Swain*, Transylvania)				
Philonotis marchica	**W7**		**S2?**	**G5**
An Apple Moss				
CMP: rocks and soil in wet places, roadsides, springs (Forsyth*, Franklin*, Harnett*, Haywood*, Jackson, Macon, McDowell*, Rutherford, Swain*, Tyrrell, Watauga)				
Platydictya subtilis	**W7**		**S2?**	**G5**
A Moss				
CMP: bark at base of hardwoods, rarely on logs (Brunswick*, Clay*, Currituck, Durham*, Haywood, Jackson, McDowell, Surry, Transylvania, Watauga)				
Pohlia longicollis	**W1**		**S2?**	**G4G5**
Long Neck Nodding Moss				
M: rocks on cliffs, in crevices, on humus or soil (Jackson, Swain*, Yancey*)				
Pohlia rabunbaldensis	**W7**		**S1**	**G1**
A Moss				
M: high elevation hardwood forest (Buncombe)				
Polytrichum appalachianum	**W1**		**S3**	**G3**
Appalachian Haircap Moss				
MP: rocky summits, mostly in high elevations (Ashe, Avery, Buncombe*, Burke*, Haywood*, Jackson, Macon*, Mitchell, Stokes, Transylvania*, Watauga, Yancey*)				
Pterigynandrum filiforme	**W7**		**S1**	**G5**
Twisted Thread Moss				
M: mesic, acidic boulders and rock shelves (Buncombe*, Jackson, McDowell*, Mitchell*, Swain*)				
Pylaisiella polyantha	**W1**		**S2?**	**G5**
Many-fruited Feather Moss				
MP: on tree trunks and bases or logs (Forsyth*, Haywood, Mitchell*, Rutherford, Transylvania*)				

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Rauiella scita	**W7**		**S2?**	**G3G5**
Smaller Fern Moss				
M: on rocks, trees, logs (Alexander*, Alleghany*, Ashe*, Avery*, Haywood*, Jackson*, Macon*, McDowell*, Transylvania*, Watauga*, Wilkes*, Yancey*)				
Sphagnum cribrosum	**W7**		**S2?**	**G3G5T3**
Florida Peatmoss				
CS: in blackwater streams; ditches (Beaufort*, Bladen, Brunswick*, Carteret*, Craven, Duplin*, Sampson*)				
Sphagnum fitzgeraldii	**W1**		**S2S3**	**G3**
Fitzgerald's Peatmoss				
C: pocosins and savannas (Bladen, Brunswick, Carteret, Craven, Duplin*, Onslow, Pamlico, Pender)				
Sphagnum henryense	**W1**		**S2S3**	**G4?**
Peatmoss				
CMP: bogs (Alleghany, Anson, Beaufort, Bladen, Brunswick*, Carteret*, Craven, Cumberland, Gates*, Hyde, Iredell*, Jackson, Johnston*, Moore*, Onslow, Pender*, Richmond*, Robeson*, Sampson*, Scotland, Tyrrell)				
Sphagnum subtile	**W1**		**S3**	**G5**
Peatmoss				
M: bogs and near wet rock outcrops (Ashe, Avery*, Haywood, Jackson, Macon, Swain, Transylvania*, Watauga)				
Thuidium allenii	**W7**		**S2?**	**G3G5**
Fernmoss				
CP: on soil, logs, exposed roots, and tree bases in swamps, often just above water line (Bertie*, Bladen*, Brunswick*, Carteret*, Chatham*, Columbus, Craven*, Davie*, Durham*, Gates*, Granville*, Lenoir*, McDowell, Pasquotank, Pender*, Tyrrell*, Wilkes)				
Thuidium recognitum	**W7**		**S2?**	**G5**
Hokkaido Fern Moss				
MP: on moist soil, humus, or rocks, in calcareous habitats, in woodlands, in clearings (Ashe*, Madison*, McDowell, Orange*, Randolph*, Watauga*, Yadkin*)				
Tortella flavovirens	**W7**		**S3**	**G4G5**
Beach Moss				
T: dune swales (Brunswick, Carteret*, Dare, Hyde)				
Tuerckheimia svihlae	**W7**		**S2?**	**GNR**
A Moss				
moist, calcareous rocks, stream margins in forests; localities in North Carolina not yet confirmed				

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Weissia brachycarpa **A Moss** Habitat and locations in NC have not been confirmed.	**W3**		**SNA**	**GNR**
Weissia muehlenbergiana **A Moss** CP: soil among grasses, roadsides (Brunswick*, Davidson*, Durham*, Madison*, Mecklenburg*, New Hanover*, Orange*, Pender*, Wake)	**W7**		**S2?**	**G5**
Zygodon viridissimus var. rupestris **A Moss** M: trunks of trees and on rocks (Avery*, Burke*, Caldwell*, Haywood, Jackson, Macon*, Mitchell, Swain*, Watauga*, Yancey*)	**W7**		**S2?**	**G5T5?**

Liverworts

Barbilophozia attenuata **A Liverwort** M: on rocks in spruce-fir forests (Avery*, Buncombe*, Haywood*, Transylvania*, Yancey*)	**W7**		**S2**	**G5**
Cephalozia macrostachya ssp. australis **A Liverwort** M: on moist rocks in humid gorges (Burke*, Jackson*, Macon*)	**W2**		**S1?**	**G4T1**
Cephaloziella massalongi **A Liverwort** M: high elevation rocky summits (Rutherford, Swain*)	**W7**		**S1**	**G3G5**
Cephaloziella obtusilobula **Roundleaf Liverwort** M: high elevation cliffs or other moist rocks (Burke*, Macon*, Rutherford)	**W2**		**S1?**	**G1?Q**
Diplophyllum andrewsii **A Liverwort** M: on soil or rocks on banks (Avery*, Buncombe*, Burke*, Graham*, Jackson, Macon*, McDowell*, Swain*, Yancey*)	**W7**		**S2**	**G3**
Diplophyllum apiculatum var. taxifolioides **A Liverwort** M: moist soil or rocks (Ashe*, Burke*, Haywood*, McDowell, Mitchell*)	**W2**		**S1?**	**G5T2Q**
Diplophyllum taxifolium var. taxifolium **A Liverwort** M: crevices and underledges of rock outcrops, mostly in spruce-fir forests at high elevations (Ashe*, Buncombe*, Burke*, Caldwell*, Clay*, Haywood*, Jackson*, Macon*, Mitchell*, Swain*, Transylvania*, Yancey*)	**W7**		**S2?**	**G5T5**

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Dumortiera hirsuta ssp. nepalensis	**W1**		**S1**	**G5T5**
A Liverwort				
M: in grottoes behind waterfalls in humid gorges (Graham*, Jackson*, Macon*, Rutherford)				
Frullania oakesiana	**W7**		**SH**	**G5**
A Liverwort				
M: on bark of conifers or deciduous trees at high elevations (Avery*, Buncombe*, Haywood*, Jackson*, Macon*, McDowell*, Mitchell*, Swain*, Watauga*, Yancey*)				
Frullania plana	**W7**		**S1**	**G4**
A Liverwort				
MP: on rock outcrops in gorges or near rivers (Burke*, Durham*, Graham*, Haywood*, Jackson, Macon*, McDowell, Polk*, Stokes*)				
Lophozia capitata	**W7**		**S1**	**G4**
A Liverwort				
CPM: in moist depressions in savannas or on clay-pans in the piedmont, rock outcrops (Durham*, Jones*, Onslow*, Orange*, Watauga)				
Mannia triandra	**W7**		**S1**	**G3G4**
A Liverwort				
M: on limestone (McDowell*)				
Marsupella emarginata ssp. emarginata	**W2**		**S1?**	**G5T5**
A Liverwort				
M: on moist rocks in humid gorges, spray zones of waterfalls, or high elevations (Burke, Haywood*, Jackson*, Macon*, McDowell*, Mitchell*, Transylvania*)				
Metzgeria furcata var. setigera	**W7**		**SH**	**G1**
A Liverwort				
M: damp shaded rocks at high elevations in spruce-fir forests or in humid gorges (Caldwell*, McDowell, Swain*)				
Metzgeria pubescens	**W7**		**SH**	**G5**
A Liverwort				
M: on bark of trees (Buncombe*, Swain*)				
Metzgeria uncigera	**W7**		**S1**	**G3**
A Liverwort				
CTM: on bark in maritime forests or on rhododendron in mountain forests (Brunswick, Carteret*, Gates*, Graham*, Hyde*, New Hanover*, Pamlico*)				
Pellia appalachiana	**W7**		**S1**	**G4**
A Liverwort				
MPC: on moist rock outcrops, usually near waterfalls, streams, or pools (Gaston, Graham, Macon*, Pender*, Transylvania, Wake*)				

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Plagiochila caduciloba	**W1**		**S3**	**G3**
A Liverwort				
M: rocks and streambanks in humid gorges, spray zone of waterfalls (Burke, Clay, Graham, Haywood*, Jackson, Macon, McDowell*, Transylvania, Yancey*)				
Plagiochila columbiana	**W2**		**SH**	**GHQ**
A Liverwort				
P: on thin soil over boulders on floodplains (Durham*, Orange*)				
Plagiochila retrorsa	**W1**		**S3**	**G2G4**
A liverwort				
(=Plagiochila sharpii) M: damp rock faces in humid gorges, high elevation rocky summits (Buncombe, Graham, Haywood*, Jackson, Macon, Transylvania, Yancey*)				
Plagiochila undata	**W7**		**S2**	**G4G5**
A Liverwort				
CMP: on rocks or bark (Anson*, Chatham*, Columbus*, Durham*, Madison*, McDowell*, Orange*, Polk*, Rutherford, Stanly*)				
Plagiochila virginica var. euryphylla	**W2**		**SH**	**G3THQ**
A Liverwort				
M: rockfaces in the sprayzone of waterfalls (Transylvania*)				
Porella japonica ssp. appalachiana	**W3**		**SNR**	**G5?T1**
A Liverwort				
M: on rocks in spray zones of waterfalls				
Ptilidium pulcherrimum	**W7**		**S1**	**G5**
A Liverwort				
MP: on bark of trees in moist forests (Ashe, Avery*, Gaston, Haywood*, Mitchell*, Watauga*)				
Radula sullivantii	**W1**		**S3**	**G3**
A Liverwort				
M: on moist rocks, mostly in spray zones of waterfalls (Cherokee, Graham, Henderson, Macon, Transylvania)				
Radula tenax	**W7**		**S2**	**G3G4**
A Liverwort				
M: on moist rocks or bark in humid gorges and cove forests (Ashe*, Buncombe*, Burke*, Caldwell*, Jackson, Macon*, Mitchell*, Swain*, Transylvania*, Watauga*, Yancey*)				
Reboulia hemisphaerica ssp. dioica	**W7**		**S1**	**G5T2?Q**
A Liverwort				
M: in spray zone of waterfalls in humid gorges (Macon*, McDowell, Rutherford)				

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Riccia beyrichiana	**W7**		**S1S2**	**G5**
A Liverwort				
CP: moist soil and gravel (Bladen, Durham*, Orange*, Robeson*, Rutherford)				
Ricciocarpos natans	**W1**		**S1**	**G5**
A Liverwort				
C: floating in shaded ponds or pools (Dare*)				
Hornworts				
Aspiromitus adscendens	**W7**		**S2?**	**G3?**
A Hornwort				
CP: old fields (Bladen*, Columbus*, Durham*, Jones*, Wilson*)				
Nothoceros aenigmaticus	**W1**		**S3**	**G3**
A Hornwort				
M: on rocks in streams (Cherokee, Clay, Graham, Haywood, Macon, Swain)				
Notothylas orbicularis var. pseudotemperata	**W2**		**SH**	**G5T1Q**
A Hornwort				
C: damp mineral soil (Columbus*)				
Lichens				
Acanthothecis fontana	**W7**		**S1**	**G1**
Fontana lichen				
M: on trees of low elevation mixed hardwood forests (Graham)				
Arthonia kermesina	**W7**		**S1**	**GNR**
Mountain Red Dot Lichen				
M: high elevation Spruce-Fir forests (Swain)				
Arthotheliopsis floridensis	**W7**		**S1**	**GNR**
A leaf lichen				
C: pocosins (Jones)				
Cladina evansii	**W7**		**S2**	**G3G5**
Powder-puff Lichen				
C: sandhills (primarily near the coast) usually associated with *Quercus geminata* (Bladen, Brunswick, Carteret, Columbus, Craven*, Dare, Jones, New Hanover, Onslow, Pender)				
Ephebe solida	**W1**		**S3**	**G3G4**
A Rockshag Lichen				
M: on rocks in rapidly flowing water and possibly moist grottoes around mountain spray cliffs (Burke, Cherokee, Graham, Jackson, Macon, Transylvania)				

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Fellhanera eriniae	**W7**		**S1**	**G1**
Erin's Fellhanera				
M: rotting wood in rich cove forests (Haywood)				
Fellhanera hybrida	**W7**		**S2?**	**G2?**
Piedmont Crustose Lichen				
MP: shaded siliceous rock and bases of trees (Henderson, Wake)				
Fellhanera montesfumosi	**W7**		**S1**	**G1**
Smoky Mountain Crustose Lichen				
M: on acidic rock (Haywood)				
Graphis sterlingiana	**W7**		**S1**	**GNR**
Mount Sterling Script Lichen				
M: high elevation Spruce-Fir forests (Haywood)				
Gyalectidium appendiculatum	**W7**		**S1?**	**GNR**
A Leaf Lichen				
M: hemlock needles in humid forests (Transylvania)				
Heterodermia erecta	**W7**		**S1?**	**G1?**
A Centipede Lichen				
M: on hardwood trees in high elevation forests (Graham, Macon)				
Heterodermia pseudospeciosa	**W7**		**S1S2**	**G5**
A Centipede Lichen				
M: growing mainly on rocks (Jackson, Macon, McDowell)				
Micareopsis irriguata	**W7**		**S1?**	**GNR**
Irrigated Rock Lichen				
M: wet sheltered rock faces in humid habitats (Jackson, Swain)				
Ochrolechia yasudae	**W7**		**S1?**	**G3G4**
Coral Saucer Lichen				
M: on bark or rock (Ashe*, Buncombe*, Haywood*, Jackson*, Macon*, Swain, Transylvania*)				
Opegrapha moroziana	**W7**		**SH**	**G1?**
A Scribble Lichen				
M: fine grained sandstones (Avery*)				
Peltigera hydrothyria	**W1**		**S3**	**G4**
Waterfan Lichen				
MP: rocks and boulders in small streams (Avery, Buncombe, Cherokee, Clay, Graham, Haywood, Jackson, Macon, Stokes, Swain, Transylvania)				

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Pertusaria andersonii	**W7**		**S1**	**GNR**
A Wart Lichen				
M: high elevation granitic rock (Avery)				
Pertusaria appalachensis	**W7**		**S1?**	**G2?**
Appalachian Wart Lichen				
M: bark of hardwoods at middle to high elevations (Graham, Macon, Swain)				
Platismatia glauca	**W7**		**SH**	**G5**
Varied Rag Lichen				
M: on bark of spruce, fir, or hardwoods in the spruce-fir zone (Avery*, Buncombe, Haywood*, Jackson*, Swain, Yancey*)				
Porpidia cinereoatra	**W7**		**S1**	**G5?**
Boulder Lichen				
M: high elevation rocky summits (Mitchell*, Yancey)				
Porpidia macrocarpa	**W7**		**S1?**	**G4**
Boulder Lichen				
MP: high elevation rocky summits, granitic flatrocks (Mitchell*, Wake)				
Porpidia tuberculosa	**W7**		**SH**	**G2G4**
Boulder Lichen				
M: high elevation rocky summits (Mitchell*)				
Punctelia reddenda	**W7**		**S2**	**G5**
Speckled Shield Lichen				
MPC: on bark of hardwoods at high elevations, granitic or mafic rocks (Buncombe*, Haywood*, Jackson*, Macon, Swain*, Yancey*)				

Watch Category 6 (regionally rare) includes species which are rare in one region of North Carolina, while being uncommon to abundant within another region. These regional rarities, generally within-state disjuncts, are significant for protection of genetic variation and long-term viability of species.

A list of North Carolina's rare plants is determined by the political boundaries of the state. Biological rarity, however, is determined by the natural boundaries of physiography, geology, soils, and climate. These and other physical, biological, and historical factors have determined the evolutionary history and phytogeography of plants currently occupying what is now called "North Carolina." Rarity in one part of the state can have as much biological significance as disjunctions from another state. Disjunct populations nearly always have some level of genetic differentiation from populations in the main part of a species' range. Further study will likely show that many disjunct populations do warrant taxonomic status. Preservation of biodiversity requires not only preventing the extinction of species, but also maintaining genetic diversity within the species. The long-term viability of a species is dependent on the genetic diversity represented within and between different populations of the species. Moreover, within-state disjunctions are likely to serve as indicators of regionally unique or unusual habitats. Attention to such species is especially important in county natural area inventories and regional planning.

The following list of Watch Category 6 plants is not exhaustive, but represents some of the most important and significant within-state disjunctions. Emphasis is placed on species which are disjunct rather than peripheral — that is, which have a demonstrable gap in their North Carolina ranges. Examples are *Rhododendron catawbiense*, which is common at high to medium elevations in the mountains, but occurs in small, disjunct populations in the lower Piedmont and upper Coastal Plain, and *Pogonia ophioglossoides*, a primarily Coastal Plain species, occurring in rare bogs in the mountains.

SANDHILLS

Comptonia peregrina
Drosera rotundifolia
Kalmia buxifolia
Pinguicula caerulea
Pleea tenuifolia
Rhododendron catawbiense
Rhododendron minus
Magnolia tripetala
Pellaea atropurpurea
Platanthera lacera
Viola blanda

COASTAL PLAIN

Anemone minima
Castilleja coccinea
Clematis ochroleuca
Clematis virginiana
Delphinium tricorne
Kalmia buxifolia
Ranunculus hispidus
Symphyotrichum cordifolium

MOUNTAINS

Aristida virgata
Bartonia virginica
Brasenia schreberi
Calopogon tuberosus var. tuberosus
Cardamine bulbosa
Chamaedaphne calyculata
Clematis crispa
Coreopsis gladiata
Cuscuta corylii
Eriocaulon compressum
Eriocaulon decangulare var. decangulare
Eryngium integrifolium
Gaylussacia dumosa
Kalmia carolina
Lespedeza angustifolia
Orontium aquaticum
Platanthera cristata
Pogonia ophioglossoides
Pycnanthemum flexuosum
Rhynchospora gracilenta
Sabatia brachiata
Sium suave
Smilax laurifolia
Sphagnum cuspidatum
Sphagnum strictum
Sphagnum tenerum
Toxicodendron vernix
Hypericum virginicum
Utricularia biflora
Utricularia subulata

PIEDMONT

Aconitum uncinatum [lower Piedmont only]
Actaea pachypoda
Aralia nudicaulis
Aralia racemosa
Asplenium montanum [lower Piedmont only]
Berchemia scandens
Campanula americana
Carex torta
Cornus alternifolia
Dicentra cucullaria
Dryopteris intermedia
Eleocharis microcarpa var. filiculmis
Eryngium integrifolium
Hydrophyllum canadense
Hydrophyllum virginianum
Lachnocaulon anceps
Diphasiastrum tristachyum
Magnolia virginiana var. virginiana
Micranthes micranthidifolia
Morella caroliniensis
Paronychia argyrocoma
Phalaris arundinacea
Pieris floribunda
Pinus strobus [lower Piedmont only]
Platanthera flava
Pogonia ophioglossoides
Rhododendron catawbiense
Rhynchospora chalarocephala
Salix humilis
Sarracenia flava
Sarracenia purpurea var. venosa
Eriocaulon compressum
Schoenoplectus pungens var. pungens
Sium suave
Smilax laurifolia
Symplocarpus foetidus
Tsuga canadensis [lower Piedmont only]
Xyris baldwiniana
Xyris curtissii
Xyris jupicai

ENDEMIC PLANTS IN NORTH CAROLINA

This is a list of all taxa (including subspecies) considered to be strictly endemic to North Carolina. The list does not include taxa whose range barely extends into another state, such as taxa endemic to the Roan Mountain area or Great Smoky Mountains National Park.

SCIENTIFIC NAME	COMMON NAME	N.C. STATUS	U.S STATUS	N.C. RANK	GLOBAL RANK
Acanthothecis fontana	Fontana Lichen	W7	N/A	S1	G1
Allium keeverae	Keever's Onion	T	N/A	S2	G2
Allium sp. 1	Savanna Onion	SR-L	N/A	S1S2	G1G2
Arthonia kermesia	Mountain Red Dot Lichen	W7	N/A	S1	GNR
Asarum rosei (Hexastylis sp. 3)	Rose's Heartleaf	SR-L	N/A	S1	G1?
Carex lutea	Golden Sedge	E	E	S2	G2
Cladonia psoromica	Bluff Mountain Reindeer Lichen	T	N/A	S1	G1
Coreopsis aristulata	Short-awned Coreopsis	SR-L	N/A	S1	G1
Crataegus oreophila	Balsam Mountain Hawthorn	W7	N/A	S2	GNR
Fellhanera erinae	Erin's Fellhanera	W7	N/A	S1	G1
Fellhanera montesfumosi	Smoky Mountain Crustose Lichen	W7	N/A	S1	G1
Gaylussacia orocola	Appalachian Dwarf Huckleberry	SR-L	N/A	S1	G1
Gentiana latidens	Balsam Mountain Gentian	SR-L	N/A	S1S2	G5T2T3
Graphis sterlingiana	Mount Sterling Script Lichen	W7	N/A	S1	GNR
Heuchera parviflora var. saurensis	Sauratown Grotto Alumroot	W7	N/A	SH	G4TH
Hudsonia montana	Mountain Golden-heather	T	T	S1	G1
Hypericum radfordiorum	Radford's St. John's-wort	SR-L	N/A	S2	G2
Isoetes microvela	Thin-wall Quillwort	T	N/A	S1	G1
Lejeunea glaucescens var.	Raven Rock Liverwort	SR-L	N/A	SX	G5TH
Liatris helleri	Heller's Blazing-star	T	T	S2	G2Q
Narthecium montanum	Appalachian Yellow	SC-H	N/A	SX	GX
Orbexilum macrophyllum	Bigleaf Scurfpea	SC-H	N/A	SX	GX
Packera serpenticola	Buck Creek Ragwort	SR-L	N/A	S1	G1
Rhododendron vaseyi	Pink-shell Azalea	SR-L	N/A	S3	G3
Rhynchospora sp. 2	Croatan Beaksedge	W7	N/A	S1?	G1?
Scleria bellii	Smooth-seeded Hairy Nutrush	SR-L	N/A	S1	G2G3
Shortia galacifolia var. *brevistyla*	Northern Oconee Bells	E	N/A	S2	G3T2
Solidago plumosa	Yadkin River Goldenrod	T	N/A	S1	G1
Solidago villosicarpa	Coastal Goldenrod	E	N/A	S1	G1
Symphyotrichum rhiannon	Buck Creek Aster	T	N/A	S1	G1

EXPLOITED PLANT TAXA IN NORTH CAROLINA

Plant species listed as Exploited in N.C. were previously tracked on the Watch List (Category W5a). This includes species that are either rare or generally widespread species that are in commercial demand and are often collected from wild populations. Such collection can cause local extirpation and is not sustainable over time. The NCNHP requests information on illegal collection incidents, but does not otherwise maintain species occurrences on Exploited species that are not Significantly Rare or on the Watch List.

SCIENTIFIC NAME	COMMON NAME	N.C. STATUS	U.S STATU	N.C. RANK	GLOBAL RANK
Actaea podocarpa	Mountain Black-cohosh	Exploited	N/A	S4	G4
Actaea racemosa	Common Black-cohosh	Exploited	N/A	S4	G4
Aletris farinosa	White-tubed Colicroot	Exploited	N/A	S5	G5
Allium tricoccum	Red Ramps	Exploited	N/A	S4	G5
Chamaelirium luteum	Devil's-bit	Exploited	N/A	S5	G5
Cypripedium parviflorum var. *pubescens*	Large Yellow Lady's-slipper	Exploited	N/A	S3	G5T5
Dionaea muscipula	Venus Flytrap	SC-V, Exploited	N/A	S2	G2
Endodeca serpentaria	Virginia Snakeroot	Exploited	N/A	S4	G4
Galax urceolata	Galax	Exploited	N/A	S5	G5
Hydrastis canadensis	Goldenseal	SR-O, Exploited	N/A	S3	G3G4
Liatris helleri	Heller's Blazing Star	T, Exploited	T	S2	G2Q
Lilium pyrophilum	Sandhills Lily	E, Exploited	N/A	S2	G2
Panax quinquefolius	Ginseng	W1, Exploited	N/A	S3S4	G3G4
Sanguinaria canadensis	Bloodroot	Exploited	N/A	S5	G5
Sarracenia flava	Yellow Pitcherplant	Exploited	N/A	S3S4	G5?
Sarracenia jonesii	Mountain Sweet Pitcherplant	E, Exploited	E	S1	G4T2
Sarracenia minor var. *minor*	Hooded Pitcherplant	E, Exploited	N/A	S2	G4T4
Sarracenia oreophila	Green Pitcherplant	E, Exploited	E	S1	G2
Sarracenia purpurea var. *montana*	Southern Appalachian Purple Pitcherplant	Exploited	N/A	S1S2	G5T1T3
Sarracenia purpurea var. *venosa*	Southern Purple Pitcherplant	Exploited	N/A	S3	G5T3T5
Sarracenia rubra var. *rubra*	Sweet Pitcherplant	Exploited	N/A	S3	G4T3T4
Shortia galacifolia var. *brevistyla*	Northern Oconee Bells	E, Exploited	N/A	S2	G3T2
Shortia galacifolia var. *galacifolia*	Southern Oconee Bells	SC-V, Exploited	N/A	S2	G3T2T3
Trillium catesbaei	Catesby's Trillium	Exploited	N/A	S4	G4
Trillium cuneatum	Little Sweet Trillium	Exploited	N/A	S3	G4G5
Trillium erectum	Stinking Benjamin	Exploited	N/A	S5	G5
Trillium grandiflorum	Large-flower Trillium	Exploited	N/A	S5	G5

POTENTIAL NEW TO NORTH CAROLINA PLANTS

The following list contains species that are not currently thought to occur in North Carolina but which are considered to have some possibility of being found here based on their established range and habitat preferences. Most are species that occur in the adjacent states of South Carolina, Georgia, Tennessee, or Virginia in habitats at least relatively similar to habitats known to exist in North Carolina. The purpose of this list is to encourage and challenge field workers to find new state occurrences. This list should give field investigators an idea of some of the species that may be regular components of North Carolina's flora. While some of these species may have relatively remote chances of being found in North Carolina, the likelihood of finding new state records is greatly increased by awareness of the possibilities and by species-directed searching. New state records of native vascular plants are being found at a rate of about five per year. Our knowledge of North Carolina's flora is still quite imperfect. Many natural areas are being destroyed before they can be investigated, and it can be assumed that a number of native species have been extirpated from North Carolina before they were ever documented as occurring in the state.

Following each species is the North Carolina province in which the species is considered most likely to be found. Where possible, a description of the typical habitat of the species in the vicinity of North Carolina is also given. Sometimes, the nearest known occurrence(s) to North Carolina are also listed.

SCIENTIFIC NAME	PROVINCE	STATE: Adjacent County of Occurrence	HABITAT
Abdra aprica	P	SC: Lancaster	granite outcrops
Actaea rubifolia	M	VA: Scott	cove forests
Agalinis auriculata	P	SC: York	mafic glades
Agalinis plukenetii	S	TN: Polk	sandhills, dry forests
Aletris obovata	C	SC: Beaufort	savannas
Alnus incana ssp. *rugosa*	M	VA: Nelson	braided streamhead seepage swamps
Anemone canadensis	M	VA: Rockingham	moist forests
Antennaria virginica	MP	VA: Carroll, Patrick	rock outcrops
Aralia hispida	M	VA: Augusta	dry rocky woods
Asclepias michauxii	C	SC: Williamsburg, Florence	savannas and pinelands
Asclepias obovata	C	SC: Charleston	sandy pinelands
Asclepias perennis	C	SC: Marion	swamp forests
Asplenium septentrionale	M	WV: Monroe	rock outcrops
Asplenium trichomanes ssp. *quadrivalens*	MP	VA: Giles	calcareous outcrops
Asplenium x *trudellii*	MP	VA: Lee, Pittsylvania	moist cliffs, acidic outcrops and bluffs
Astragalus distortus var. distortus	P	VA: Pittsylvania	glades, dry shaly places
Baptisia perfoliata	SC	SC: Lexington	sandhills
Batis maritima	C	SC: Charleston	salt and brackish marshes
Berlandiera pumila var. pumila	S	SC: Chesterfield, Darlington	sandy woods and fields
Bothriochloa saccharoides	M	TN	dry openings
Bromus kalmii	M	VA: Augusta, Bath	forests, shale woodlands and

SCIENTIFIC NAME	PROVINCE	STATE: Adjacent County of Occurrence	HABITAT
			barrens, grassy ridges
Carex brevior (C. molesta)	M	VA: Wythe	dry woods
Carex conjuncta	MC	VA: Russell, Southampton	mesic woods
Carex pallescens	M	TN: Unicoi	grassy balds
Carex polymorpha	M	VA: Augusta	dry upland woods or wetland margins
Carex sp. 3	M	SC: Oconee, Pickens	rich cove forests
Ceratiola ericoides	SC	SC: Horry	sandhills
Chamaecrista nictitans var. *aspera*	C	SC: Charleston	savannas
Cheilanthes feei	M	VA: Pulaski	calcareous outcrops
Clematis reticulata	C	VA: Darlington	dry sandy woods
Clematis vinacea	M	TN: Polk	dry shale slopes
Collinsia verna	M	VA: Smyth	rich moist woods
Coreopsis integrifolia	C	SC: Berkeley	creekbanks and floodplains
Coreopsis rosea	C	SC: Horry	blackwater rivers, limesink ponds, Carolina bays
Cornus canadensis	M	VA: Albemarle, Bath	mountain forests
Cornus rugosa	M	VA: Craig, Giles	high elevations, usually on talus
Cypripedium kentuckiense	M	TN, KY, VA	forests
Dasistoma macrophylla	P	SC: York	glades
Delphinium carolinianum ssp. calciphilum	P	SC: Lancaster	glades
Desmodium floridanum	P	SC: Beaufort, Jasper	dry sandy areas
Dioscorea floridana	C	SC: Williamsburg	moist woods
Dyschoriste humistrata	C	SC: Charleston	moist forests
Dyschoriste oblongifolia	C	SC: Orangeburg	savannas
Elephantopus elatus	C	SC: Charleston	dry pinelands
Ellisia nyctelea	P	VA: Pittsylvania	bottomlands, forest
Elytraria caroliniensis var. caroliniensis	C	SC: Berkeley	low marl forests
Equisetum fluviatile	M	VA: Augusta	wet places, shallow water
Equisetum sylvaticum	M	VA: Shenandoah	moist forests
Eriocaulon ravenelii	C	SC: Berkeley	savannas
Erythronium americanum ssp. *harperi*	M	TN: Polk	moist forests
Eupatorium scabridum	C	SC	savannas
Floerkea proserpinacoides	P	VA: Fauquier	rich moist woods
Galactia elliottii	C	SC: Beaufort, Jasper	low moist areas
Galium boreale	M	VA: Scott, Wythe	moist forests
Galium concinnum	M	VA: Giles, Smyth	dry forests
Gaylussacia mosieri	CS	SC: Lexington	seepages, savannas
Gleditsia aquatica	C	SC: Williamsburg	swamp forests
Glyceria acutiflora	M	VA: Wythe	wet openings

SCIENTIFIC NAME	PROVINCE	STATE: Adjacent County of Occurrence	HABITAT
Glyceria grandis	MC	VA: Floyd, James City	bogs, seepages, wet meadows
Gratiola amphiantha	P	SC: Lancaster	pools on granitic flatrocks
Habenaria quinqueseta	C	SC: Berkeley, Charleston	wet pinelands and forests
Hemianthus micranthemoides	C	VA: Charles City	tidal marshes
Honckenya peploides ssp. *robusta*	C	VA: Accomack	beaches and dunes
Houstonia canadensis	M	VA: Pulaski, Washington, Wythe	rocky woods and outcrops
Hudsonia ericoides	S	SC: Chesterfield	sandhills
Hydrolea corymbosa	C	SC	pond cypress savannas, depression meadows
Hypericum harperi	C	SC: Barnwell	clay-based Carolina bays
Isoetes lacustris	M	VA	shoals in cold streams
Juncus brachycephalus	M	GA; VA: Giles	wet meadows
Juncus gerardii	C	VA: Chesapeake City	margins of brackish marshes
Kalmia hirsuta	C	SC: Beaufort, Colleton	savannas, pocosin edges
Liatris gracilis	CSP	SC: Colleton, Laurens	pinelands, dry woodlands
Liatris tenuifolia	S	SC: Chesterfield, Lancaster, Marlboro	sandhills
Linnaea borealis var. americana	M	TN	high elevation forests
Lithospermum caroliniense	C	VA: Isle of Wight; SC: Calhoun, Lexington	sandhills
Ludwigia spathulata	C	SC: Aiken, Lexington	clay-based Carolina bays
Magnolia pyramidata	P	SC: Richland	rich woods
Maianthemum stellatum	M	VA: Bedford; TN	alluvial forests
Mononeuria cumberlandensis	MP	TN	rock outcrops
Mononeuria patula	MP	VA: Rockbridge	mafic or calcareous glades and outcrops
Myriopteris rufa	MP	VA: Carroll, Pittsylvania, Pulaski, Montgomery	dry, shaly outcrops
Nolina georgiana	S	SC: Kershaw	sandhills
Oenothera filipes	CS	SC: Kershaw, Williamsburg	sandy areas
Ophioglossum engelmannii	MP	VA: Montgomery	glades over calcareous or mafic rocks
Ophioglossum pusillum	M	VA	moist areas
Opuntia stricta var. *dillenii*	C	SC: Charleston	dunes
Opuntia stricta var. *stricta*	C	SC: Charleston	dunes
Paronychia virginica var. *virginica*	M	VA: Wythe	calcareous rock outcrops
Paspalum plicatulum	C	SC	pine savannas, fields

SCIENTIFIC NAME	PROVINCE	STATE: Adjacent County of Occurrence	HABITAT
Patis racemosa	MP	VA: Patrick	dry woods
Pellaea glabella ssp. *glabella*	M	VA: Wythe	limestone outcrops
Pieris phillyreifolia	C	SC: Charleston	blackwater swamps, pocosins
Pilularia americana	PM	TN, GA	muddy wet places, granite outcrops, pond margins
Pinus glabra	C	SC: Georgetown	bottomland forests
Pityopsis ruthii	M	TN: Polk	riverside outcrops
Plantago maritima	C	VA: Accomack	salt marshes
Platanthera leucophaea	C	VA: Augusta	damp calcareous meadows
Potamogeton tennesseensis	M	TN: Polk, Monroe, Blount	quiet or flowing water
Pseudotaenidia montana	MP	VA: Bedford, Roanoke	dry shaly woods
Pyrola chlorantha	M	VA: Page	dry forests
Pyrola secunda	MP	VA: New Kent	moist forests
Quercus oglethorpensis	CP	SC: Greenwood, Saluda	low woods
Quercus similis	C	SC	wet stream bottoms, flatwoods
Quercus sinuata var. sinuata	C	SC	hills and streambanks
Ratibida pinnata	P	SC: York	diabase glades
Rhamnus lanceolata	M	VA: Pulaski	moist calcareous woodlands
Rhododendron eastmanii	P	SC: Cherokee	rich slopes
Rhynchospora saxicola	P	GA, SC?	granitic flatrocks
Ribes americanum	M	VA: Rockbridge	moist forests
Ribes echinellum	P	SC: McCormick	rich woods
Ribes lacustre	M	VA: Bath	moist forests
Rorippa aquatica	C	VA: Southampton	shallow water of swamps and lakes
Sabatia decandra	C	SC: Hampton	pine savannas
Sabatia brevifolia	C	SC: Berkeley	pine savannas
Sagittaria rigida	PM	VA: Nelson	swamps and ponds
Schizachne purpurascens	M	VA: Highland	dry rocky woods
Scirpus ancistrochaetus	M	VA	mountain ponds
Scutellaria incana var. *incana*	M	WV: Mercer	rocky woodlands
Scutellaria montana	M	GA, TN	rocky woodlands
Scutellaria montana	P	SC: Anderson	woodlands
Scutellaria parvula	P	VA	dry rocky openings
Sedum nevii	M	TN: Polk	rock outcrops
Smilax pumila	C	SC: Horry	maritime hardwood forests
Solidago hispida	M	TN; GA: Walker	calcareous woodlands
Sparganium androcladum	MC	TN; VA: Virginia Beach city	ponds and streams
Sparganium eurycarpum	MC	VA: Pulaski	ponds and streams

SCIENTIFIC NAME	PROVINCE	STATE: Adjacent County of Occurrence	HABITAT
Sporobolus curtissii	C	GA	savannas
Sporobolus neglectus	M	VA: Lee, Montgomery	mafic glades
Spinulum annotinum	M	VA: Grayson, TN: Blount	moist, high elevation forests
Stillingia aquatica	C	SC: Allendale, Barnwell, Hampton	clay-based Carolina bays
Sullivantia sullivantii	M	VA: Russell	cliffs
Thalictrum mirabile	M	KY, TN	cliff bases
Toxicodendron radicans ssp. *negundo*	M	VA, WV	mesic forests, rock outcrops, open or disturbed areas
Toxicodendron rydbergii	M	VA, WV	acidic woodlands
Trichophorum planifolium	P	VA: Grayson, Halifax, Pittsylvania	mesic banks and bluffs
Trillium cernuum	M	VA: Fauquier, Rappahannock	wet woods
Trillium decumbens	M	TN; GA: Pickens & Murray	rich forests
Trillium lancifolium	P	SC: Kershaw	rich forests
Trillium maculatum	PC	SC: Berkeley	rich forests
Trillium nivale	M	VA: Highland	moist calcareous forests
Trillium persistens	MP	SC; GA: Rabun	acid woods under hemlock
Trillium reliquum	PC	SC: Aiken	rich river bluffs
Urtica gracilis	M	VA: Giles	limestone outcrops
Uvularia floridana	C	SC: Berkeley, Charleston	alluvial forests
Vaccinium myrtilloides	M	VA: Pulaski, Roanoke	forests and bogs
Vaccinium oxycoccos	M	WV: Pocahontas	bogs
Vaccinium sempervirens	SC	SC: Lexington	sphagnous seeps, savannas
Vernonia angustifolia var. *scaberrima*	C	SC: Marion	pinelands
Vernonia pulchella	SC	SC: Beaufort, Jasper	pinelands
Veronica scutellata	M	VA: Carroll, Grayson	swamps and bogs
Viburnum obovatum	C	SC: Horry	moist forests

SIGNIFICANT 2018 REVISIONS TO THE PLANT LISTS

RARE LIST SPECIES ADDITIONS FOR 2018

SCIENTIFIC NAME	NEW N.C. STATUS	PREVIOUS N.C. STATUS	U.S. STATUS	N.C. RANK	GLOBAL RANK
Asarum rosei (*Hexastylis sp. 3*)	SR-L	N/A	N/A	S1	G1?
Eleocharis wolfii	SR-T	N/A	N/A	S1	G3G5

WATCH LIST SPECIES ADDITIONS FOR 2018

SCIENTIFIC NAME	NEW N.C. STATUS	PREVIOUS N.C. STATUS	U.S. STATUS	N.C. RANK	GLOBAL RANK
Acanthothecis fontana	W7	N/A	N/A	S1	G1
Carex aquatilis	W7	N/A	N/A	S1	G5
Cyperus hystricinus	W7	N/A	N/A	SH	G4
Dichanthelium malacon	W7	N/A	N/A	S1?	G3
Monarda austroappalachiana	W7	N/A	N/A	S1	G1

TAXA REMOVED FROM RARE AND WATCH LIST SINCE 2016

SCIENTIFIC NAME	NEW N.C. STATUS	PREVIOUS N. C. STATUS	U.S. STATUS	N.C. RANK	GLOBAL RANK
Calycanthus floridus	N/A	W7	N/A	S5	G5
Carex festucaea	N/A	W7	N/A	S3	G5
Carex tetanica	N/A	SR-P	N/A	SNA	G4G5
Carex woodii	W1	SR-P	N/A	S3	G4
Cephalozia macrostachya ssp. australis	W2	SR-T	N/A	S1?	G4T1
Dichanthelium columbianum	N/A	W7	N/A	S3	G5
Diplazium pycnocarpon	N/A	W1	N/A	S3	G5
Diplophyllum apiculatum var. taxifolioides	W2	SR-L	N/A	S1?	G5T2Q
Gaultheria hispidula	N/A	W3	N/A	SNA	G5
Marsupella emarginata ssp. emarginata	W2	SR-L	N/A	S1?	G5T5
Muhlenbergia glabrifloris	W7	SR-P	N/A	SH	G4?
Plagiochila retrorsa (P. sharpii)	W1	SR-L	N/A	S3	G2G4
Porpidia cineroatra	W7	SR-T	N/A	S1	G5?
Typha domingensis	N/A	W7	N/A	S3	G4G5
Vaccinium virgatum	W7	SR-P	N/A	S2?	G4

CHANGES TO WATCH LIST DESIGNATION SINCE 2016

SCIENTIFIC NAME	NEW N.C. STATUS	PREVIOUS N. C. STATUS	U.S. STATUS	N.C. RANK	GLOBAL RANK
Boykinia aconitifolia	W1	W7	N/A	S3	G4
Chrysopsis trichophylla	W1	W7	N/A	S2	G5T5
Phlox divaricata	W1	W7	N/A	S3	G5
Symphyotrichum simmondsii	W1	W7	N/A	S2S3	G4G5

SCIENTIFIC NAME CHANGES TO THE PLANT LIST SINCE 2016

FORMER NAME	CURRENT NAME
Allium cuthbertii	*Allium keeverae*
Arabidopsis lyrata	*Arabidopsis lyrata ssp. lyrata*
Asplenium ruta-muraria	*Asplenium ruta-muraria var. cryptolepis*
Baptisia australis var. aberrans	*Baptisia aberrans*
Bigelowia nudata ssp. australis	*Bigelowia nudata var. australis*
Canoparmelia amabilis	*Canoparmelia caroliniana*
Cheilolejeunea myriantha	*Cheilolejeunea discoidea*
Cladonia evansii	*Cladina evansii*
Cymophyllus fraserianus	*Carex fraseriana*
Ipomoea pes-caprae	*Ipomoea brasiliensis*
Marsupella emarginata var. latiloba	*Marsupella emarginata ssp. emarginata*
Micropolypodium nimbatum	*Moranopteris nimbata*
Muhlenbergia glabriflora	*Mulenbergia glabrifloris*
Minuartia godfreyi	*Mononeuria paludicola*
Panicum lithophilum	*Panicum philadelphicum ssp. lithophilum*
Parthenocissus vitacea	*Parthenocissus inserta*
Persicaria glabra	*Persicaria densiflora*
Plagiochila sharpii	*Plagiochila retrorsa*
Platanthera flava var. herbiola	*Platanthera herbiola*
Potamogeton foliosus	*Potamogeton foliosus var. foliosus*
Rubus dalibarda	*Rubus repens*
Salvia azurea	*Salvia azurea var. azurea*
Seymeria pectinata	*Seymeria pectinata ssp. pectinata*
Streptopus amplexifolius	*Streptopus amplexifolius var. amplexifolius*

Taxonomy in this publication generally follows Weakley, A.S. *Flora of the Southern and Mid-Atlantic States. 2018.* University of North Carolina Herbarium (NCU) NC Botanical Garden, University of North Carolina, Chapel Hill, North Carolina. Available online at www.herbarium.unc.edu.

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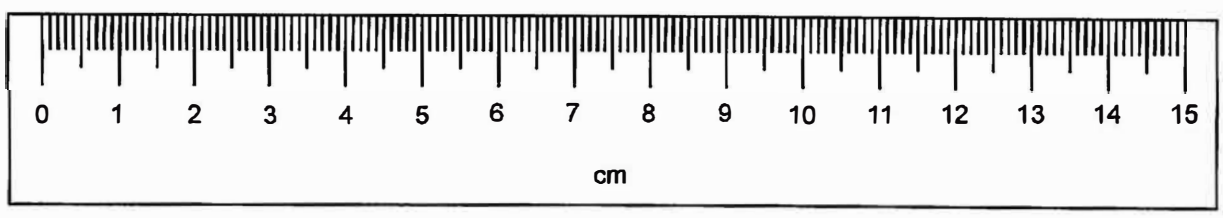

Enclosure 7. Invasive Plant Species of Virginia

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Virginia Invasive Plant Species List

Tree-of-heaven

Phragmites

Wavyleaf Grass

The Virginia Invasive Plant Species List comprises species that are established — or may become established — in Virginia, cause economic and ecological harm, and present ongoing management issues.

The list is for educational purposes only and has no regulatory authority.

To be included on the list, there must be demonstrable evidence that a species poses a threat to Virginia's forests, native grasslands, wetlands or waterways.

The Virginia Department of Conservation and Recreation's Invasive Species Assessment Protocol, approved by the Virginia Invasive Species Working Group, May 2015, was used to conduct a risk assessment for each listed species. Species were ranked as exhibiting **high**, **medium** or **low** levels of invasiveness based on their threat to natural communities and native species.

Scientific Name	Common Name	Virginia Invasiveness Rank	REGION		
			Mountain	Piedmont	Coastal
Ailanthus altissima	**Tree-of-heaven**	High	•	•	•
Alliaria petiolata	**Garlic Mustard**	High	•	•	•
Alternanthera philoxeroides	**Alligator-weed**	High			•
Ampelopsis brevipedunculata	**Porcelain-berry**	High		•	•
Carex kobomugi	**Japanese Sand Sedge**	High			•
Celastrus orbiculatus	**Oriental Bittersweet**	High	•	•	•
Centaurea stoebe ssp. micranthos	**Spotted Knapweed**	High	•	•	•
Cirsium arvense	**Canada Thistle**	High	•	•	•
Dioscorea polystachya	**Cinnamon Vine**	High	•	•	•
Elaeagnus umbellata	**Autumn Olive**	High	•	•	•
Euonymus alatus	**Winged Euonymus**	High	•	•	
Ficaria verna	**Lesser Celandine**	High		•	•
Hydrilla verticillata	**Hydrilla**	High	•	•	•
Iris pseudacorus	**Yellow Flag**	High	•	•	•
Lespedeza cuneata	**Chinese Lespedeza**	High	•	•	•
Ligustrum sinense	**Chinese Privet**	High	•	•	•
Lonicera japonica	**Japanese Honeysuckle**	High	•	•	•
Lonicera maackii	**Amur Honeysuckle**	High	•	•	•
Lonicera morrowii	**Morrow's Honeysuckle**	High	•	•	
Lythrum salicaria	**Purple Loosestrife**	High	•	•	•
Microstegium vimineum	**Japanese Stiltgrass**	High	•	•	•
Murdannia keisak	**Marsh Dewflower**	High	•	•	•
Myriophyllum aquaticum	**Parrot Feather**	High	•	•	•
Myriophyllum spicatum	**Eurasian Water-milfoil**	High	•	•	•
Persicaria perfoliata	**Mile-a-minute**	High	•	•	•
Phragmites australis ssp. australis	**Common Reed**	High	•	•	•
Pueraria montana var. lobata	**Kudzu**	High	•	•	•
Reynoutria japonica	**Japanese Knotweed**	High	•	•	•
Rosa multiflora	**Multiflora Rose**	High	•	•	•
Rubus phoenicolasius	**Wineberry**	High	•	•	•
Sorghum halepense	**Johnson Grass**	High	•	•	•
Urtica dioica	**European Stinging Nettle**	High	•	•	•
Acer platanoides	**Norway Maple**	Medium	•	•	•
Agrostis capillaris	**Colonial Bent-grass**	Medium	•	•	•
Akebia quinata	**Five-leaf Akebia**	Medium		•	•
Albizia julibrissin	**Mimosa**	Medium	•	•	•
Arthraxon hispidus var. hispidus	**Joint Head Grass**	Medium	•	•	•
Berberis thunbergii	**Japanese Barberry**	Medium	•	•	•
Cirsium vulgare	**Bull Thistle**	Medium	•	•	•
Dipsacus fullonum	**Wild Teasel**	Medium	•	•	•
Egeria densa	**Brazilian Waterweed**	Medium	•	•	•
Euonymus fortunei	**Winter Creeper**	Medium	•	•	•
Glechoma hederacea	**Gill-over-the-ground**	Medium	•	•	•
Hedera helix	**English Ivy**	Medium		•	•

continued

Invasiveness rank is higher for species that:

- Alter ecosystem processes, such as succession, hydrology or fire regime.
- Are capable of invading undisturbed natural communities.
- Cause substantial impacts on rare or vulnerable species or natural communities or high-quality examples of more common communities.
- Are found widely distributed and generally abundant where present.
- Disperse readily to new areas.
- Are difficult to control.

Early detection species

The list includes a subcategory of invasive plants that are considered early detection species. These are species not yet established or, if established, are not yet widespread in Virginia but known to be highly invasive in habitats similar to those found here. If discovered in Virginia, these species need to be quickly mapped, photographed and reported to DCR. The management goal for early detection species is eradication, as preventing the establishment and spread of newly arrived species will save valuable natural and economic resources.

INFORMATION

For more information, or to report early detection species, contact Stewardship Biologist Kevin Heffernan with the Virginia Department of Conservation and Recreation at 804-786-9112 or kevin.heffernan@dcr.virginia.gov

Photo credits:
Tree-of-heaven, Chuck Bargeron, University of Georgia, Bugwood.org. Phragmites, Jil M. Swearingen, USDI National Park Service, Bugwood.org. Wavyleaf grass, Kerrie L. Kyde, Maryland Department of Natural Resources, Bugwood.org.

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DCR
Virginia Department of Conservation & Recreation

www.dcr.virginia.gov/natural_heritage/invspinfo.shtml

Scientific Name	Common Name	Virginia Invasiveness Rank	REGION		
			Mountain	Piedmont	Coastal
Holcus lanatus	**Common Velvet Grass**	Medium	•	•	•
Humulus japonicus	**Japanese Hops**	Medium	•	•	•
Ligustrum obtusifolium var. obtusifolium	**Border Privet**	Medium	•	•	•
Lonicera tatarica	**Tartarian Honeysuckle**	Medium	•	•	
Lysimachia nummularia	**Moneywort**	Medium	•	•	•
Miscanthus sinensis	**Chinese Silvergrass**	Medium	•	•	•
Najas minor	**Brittle Naiad**	Medium	•	•	•
Paulownia tomentosa	**Royal Paulowina**	Medium	•	•	•
Persicaria longiseta	**Long-bristled Smartweed**	Medium	•	•	•
Phyllostachys aurea	**Golden Bamboo**	Medium	•	•	•
Poa compressa	**Flat-stemmed Bluegrass**	Medium	•	•	•
Poa trivialis	**Rough Bluegrass**	Medium	•	•	•
Pyrus calleryana	**Callery Pear**	Medium	•	•	•
Rhodotypos scandens	**Jetbead**	Medium	•	•	•
Rumex acetosella	**Sheep sorrel**	Medium	•	•	•
Spiraea japonica	**Japanese Spiraea**	Medium	•	•	
Stellaria media	**Common Chickweed**	Medium	•	•	•
Veronica hederifolia	**Ivy-leaved Speedwell**	Medium	•	•	•
Viburnum dilatatum	**Linden arrow-wood**	Medium		•	
Wisteria sinensis	**Chinese Wisteria**	Medium	•	•	•
Commelina communis	**Asiatic Dayflower**	Low	•	•	•
Elaeagnus pungens	**Thorny Olive**	Low	•	•	•
Lespedeza bicolor	**Shrubby Bushclover**	Low	•	•	•
Lonicera fragrantissima	**Winter Honeysuckle**	Low	•	•	•
Melia azedarach	**Chinaberry**	Low		•	•
Morus alba	**White Mulberry**	Low	•	•	•
Perilla frutescens	**Beefsteak Plant**	Low	•	•	•
Phleum pratense	**Timothy**	Low	•	•	•
Populus alba	**Silver Poplar**	Low	•	•	•
Rumex crispus ssp. crispus	**Curly Dock**	Low	•	•	•
Securigera varia	**Crown-vetch**	Low	•	•	•
Trapa natans	**European Water Chestnut**	Low			•
Ulmus pumila	**Siberian Elm**	Low	•	•	
Vinca major	**Greater Periwinkle**	Low	•	•	•
Vinca minor	**Periwinkle**	Low	•	•	•
Wisteria floribunda	**Japanese Wisteria**	Low		•	•
EARLY DETECTION SPECIES - not yet widely established in Virginia					
Aldrovanda vesiculosa	**Waterwheel**	High			•
Eichhornia crassipes	**Water Hyacinth**	High			•
Imperata cylindrica	**Cogon Grass**	High			•
Ludwigia grandiflora ssp. hexapetala	**Large Flower Primrose Willow**	High	•	•	•
Oplismenus hirtellus ssp. undulatifolius	**Wavyleaf Grass**	High	•	•	
Vitex rotundifolia	**Beach Vitex**	High			•
Heracleum mantegazzianum	**Giant Hogweed**	Medium	•	•	
Ipomoea aquatica	**Water Spinach**	Medium	•	•	•
Salvinia molesta	**Giant Salvinia**	Medium	•	•	•
Solanum viarum	**Tropical Soda Apple**	Medium		•	•

Enclosure 8. Invasive Plant Species of North Carolina

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NC Native Plant Society – Invasive Exotic Plants in NC – 2010

compiled by Misty Franklin Buchanan with review and input from biologists in the following agencies: NC Natural Heritage Program, NC Botanical Garden, University of North Carolina Herbarium, NC Exotic Pest Plant Council, NC DENR Aquatic Weed Control Program, US Fish & Wildlife Service, The Nature Conservancy, and the NC Zoo.

The intent of the NC Native Plant Society Invasive Exotic Plant list is to rank exotic (alien, foreign, introduced, and non-indigenous) plants based on their invasive characteristics, to educate the public and resource managers, and to encourage early detection of invasive exotic species so that a rapid response can be implemented when needed. We hope this list will help eliminate the use of invasive exotic plants in landscaping and restoration projects. The 2004 Tennessee Exotic Pest Plant Council Invasive Exotic Plant list was used as a model for organization of this list, but species listed and ranks assigned here are applicable to North Carolina. The NC Native Plant Society Invasive Exotic Plant List is considered a work in progress, and will be evaluated and updated as new information is gathered about these and other species. Please send your comments to:

North Carolina Native Plant Society
c/o North Carolina Botanical Garden
Totten Center 3375
Chapel Hill, NC 27599-3375

Background: Many introduced plants have become naturalized in North Carolina and some are replacing our native plant species. Not all exotic species are considered harmful. Invasive plants are usually characterized by fast growth rates, high fruit production, rapid vegetative spread and efficient seed dispersal and germination. Not being native to NC, they lack the natural predators and diseases which would naturally control them in their native habitats. The rapid growth and reproduction of invasive plants allows them to overwhelm and displace existing vegetation and, in some cases, form dense one-species stands. Invasive species are especially problematic in areas that have been disturbed by human activities such as road building, residential development, forest clearing, logging, grazing, mining, ditching, mowing, erosion control, and fire control activities.

Invasive exotic plants disrupt the ecology of natural ecosystems, displace native plant and animal species, and degrade our biological resources. Aggressive invaders reduce the amount of light, water, nutrients and space available to native species. Some cause increased erosion along stream banks, shorelines and roadsides. Some exotics hybridize with related native plant species, resulting in changes to a population's genetic makeup; others have been found to harbor plant pathogens, which can affect both native and non-native plants, including ornamentals. Others contain toxins that may be lethal humans and other animals. Some invasive plants compete with and replace rare and endangered species and encroach upon their limited habitat. Other problems include disruption of native plant-pollinator relationships, tree and shrub mortality due to girdling, reduced establishment of native tree and shrub seedlings, reduction in the amount of space, water, sunlight and nutrients that would be available to native species, and altered fire regimes. Invasive plants also cause economic losses and expenditures each year for agriculture, forestry, and roadside management.

Our native fauna, including insects, birds, mammals, reptiles, fish and other animals, is dependent on native plants for food and shelter. While some animals can feed on a wide number of plant species, others are highly specialized and may be restricted to feeding on several or a single plant species. As exotic plants replace our native flora, fewer host plants are available to provide the necessary nutrition for our native wildlife. In some cases, invasive plants replace nutritious native plant foods with lower quality sources. Each exotic plant is one less native host plant for our native insects, vertebrates and other organisms that are dependent upon them.

It is important to document the spread of invasive exotic plants into natural areas. When invaders are found outside of landscape plantings, they should be recorded and voucher specimens should be collected for donation to a herbarium.

To reduce invasive plant invasions, we must approach the problem in a variety of ways: stop planting them, prevent accidental introductions, manage existing infestations, minimize disturbance to forests, wetlands, and other natural communities, and learn to work with (rather than against) natural systems and cycles.

Rank 1 – Severe Threat: Exotic plant species that have invasive characteristics and spread readily into native plant communities, displacing native vegetation.

Scientific Name	Common Name
Ailanthus altissima (Mill.) Swingle	Tree of Heaven
Albizia julibrissin Durz.	Mimosa
Alliaria petiolata (Bieb.) Cavara & Grande	Garlic-mustard
Alternanthera philoxeroides (Mart.) Griseb.	Alligatorweed
Celastrus orbiculatus Thunb.	Asian bittersweet
Elaeagnus angustifolia L.	Russian olive
Elaeagnus umbellata Thunb.	Autumn olive
Hedera helix L.	English ivy
Hydrilla verticillata (L.f.) Royle	Hydrilla
Lespedeza bicolor Turczaninow	Bicolor lespedeza
Lespedeza cuneata (Dum.-Cours.) G. Don	Sericea lespedeza
Ligustrum sinense Lour.	Chinese privet
Lonicera fragrantissima Lindl. & Paxton	Fragrant honeysuckle
Lonicera japonica Thunb.	Japanese honeysuckle
Microstegium vimineum (Trin.) A. Camus	Japanese stilt-grass
Murdannia keisak (Hassk.) Hand.-Mazz.	Asian spiderwort
Myriophyllum aquaticum (Vell.) Verdc.	Parrotfeather
Paulownia tomentosa (Thunb.) Sieb.& Zucc. ex Steud.	Princess tree
Persicaria perfoliata (Linnaeus) H. Gross (=Polygonum perfoliatum L.)	Mile-a-minute vine
Phragmites australis (Cav.) Trin. ssp. australis	Common reed
Pyrus calleryana Decne.	Bradford pear
Reynoutria japonica Houttuyn (Polygonum cuspidatum)	Japanese knotweed
Pueraria montana (Lour.) Merr.	Kudzu
Rosa multiflora Thunb.	Multiflora rose
Salvinia molesta Mitchell	Aquarium water-moss
Vitex rotundifolia L.f.	Beach vitex
Wisteria sinensis (Sims) DC	Chinese wisteria

Rank 2 – Significant Threat: Exotic plant species that display some invasive characteristics, but do not appear to present as great a threat to native communities in NC as the species listed in Rank 1.

Scientific Name	Common Name
Ampelopsis brevipedunculata (Maxim.) Trautv.	Porcelain-berry
Arthraxon hispidus (Thunb.) Makino	Hairy jointgrass
Bambusa spp.	Exotic bamboo
Berberis thunbergii DC	Japanese barberry
Broussonetia papyrifera (L.) L'Her. ex Vent.	Paper mulberry
Cardiospermum halicacabum L.	Balloonvine
Cayratia japonica (Thunb. ex Murray) Gagnep.	Bushkiller
Centaurea biebersteinii DC	Spotted knapweed
Clematis terniflora DC (=C. dioscoreifolia)	Leatherleaf clematis
Conium maculatum L.	Poison hemlock
Coronilla varia L.	Crown vetch
Dioscorea oppositifolia L.	Air-potato
Eichhornia crassipes (Mart.) Solms	Water-hyacinth
Euonymus alata (Thunb.) Sieb.	Burning bush
Euonymus fortunei (Turcz.) Hand. – Mazz.	Winter creeper
Ficaria verna ssp. ficariiformis (F.W. Schultz) B. Walln. (=Ranunculus ficaria)	Lesser Celandine
Glechoma hederacea L.	Gill-over-the-ground, ground ivy
Humulus japonicus Siebold & Zuccarini	Japanese Hops
Lamium purpureum L.	Henbit
Ligustrum japonicum Thunb.	Japanese privet
Ligustrum vulgare L.	Common privet
Lonicera maackii (Rupr.) Maxim.	Amur bush honeysuckle
Lonicera morrowii A. Gray	Morrow's bush honeysuckle
Lonicera standishii Jaques	Standish's Honeysuckle
Lonicera ×bella [morrowii × tatarica]	Hybrid Bush Honeysuckle
Lygodium japonicum (Thunb. ex Murr.) Sw.	Japanese climbing fern
Lythrum salicaria L.	Purple loosestrife
Mahonia beali (Fortune) Carriere	Leatherleaf Mahonia
Miscanthus sinensis Andersson	Chinese silver grass
Morus alba L.	White mulberry
Myriophyllum spicatum Komarov	Eurasian watermilfoil
Nandina domestica Thunb.	Nandina
Persicaria longiseta (de Bruijn) Moldenke (=Polygonum caespitosum Blume)	Oriental ladies-thumb
Persicaria maculosa S.F. Gray (=Polygonum persicaria L.)	Lady's thumb
Phyllostachys spp.	Exotic bamboo
Poncirus trifoliata (L.) Raf.	Hardy-Orange
Pseudosasa japonica (Sieb. & Zucc. ex Steud.) Makino ex Nakai	Arrow bamboo
Rhodotypos scandens (Thunb.)	Makino jetbead
Rubus phoenicolasius Maxim.	Wineberry
Solanum viarum Dunal	Tropical soda apple
Sorghum halepense (L.) Pers.	Johnson grass
Spiraea japonica L.f.	Japanese spiraea
Stellaria media (L.) Vill.	Common chickweed
Veronica hederifolia L.	Ivyleaf speedwell
Vinca major L.	Bigleaf periwinkle
Vinca minor L.	Common periwinkle
Wisteria floribunda (Willd.) DC	Japanese Wisteria
Xanthium strumarium L.	Common cocklebur

Rank 3 – Lesser Threat: Exotic plant species that spread into or around disturbed areas, and are presently considered a low threat to native plant communities in NC.

Scientific Name	Common Name
Ajuga reptans L.	Bugleweed
Allium vineale L.	Field garlic
Artemisia vulgaris L.	Mugwort, common wormwood
Arundo donax L.	Giant reed
Baccharis halimifolia L.*	Silverling, groundsel tree
Bromus catharticus Vahl	Bromegrass, rescue grass
Bromus commutatus Schrad.	Meadow brome
Bromus japonicus Thunb. ex Murray	Japanese bromegrass
Bromus secalinus L.	Rye brome
Bromus tectorum L.	Thatch bromegrass, cheat grass
Buddleia davidii Franch.	Butterfly bush
Chicorium intybus L.	Chicory
Chrysanthemum leucanthemum L.	Ox-eye daisy
Cirsium vulgare (Savi) Ten.	Bull thistle
Daucus carota L.	Wild carrot, Queen Anne's-lace
Dipsacus fullonum L.	Fuller's teasel
Egeria densa Planch.	Brazilian elodea, Brazilian water-weed
Fatoua villosa (Thunb.) Nakai	Hairy crabweed
Festuca pratensis Huds.	Meadow fescue
Ipomoea quamoclit L.	Cypressvine morningglory
Kummerowia stipulacea (Maxim.)	Makino Korean clover
Kummerowia striata (Thunb.) Schindl.	Japanese clover
Liriope muscari (Dcne.) Bailey	Liriope, Lilyturf
Lysimachia nummularia L.	Moneywort, creeping Jenny
Melilotus albus Medik.	White sweet clover
Melilotus officinalis (L.) Lam.	Yellow sweet clover
Najas minor All.	Brittle naiad
Pastinaca sativa L.	Wild parsnip
Perilla frutescens (L.) Britt.	Beefsteakplant
Populus alba L.	White poplar
Senecio vulgaris L.	Ragwort
Setaria faberi R.A.W. Herrm.	Nodding foxtail-grass
Triadica sebifera (L.) Small	Chinese tallowtree
Tussilago farfara L.	Coltsfoot
Vicia sativa L.	Garden vetch

*_Baccharis halimifolia_ is native to marshes and marsh borders on the outer Coastal Plain in NC, but has spread along road corridors to invade disturbed areas in the Piedmont, which is not considered its native habitat.

Watch List A: Exotic plants that naturalize and may become a problem in the future; includes species that are or could become widespread in North Carolina. At this time, more information is needed.

Scientific Name	Common Name
Arum italicum P. Mill.	Italian lords and ladies
Buglossoides arvensis (L.) I.M. Johnston (L.) I.M.	Corn gromwell
Bupleurum rotundifolium L.	Hound's-ear, hare's-ear
Centaurea cyanus L.	Cornflower
Cyperus entrerianus Böckler	Deeprooted sedge
Echium vulgare L.	Viper's bugloss
Elaeagnus pungens Thunb.	Thorny olive
Hibiscus syriacus L.	Rose of Sharon
Hypericum perforatum L.	St. John's-wort
Ornithogalum umbellatum L.	Star of Bethlehem
Solanum dulcamara L.	Climbing nightshade
Verbascum thapsus L.	Common mullein

Watch List B: Exotic plant species that cause problems in adjacent states but have not yet been reported to cause problems in NC.

Scientific Name	Common Name
Acer platanoides L.	Norway maple
Akebia quinata (Houtt.) Dcne.	Fiveleaf akebia
Bromus inermis Leyss.	Smooth bromegrass
Carduus nutans L.	Musk thistle
Carex kobomugi Ohwi	Japanese sedge
Cirsium arvense (L.) Scop.	Canada thistle
Commelina benghalensis L.	Bengal dayflower
Elaeagnus pungens Thunb.	Thorny-olive
Hesperis matronalis L.	Dame's rocket
Imperata cylindrica (Linnaeus) Palisot de Beauvois	Cogongrass
Iris pseudoacorus L.	Pale-yellow iris
Lonicera tatarica L.	Tartarian honeysuckle
Ludwigia grandiflora ssp. grandiflora (Michx) Greuter & Burdet	Creeping waterprimrose
Melia azedarach L.	Chinaberry
Nymphoides cristata (Roxburgh) Kuntze	Crested floating heart
Pistia stratiotes L.	Watter-lettuce
Potamogeton crispus L.	Curly pondweed
Quercus acutissima Carruthers	Sawtooth oak
Rhamnus cathartica L.	European buckthorn
Setaria italica (L.) P. Beauv.	Foxtail-millet
Setaria verticillata (L.) Beauv.	Bur-foxtail
Setaria viridis (L.) P. Beauv.	Green millet
Stachys floridana Shuttlw. ex Benth.	Florida Hedge nettle
Torilis arvensis (Huds.) Link	Spreading hedge-parsley
Tragopogon dubius Scop.	Yellow goat's-beard
Trapa natans L.	Water-chestnut
Tribulus terrestris L.	Puncturevine
Xanthium spinosum L.	Spiny cocklebur

Enclosure 9. IPaC Reports

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Project information

NAME

NSAHR HQ Complex

LOCATION

Norfolk County, Virginia

DESCRIPTION

None

Local office

Virginia Ecological Services Field Office

(804) 693-6694
(804) 693-9032

6669 Short Lane
Gloucester, VA 23061-4410

http://www.fws.gov/northeast/virginiafield/

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

THERE ARE NO ENDANGERED SPECIES EXPECTED TO OCCUR AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

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NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE

BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black Skimmer Rynchops niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler Cardellina canadensis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Clapper Rail Rallus crepitans This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 10 to Oct 31
Dunlin Calidris alpina arcticola This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Least Tern Sterna antillarum This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 20 to Sep 10
Lesser Yellowlegs Tringa flavipes This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Nelson's Sparrow Ammodramus nelsoni This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Sep 5
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31

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Prothonotary Warbler Protonotaria citrea — Breeds Apr 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Purple Sandpiper Calidris maritima — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-throated Loon Gavia stellata — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ruddy Turnstone Arenaria interpres morinella — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Semipalmated Sandpiper Calidris pusilla — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Whimbrel Numenius phaeopus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9483

Willet Tringa semipalmata — Breeds Apr 20 to Aug 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper

Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

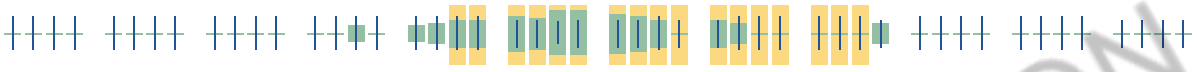
No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

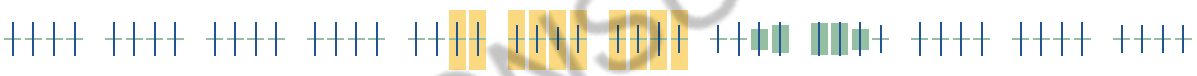
NOT FOR CONSULTATION

Bald Eagle Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

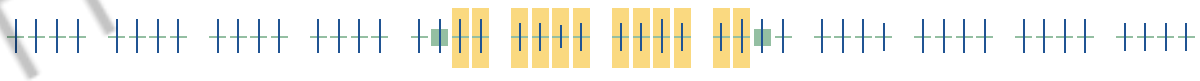
Black Skimmer BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



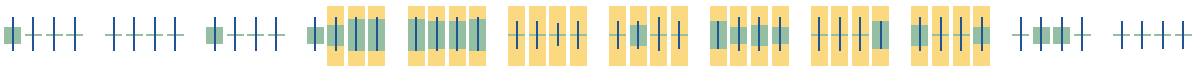
Bobolink BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Canada Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



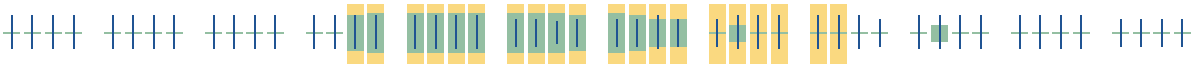
Clapper Rail BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



NOT FOR CONSULTATION

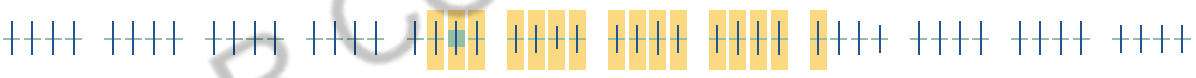
Dunlin
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Least Tern
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

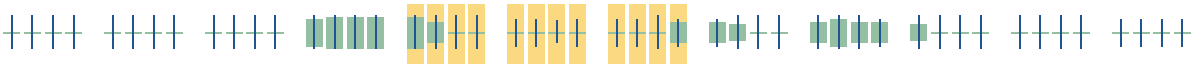


Lesser Yellowlegs
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Nelson's Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Prairie Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



NOT FOR CONSULTATION

Prothonotary Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Purple Sandpiper BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Red-headed Woodpecker BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Red-throated Loon BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Ruddy Turnstone BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

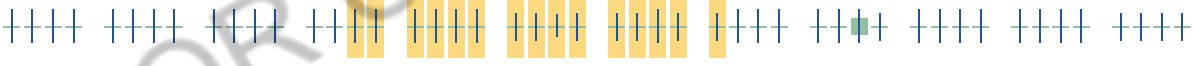
NOT FOR CONSULTATION

Rusty Blackbird BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

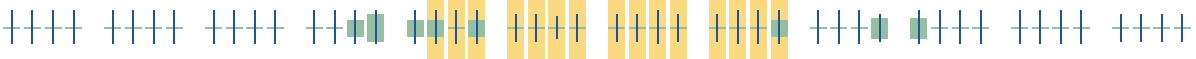
Semipalmated Sandpiper BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Whimbrel BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Willet BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wood Thrush BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



NOT FOR CONSULTATION

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be

breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

NOT FOR CONSULTATION

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

NOT FOR CONSULTATION

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Project information

NAME

NSAHR LRA

LOCATION

Norfolk County, Virginia

DESCRIPTION

None

Local office

Virginia Ecological Services Field Office

(804) 693-6694
(804) 693-9032

6669 Short Lane
Gloucester, VA 23061-4410

http://www.fws.gov/northeast/virginiafield/

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

THERE ARE NO ENDANGERED SPECIES EXPECTED TO OCCUR AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

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NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE

BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus — Breeds Oct 15 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Black Skimmer Rynchops niger — Breeds May 20 to Sep 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5234

Bobolink Dolichonyx oryzivorus — Breeds May 20 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Canada Warbler Cardellina canadensis — Breeds May 20 to Aug 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Clapper Rail Rallus crepitans — Breeds Apr 10 to Oct 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Dunlin Calidris alpina arcticola — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Least Tern Sterna antillarum — Breeds Apr 20 to Sep 10
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Nelson's Sparrow Ammodramus nelsoni — Breeds May 15 to Sep 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Prothonotary Warbler Protonotaria citrea — Breeds Apr 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Purple Sandpiper Calidris maritima — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-headed Woodpecker Melanerpes erythrocephalus — Breeds May 10 to Sep 10
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Red-throated Loon Gavia stellata — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ruddy Turnstone Arenaria interpres morinella — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Semipalmated Sandpiper Calidris pusilla — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Whimbrel Numenius phaeopus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9483

Willet Tringa semipalmata — Breeds Apr 20 to Aug 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper

Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

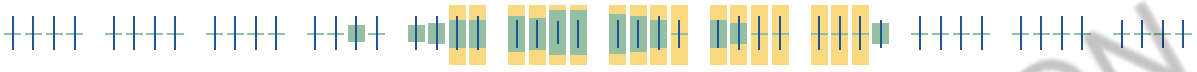
NOT FOR CONSULTATION

■ probability of presence ■ breeding season | survey effort – no data

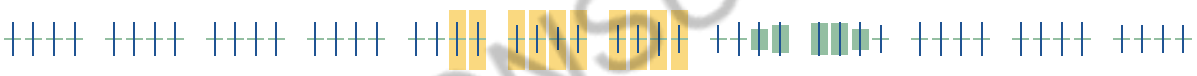
SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Bald Eagle Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

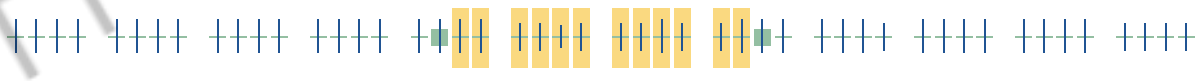
Black Skimmer BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



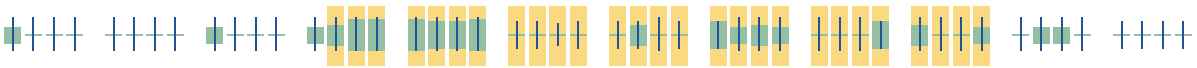
Bobolink BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Canada Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



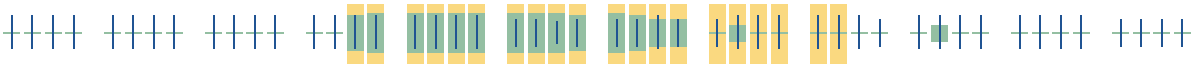
Clapper Rail BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



NOT FOR CONSULTATION

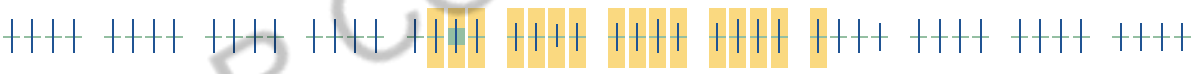
Dunlin
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Least Tern
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

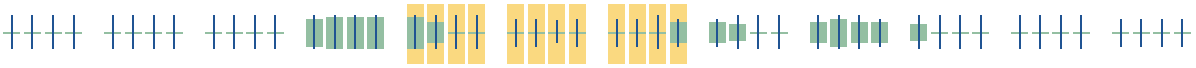


Lesser Yellowlegs
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Nelson's Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Prairie Warbler
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



NOT FOR CONSULTATION

Prothonotary Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Purple Sandpiper BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Red-headed Woodpecker BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Red-throated Loon BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Ruddy Turnstone BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

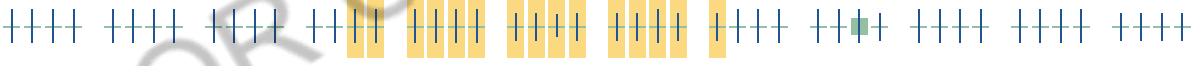
NOT FOR CONSULTATION

Rusty Blackbird BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

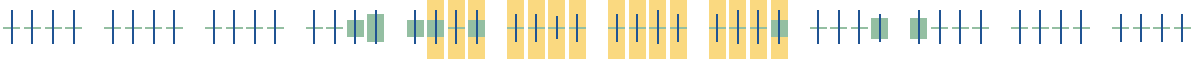
Semipalmated Sandpiper BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Whimbrel BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Willet BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Wood Thrush BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



NOT FOR CONSULTATION

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be

breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

NOT FOR CONSULTATION

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

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Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Portsmouth County, Virginia

Local office

Virginia Ecological Services Field Office

(804) 693-6694
(804) 693-9032

6669 Short Lane
Gloucester, VA 23061-4410

http://www.fws.gov/northeast/virginiafield/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

THERE ARE NO ENDANGERED SPECIES EXPECTED TO OCCUR AT THIS LOCATION.

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE.

NOT FOR CONSULTATION

"BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus — Breeds Oct 15 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Least Tern Sterna antillarum — Breeds Apr 20 to Sep 10
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Prairie Warbler Dendroica discolor — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Prothonotary Warbler Protonotaria citrea — Breeds Apr 1 to Jul 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Purple Sandpiper Calidris maritima — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Ruddy Turnstone Arenaria interpres morinella — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Rusty Blackbird Euphagus carolinus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Wood Thrush Hylocichla mustelina — Breeds May 10 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

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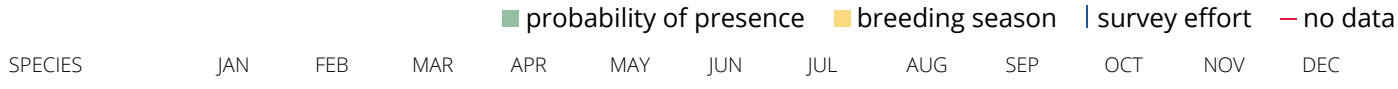
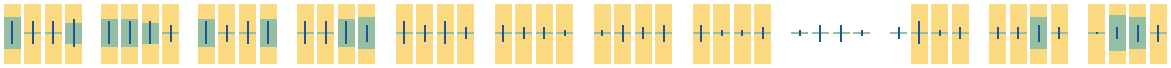
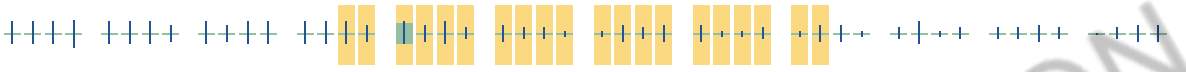


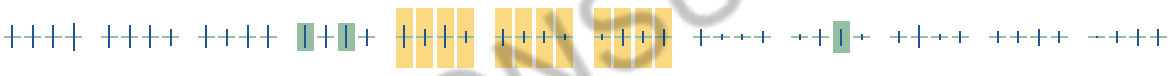
Bald Eagle Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)



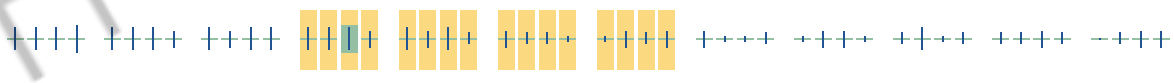
Least Tern BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Prairie Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Prothonotary Warbler BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



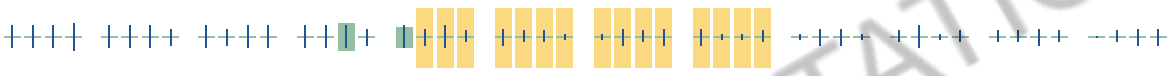
Purple Sandpiper BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

NOT FOR CONSULTATION

Ruddy Turnstone BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Rusty Blackbird BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Wood Thrush BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



NOT FOR CONSULTATION

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

NOT FOR CONSULTATION

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Project information

NAME

NSAHR NWA

LOCATION

North Carolina and Virginia

DESCRIPTION

for INRMP Update

Local offices

Raleigh Ecological Services Field Office

(919) 856-4520
(919) 856-4556

MAILING ADDRESS

Post Office Box 33726
Raleigh, NC 27636-3726

PHYSICAL ADDRESS

551 Pylon Drive, Suite F
Raleigh, NC 27606-1487

Virginia Ecological Services Field Office

(804) 693-6694
(804) 693-9032

6669 Short Lane
Gloucester, VA 23061-4410

http://www.fws.gov/northeast/virginiafield/

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Northern Long-eared Bat Myotis septentrionalis — Threatened
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9045

West Indian Manatee Trichechus manatus — Threatened
Marine mammal
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/4469

Birds

NAME	STATUS

Eastern Black Rail Laterallus jamaicensis ssp. jamaicensis — Proposed Threatened
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/10477

Piping Plover Charadrius melodus — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/6039

Red Knot Calidris canutus rufa — Threatened
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1864

Red-cockaded Woodpecker Picoides borealis — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/7614

Reptiles

NAME	STATUS

American Alligator Alligator mississippiensis — SAT
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/776

Green Sea Turtle Chelonia mydas — Threatened
There is **final** critical habitat for this species. Your location is outside the critical habitat.
https://ecos.fws.gov/ecp/species/6199

Kemp's Ridley Sea Turtle Lepidochelys kempii — Endangered
There is **proposed** critical habitat for this species. The location of the critical habitat is not available.
https://ecos.fws.gov/ecp/species/5523

NOT FOR CONSULTATION

Leatherback Sea Turtle Dermochelys coriacea There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle Caretta caretta There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1110	Threatened

Flowering Plants

NAME	STATUS
Seabeach Amaranth Amaranthus pumilus No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8549	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

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NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
American Kestrel Falco sparverius paulus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Apr 1 to Aug 31
Prairie Warbler Dendroica discolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Prothonotary Warbler Protonotaria citrea This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

NOT FOR CONSULTATION

■ probability of presence ■ breeding season | survey effort – no data

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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

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Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Marine mammals

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take (to harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill) of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

1. The Endangered Species Act (ESA) of 1973.
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following marine mammals under the responsibility of the U.S. Fish and Wildlife Service are potentially affected by activities in this location:

NAME

West Indian Manatee Trichechus manatus
https://ecos.fws.gov/ecp/species/4469

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

Palustrine

RIVERINE

Riverine

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

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Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Appendix G

Educational Outreach and Encroachment Partnering

Enclosure 1	**Hazards/Safety: Black Bear**
Enclosure 2	**Hazards/Safety: Diseases**
Enclosure 3	**Cat Control**
Enclosure 4	**CNRMA Environmental Management System**
Enclosure 5	**NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSA Northwest Hunting, Fishing, and Archery Range**
Enclosure 6	**Venomous Snakes of Naval Facilities in Southeastern Virginia**
Enclosure 7	**Compliance: Wildlife**
Enclosure 8	**A Visitor's Guide to the Great Dismal Swamp Boardwalk Project**
Enclosure 9	**NSAHR NWA Nature/Education Trail Maps (North and South)**
Enclosure 10	**Zoonotic Disease: When Humans and Animals Intersect**
Enclosure 11	**Poisonous Plants**
Enclosure 12	**Hampton Roads Installation Invasive Plant Species Pamphlet**

Enclosure 1. Hazards/Safety: Black Bear

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Hazards/Safety: Black Bear

- Avoid Contact
- Don't get between an adult and their cub (see a cub look for an adult)
- Don't turn your back on the animal
- Don't run, back away slowly
- Make yourself look big (open wide arms)
- Speak in a loud, authoritative voice (not a scared voice)
- If attacked, fight back (most black bear will back down to resistance)

Photo credit: Dave Telesco. BBCC.

Photo credit: Cynthia L. Cunningham, USGS.

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Enclosure 2. Hazards/Safety: Diseases

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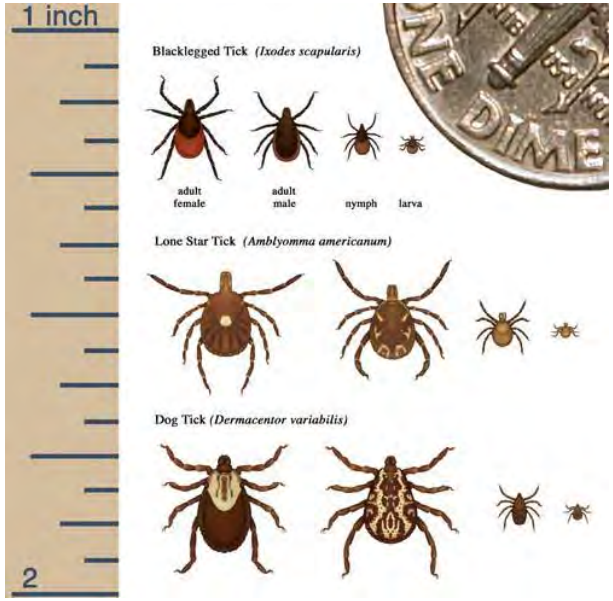
Hazards/Safety: Diseases

- Lyme's Disease
- West Nile Virus
- Equine Encephalitis
- Rabies
- Distemper



Protect yourself from mosquito-born illnesses: When working or playing outdoors, utilize Mosquito repellents; Cover as much of your body as possible with clothing; Reduce the amount of standing water that may be supporting breeding populations of mosquitoes.

Protect yourself from tick-born illnesses: When working or playing outdoors, utilize Tick repellents (spray all clothing, including hats); Cover as much of your body as possible with clothing; Tuck your pant legs into your boots and Tuck your shirt into your pants; Utilize duct tape around your pant bottoms and boots, your waist line, and your shirt sleeve arm openings (to seal potential openings for ticks to get to our skin); Wear a hat and tuck your hair into the hat.

Protect yourself from Rabies and other diseases by avoiding contact with wildlife. Admire from afar, do not try to pick up, touch, or come in contact with any animals (wild or domesticated).

Enclosure 3. Cat Control

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Military bases often struggle with how to manage domestic cat populations. Frequent transfers of personnel often means cats are left behind, abandoned to fend for themselves. Lucky cats find a new human, but most are not so fortunate. Abandoned cats face many dangers: being hit by cars, starving, freezing temperatures, disease, and more. If not spayed or neutered, cat populations can explode.

Free-roaming cats kill native wildlife, including many rare and endangered species, and can also threaten the health and safety of military personnel and their children. Base commanders must deal with how to humanely and cost-effectively resolve the issue of too many free-roaming cats. ***As a cat owner, you are an important part of the solution.***

Photo: Dr. Gil Ewing

Cat killing a Yellow-rumped Warbler at a bird bath.

The Skinny on Cats

Domesticated in Egypt over 4,000 years ago, house cats are descendants of the European and African wild cat. Now considered a separate species, *Felis catus* was introduced all over the rest of the world by European explorers and settlers. Recent estimates place the U.S. pet cat population at 90 million. No one knows how many stray or feral cats are out there—best estimates range from 60 to 100 million.

- ***Stray* cats are lost or abandoned by their owners.**
- **Truly *feral* cats live entirely on their own without any human assistance.**
- **A female cat can have two to three litters per year, with four to eight kittens per litter.**

Photo: Microsoft

Cats kill small animals such as chipmunks.

Keeping Cats Indoors Is Good For People

Stray cats often congregate around a food source such as garbage dumps and mess halls, or where people leave food out for them. They can be a nuisance around base housing, where people may feed birds, tend flower gardens, or have children's sand boxes.

Outdoor cats are exposed to many diseases and parasites, some of which can be transmitted to people:

Rabies, a deadly virus, can infect cats, wildlife, and humans. Outdoor cats are more likely to contract rabies than any other domestic animal.

Cat-scratch Disease: is transmitted from cat to cat by fleas, and from cat to human by a scratch or bite. While cats show no symptoms of the disease, it can cause severe illness in people.

Toxoplasmosis is caused by a tiny parasite found in the intestines of cats and in the tissues of many animals. People can contract this disease by not washing their hands after coming into contact with cat litter or soil contaminated with cat feces. If contracted by a pregnant woman, abortion of the fetus or blindness or retardation in the newborn can result.

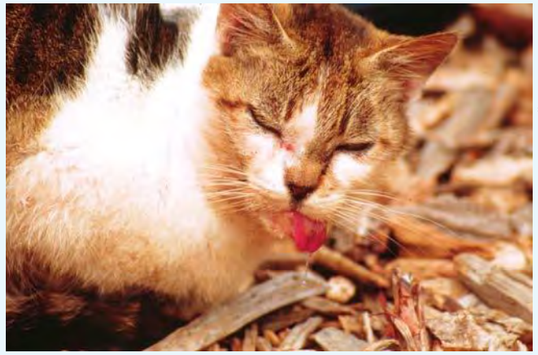

Photo: Alan Hopkins

Cats are not wildlife and struggle to survive outdoors.

Cats can also transmit fleas, roundworm, and hookworm to humans. In the southwest, cases of the most lethal form of plague in humans have been linked to outdoor cats.

Keeping Cats Indoors Is Good For Cats

Many people don't realize the daily hazards that outdoor cats face. The average life expectancy of a free-roaming cat is less than five years, while indoor cats commonly live to 12 - 20 years. Cats who roam are in constant danger from:

Cars: Millions of cats are run over by cars annually. In colder climates, cats may crawl into car engines to get warm and are killed or maimed when the car is started.

Disease: In addition to rabies, outdoor cats risk exposure to fatal diseases such as feline leukemia and feline immunodeficiency virus (FIV). While vaccines are available for some diseases, they are not 100 percent effective. A vaccine for FIV is not available.

Injuries: Abscesses, broken limbs, disease, torn ears, scratched eyes, internal injuries, parasites, and death can result from encounters with dogs, other cats, coyotes, raccoons, foxes, hawks, and owls.

Overpopulation: Cats who have not been spayed or neutered are the greatest cause of cat overpopulation. As a result, millions of cats must be euthanized each year because there are not enough homes for them.

Poisons and Traps: Pesticides, rodenticides, and antifreeze poison and kill thousands of outdoor cats yearly. Cats may be caught in traps set for furbearing animals.

Parasites: Outdoor cats suffer from debilitating parasites such as ear mites, fleas, ticks, and worms.

Human Cruelty: Unfortunately, it is not uncommon for animal shelters and veterinarians to have to treat cats who have been shot, stabbed, or set on fire.

Inclement Weather: Outside cats suffer from extreme weather conditions and natural disasters, such as hurricanes, floods, fires, and tornadoes.

Keeping Cats Indoors Is Good For Birds

Isn't it natural for cats to kill birds?
No! Cats are not native to North America or many other parts of the world. Our wildlife did not evolve with this abundant and efficient predator, and thus have few defenses against them. Millions of animals may be killed each year by outdoor, pet cats in the U.S. Stray and feral cats add to the toll.

The Truth About Cats and Wildlife

- **Even well-fed cats kill wildlife.** This is because cats are born predators and the urges to hunt and eat are controlled by different parts of their brain.
- Belled cats kill wildlife. Cats quickly learn to silently stalk their prey. Wild animals don't necessarily know a ringing bell means danger.

Photo: Michael Stubblefield

Cats kill rare species such as this Piping Plover chick.

- Once caught by a cat, few small animals survive the ordeal. Even if the animal escapes, infection from a cat's teeth or claws, or internal injury usually result in death.

Tips for Happy Indoor Cats

Kittens who are kept indoors from the start usually show no desire to go outside as adults. With patience and time, most outdoor cats can become happy indoor pets. The following tips will help:

Photo: Dr. Jeff Price

An indoor cat is a safe and happy cat.

- Play with your cat for at least 15 minutes each day.
- Paper bags and cardboard boxes provide places to play when they are alone.
- Provide window shelves and bird feeders to keep your indoor cat entertained.
- Give your cat a nutritious diet, including constant access to clean water.
- If your cat must go outside, train him to wear a harness and leash or provide a safe outside enclosure such as a screened porch or cat run.
- Plant kitty grass in indoor pots so your cat can safely graze.
- Keep the litter box clean.

Indoor Cats Can Slip Out, So Remember To:

- Spay or neuter your kitten as early as eight weeks old, *before* it can breed. Your cat will be healthier and won't contribute to the overpopulation problem.
- Attach an ID tag to your pet's collar or get a microchip implanted containing your contact information.
- Provide routine veterinary care, including an annual check up and vaccinations.

Cat ownership is a responsibility, so please do your part.

For the Sake of Cats, Wildlife and People:

- *Never* abandon cats. If you are transferred and can't take your cat with you, find a good home or contact a veterinarian or local humane society for help.
- Do not feed stray cats—this only increases the cat overpopulation problem. Take them to a local shelter or call your base animal control officer for help.

For more information: contact your base veterinarian, local humane society, or **www.denix.osd.mil/DoDPIF.**

Produced by DoD Legacy Program
Prepared by American Bird Conservancy

Don't Let Your Cat Go AWOL!

Indoor Cats Are Safe Cats

Enclosure 4. CNRMA Environmental Management System

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CNRMA
Environmental Policy Statement

CNRMA's Environmental Policy Statement is the foundation of the EMS and reflects CNRMA's commitment to integrate mission accomplishment with environmental stewardship.

CNRMA's policy is communicated through the acronym, **"CARE"**, which summarizes the key concepts:

- **C – Comply with all rules**
- **A – Always improve**
- **R – Reduce waste**
- **E – Eliminate pollution**

Visit our website to see entire policy

CNRMA EMS facilities include:

- NAVSTA Norfolk
- NSA Norfolk
- NAS Oceana
- NAVPHIBASE Little Creek
- WPNSTA Yorktown
- NAVSUBASE New London
- NAVSTA Newport
- NAS Brunswick
- NAES Lakehurst
- NWS Earle
- NCTAMS LANT DET Cutler
- NAS JRB Willow Grove
- NSA Mechanicsburg
- NSA Philadelphia
- Philadelphia Naval Business Center
- NSGA Sugar Grove

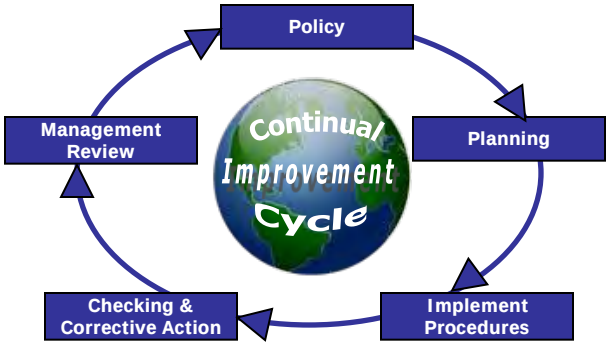
To learn more about CNRMA's EMS, please visit our Website: www.cnrma.navy.mil/environmental/Environmental_management_system.htm

Commander Navy Region Mid-Atlantic (CNRMA)

E nvironmental
M anagement
S ystem

www.cnrma.navy.mil/environmental/environmental_management_system.htm

CNRMA
Environmental Management System (EMS)



The EMS Cycle of Continuous Improvement

What is EMS?

EMS is a set of management processes and procedures that allows an organization to:

- analyze, control and reduce it's impact on the environment
- operate with greater efficiency and control

The EMS management tool is used to plan, implement, review, and improve the actions CNRMA takes to meet environmental goals. The CNRMA EMS must be:

- Mission focused
- Integrated into existing business processes
- Flexible in order to optimize mission performance while minimizing negative environmental impacts

The EMS is based on the International Organization for Standardization (ISO) 14001 Standard

CNRMA's EMS Goals include:

Reduce energy and water use

Increase purchase of alternative fuel vehicles, hybrid, and plug-in hybrid vehicles

Reduce greenhouse gas emissions

Reduce use of petroleum in fleet vehicles

Increase use of alternative fuels and renewable energy

Integrate green building concepts in major renovations and new construction

Expand purchase of green products and services; increase recycling

Procure, use, and dispose of electronic equipment in an environmentally-sound manner

Reduce purchase and use of toxic and hazardous materials

What is your role?

All personnel working for or on behalf of CNRMA have roles and responsibilities regarding CNRMA's EMS. Following are some examples:

- Know CNRMA's environmental policy, or the "CARE" acronym
- Know and comply with the environmental procedures that apply to your job
- Know how your job could impact the environment (i.e. potential spills, emission of air pollutants, material and energy use
- Know what your installation's significant environmental aspects are
- Incorporate concepts of conservation and pollution prevention in your day-to-day activities
- Know what to do in the event of a spill or environmental emergency:
  - * Contain the spill if safe to do so
  - * Notify your supervisor
  - * Call Emergency Communications Center

Think about activities you do everyday that may impact the environment:

- Do you recycle?
- Do you buy "green" office supplies?
- Do you print double-sided copies?
- Do you conserve energy and water?
- Do you comply with all environmental laws applicable to your job?

Enclosure 5. NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSA Northwest Hunting, Fishing, and Archery Range

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Fishing: Questions & Answers

Q: What permits are needed to fish and where can they be purchased?

A: Authorized patrons and guests between the ages 16 and 65 must obtain as appropriate, Virginia (state or county) freshwater fishing licenses and Base fishing permits. Virginia Saltwater fishing licenses are required for anyone attempting saltwater fishing except when fishing from MWR piers that maintain pier licenses. Dependents and guests under the age of 12 must be directly supervised by an adult, 18 years of age or older, who holds a valid fishing licenses and station permits. Permits are sold at the NAS Oceana and NASO Dam Neck Annex MWR ITT offices and they are currently valid, in authorized locations only, at: NAS Oceana, NASO Dam Neck Annex, NSA Northwest Annex, JEB Little Creek, and JEBLC Fort Story. Permits are currently $8.00 for a full calendar year, but the cost is subject to change.

Q: When can I Fish?

A. Fishing is only authorized during state sanctioned seasons. Fishing is from sunrise to sunset (dawn to dusk), unless otherwise stipulated in the Base Fishing Instruction.

Q: With what can I Fish?

A. Fishing shall be conducted only by angling with a hook and line or rod and reel, held in hand. No more than two treble hooks are permitted on any fishing lure. In catch-and-release waters, barbed hooks are discouraged and treble hooks are prohibited. A hand-held landing net may also be used to remove legally hooked fish. No live bait fish are authorized.

Q: Where can I get more specific information regarding fishing on base?

A. Visit the Natural Resources Website and view the CNRMA Fishing Instruction. The general content of the instruction is still good, but there have been updates to fishing area locations, and ticket purchasing locations. Contact the NRC for the most current information.

Q: Can I use a boat?

A. Only at those locations authorized in the Fishing instruction. The boat and trailer should be cleaned, thoroughly flushing water through the motor's cooling system, live wells, and other areas that hold water and drying the boat and equipment for five days in a sunny location before transferring it to a new body of water.

Additional Information

WARNINGs:
No off-road or 4-wheel driving is authorized.

Be aware there are venomous snakes and poisonous plants on the premises.

It is unlawful and strictly PROHIBITED to harm, disturb, or collect plants and animals.

The release of fish of or other aquatic wildlife not caught on the premises is PROHIBITED.

The release of any animals or the planting of any plants without the written approval of the Base's Natural Resources Manager is PROHIBITED.

It is recommended that individuals recreating on site use insect repellent.

It is required to provide, when requested, appropriate identification, permits and passes to Base Security and Conservation Law Enforcement Officers.

Please enjoy yourself while recreating on base and help us maintain it by packing out your trash and placing your litter in appropriate receptacles.

Public Access

Hunting, Fishing & Archery range utilization is open to anyone with Base Access privileges. Members of the General Public that would like to recreate on base must have a qualified sponsor. Sponsors can be active or retired military or government civilians with current base access identification. Contact the Natural Resource Center (NRC) at 757-433-2151 or stop by the NRC, Building 78, to ensure you have all appropriate access documentation.

You may also visit the Natural Resources Website at:
http://www.cnic.navy.mil/Oceana/About/Departments/NaturalResources/index.htm

In case of an emergency call 911 or 757-433-9111.

Hunting, Fishing & Archery Range

NAS Oceana,
NASO Dam Neck Annex,
NALF Fentress &
NSA Northwest Annex

Hunting: Questions & Answers

Q: What do I need to do to hunt on the local bases?

A: (1) You must be Active Duty, dependent or retired. DoD Civilians are allowed and Non-DoD affiliated civilians are allowed with a qualified sponsor.

(2) You need a Hunter Safety Course Certificate valid in the state of Virginia.

(3) You need to attend the annual Basic Hunter Indoctrination (Indoc.) conducted by Navy Natural Resources Staff.

Note: The above will allow you to deer hunt with shotgun, buckshot only, at NASO Dam Neck Annex, NALF Fentress, and NSA Northwest Annex. The fee for the annual license as of 2010 is $20.00 (subject to change). This license is in addition to the required Virginia State Hunting Licenses.

(4) To hunt via Shotgun with Slugs, Muzzleloader, or Archery:

Shotgun Slugs?

You must qualify with your shotgun by shooting 3 out of 3 slugs within a 9" circle @ 50 yards. You will be allowed to shoot from a seated rest.
Note: Slugs are only allowed for use at NSA Northwest Annex.

Muzzleloader?

You must qualify with your muzzleloader by shooting 3 out of 3 slugs within a 9" circle @ 50 yards. You will be allowed to shoot from a seated rest. Flintock, Percussion Cap and In-Lines are allowed on NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSA Northwest Annex only in designated hunting areas.

Archery?

You must have graduated from the International Bowhunter Education Program (IBEP) which is taught at the Natural Resources Center (NRC) Building #78 on NAS Oceana. Schedules will be posted by July 1st each year. You must qualify by shooting two arrows from an elevated platform into the kill zone of each of three 3D deer targets placed at varying ranges. The ranges will vary from directly beneath the platform out to 30 yards maximum. Your archery tackle will be inspected prior to any qualification attempt and can be grounds for rejection if determined to be unsafe. The qualification will be with Broadheads attached unless you will be hunting with Mechanical Broadheads; you will be allowed to shoot field points in this instance.

Q: Where do I purchase a permit?

A: You must have both the appropriate State Hunting Permit(s) and a Base Hunting Permit. Contact the appropriate state Wildlife Agency for information on purchasing their permits. Base Hunting Permit can be purchased from the NAS Oceana or NASO Dam Neck Annex MWR ITT ticket offices.

Q: Where and when are qualifications?

A: A schedule of qualifications will be posted at the NRC/NAS Oceana Bldg. 78, made available at the Basic Indoctrination Classes, and will be posted on the Natural Resources Program Website. Muzzleloader and shotgun qualifications will be conducted at the NASO Dam Neck Annex rifle range. Bow qualifications will be conducted at the NRC/Bldg. #78. All qualifications must be observed by designated NRC representatives on scheduled days to be valid.

Q: Where can I hunt on base?

A: The NAS Oceana Natural Resources Center controls and manages all hunting aboard NAS Oceana, NASO Dam Neck Annex, NALF Fentress, and NSA Norfolk Northwest Annex. Areas are designated at each base for Archery, Shotgun, and Muzzleloader as applicable. NAS Oceana allows Archery and Muzzleloader ONLY. NASO Dam Neck Annex and NALF Fentress allow Archery, Shotgun (Buckshot Only) and Muzzleloader. NSA Northwest Annex allows Archery, Shotgun (Buckshot and Slugs) and Muzzleloader. Maps of the exact hunting area are located on the Natural Resources website or can be obtained at the Natural Resources Center, Oceana building 78.

Q: Can I hunt anything else besides deer?

A: Yes. Small game hunting is authorized. Contact the NRC for more details.

Q: When can I deer hunt?

A: Within the State Hunting season dates, generally from Oct 1st through the 1st Saturday in January. NAS Oceana has an extended hunting season through the end of February. Operational Security and Threat Conditions will dictate closures but normally NAS Oceana, NASO Dam Neck Annex and NALF Fentress are open 6 days a week, closed only on Sundays. NSA Northwest is only open on Tuesdays, Thursdays, and Saturdays.

Q: Can I deer hunt from the ground?

A: Ground hunting or stalking is only allowed by Archers (except crossbow archers). No ground hunting is allowed on any base by Shotgun, Muzzleloader or Crossbow hunters.

Q: Do I need a tree stand?

A: Tree stands are required of all Shotgun, Muzzleloader and Crossbow hunters. These stands must be elevated at a shooting height of 15 feet. Climbers and clip-ons are allowed with minimal tree limb removal permitted. NAS Oceana, NASO Dam Neck Annex, and NALF Fentress have no permanent tree stands available. Any permanent tree stands found on these bases are not maintained and are unauthorized for use. NSA Northwest Annex has permanent tree stands available for use. Much work has gone into the stands at NSA Northwest Annex but they are still only available for use at your own risk and judgment. You can use your own tree stand at these locations but you must use it in the vicinity of the stand you have checked out.

Q: Where do I find the Base's Annual Hunting Rules & Regulations?

A: On the Oceana Natural Resources website. For questions regarding the R&Rs visit the Natural Resources Center, Oceana building 78, or call the NRC at 757-433-2151.

Archery Range: Questions & Answers

Q: Where is the Archery Range?

A: The range is located off of Oceana Blvd., across from the Oceana Stables, at/adjacent to the Natural Resources Center, NASO building 78.

Q: What do I need to do to use the archery range on NAS Oceana?

A. Obtain a permit from the Oceana MWR ITT ticket office and visit the NRC to fill out the appropriate paperwork and obtain required signatures and stamps. Contact the NRC if you have additional questions.

Q: Can I use the range if I purchased a base hunting permit?

A: Yes, the hunting permit and the archery range permit are all on 1 single permit. If you qualify to be a hunter you can use the archery range for the permitted calendar year. If you do not qualify to be a hunter or you do not want to hunt but just use the archery range you may get your permit stamped for archery range use only. You are not authorized to use this range until you have obtained the range or appropriate hunting stamps, signatures and card lamination. (To get your permit stamped for archery range use only visit the NRC, Oceana Building 78.)

Enclosure 6. Venomous Snakes of Naval Facilities in Southeastern Virginia

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Characteristics of Venomous Snakes

- Vertical pupil (Figure 7)
- Pit organ: The pit organ is located on each side of the head between the eye and nostril (Figure 7) It detects heat from small mammals and other prey
- The scales under the tail form only a single row (Figure 8)
- The head is distinctly wider than the neck giving the snake a triangular shaped head

Non-venomous **Venomous**

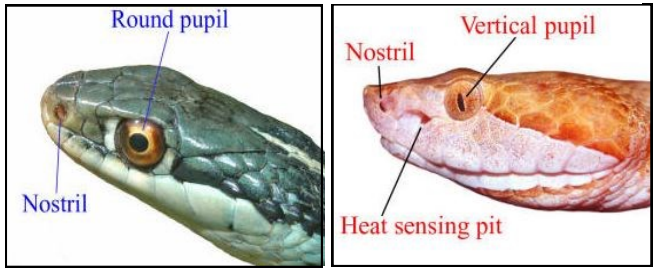

Figure 7. Facial characteristics of non-venomous and venomous snakes of southeastern Virginia.

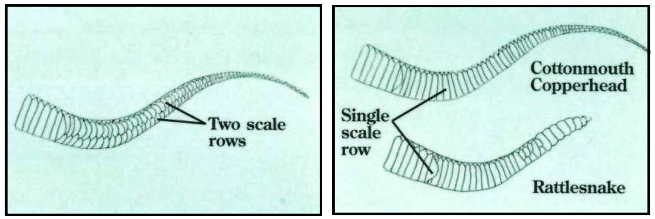

Figure 8. Undersides of tails of a non-venomous and venomous snakes of southeastern Virginia.

If You Encounter a Snake

Leave the snake alone and move away. Approximately half of all bites occur when individuals were attempting to capture, harass, or kill the snake.

Snake Safety Tips

- Snakes prey on small animals including mice, rats, lizards, and frogs. Removing habitat for these animals (eliminating brush piles, wood piles, sources of food, etc.) will help reduce unwelcome encounters with snakes.
- Be careful working around brush piles or other debris. Use a rake or long handled tool to move brush, debris, or other materials before picking it up.
- Wear snake chaps or tall leather boots when walking in thick vegetation.
- Seek medical attention immediately if you are bitten by any venomous or unknown snake. Do not attempt to draw out the venom. If possible, collect the snake or provide a description of the animal to medical staff.

Created by:

Chris Petersen
National Coordinator
Department of Defense
Partners in Amphibian and Reptile Conservation

Venomous Snakes of Southeastern Virginia

Timber Rattlesnake

Copperhead

Cottonmouth

Timber Rattlesnake
(*Crotalus horridus*)

Figure 1. Timber Rattlesnake

Figure 2. Rattle of Timber Rattlesnake. Shape of rattle and number of segments.

Description

- Black chevron-shaped markings on a dark yellow, gray or tan background color
- Orange or rust-brown stripe down the middle of the back
- Black tail with distinctive rattle
- Newborns look like adults, but rattle consists of only one segment

Size

Average length: 54 inches
Maximum length in Virginia: 67 inches

Remarks

This snake was listed as State Endangered in 1992, primarily due to habitat loss. These snakes are present at NALF Fentress and NSAHR Northwest Annex.

Copperhead
(*Agkistrodon contortrix*)

Figures 3 and 4. Copperhead

Description

- Chestnut to brown hourglass-shaped bands on a lighter brown to tan background color
- Hourglass markings on the sides may not always match up along the back
- Newborns and young have a bright yellow tail

Size

Average length: 45.3 inches
Maximum length in Virginia: 48 inches

Remarks

This secretive snake occupies forested habitats. It is present at JEB Little Creek-Fort Story (Fort Story only), NALF Fentress, NAS Oceana, NSAHR Northwest Annex, NWS Yorktown, and Cheatham Annex.

Cottonmouth
(*Agkistrodon piscivorus*)

Figures 5 and 6. Cottonmouth

Description

- Black, olive or brown bands on a lighter olive to gray background
- Some individuals may appear to be all black in color, especially when out of the water
- Newborns and young have a bright yellow tail

Size

Average length: 51.8 inches
Maximum length in Virginia: 61 inches

Remarks

Habitats used by this snake include: streams, lakes, rivers and ditches. It is present on JEB Little Creek-Fort Story (Fort Story only), NALF Fentress, NAS Oceana, and Dam Neck Annex.

Enclosure 7. Compliance: Wildlife

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Compliance: Wildlife

- Threatened & Endangered Species
- Marine Resources
- Migratory Birds
- Bald Eagles
- Code of Virginia
- Code of North Carolina

Bald Eagle, *delisted but still protected*

Small Whorled Pogonia

Loggerhead Sea-Turtle

Canebrake Rattlesnake

Endangered Species Act (ESA); Marine Mammal Protection Act (MMPA); Bald & Golden Eagle Protection Act; Code of Virginia; Migratory Bird Treaty Act (MBTA)...etc. (there are many laws which protect wildlife, several of which cross international/country borders)

Yes, even the dead remains of a protected species are protected and you are subject to federal or state penalties if found to be in violation of the law (possession without permit is a violation).

Assume all bird species are protected (since there are very few species that are not protected).

Enclosure 8. A Visitor's Guide to the Great Dismal Swamp Boardwalk Project

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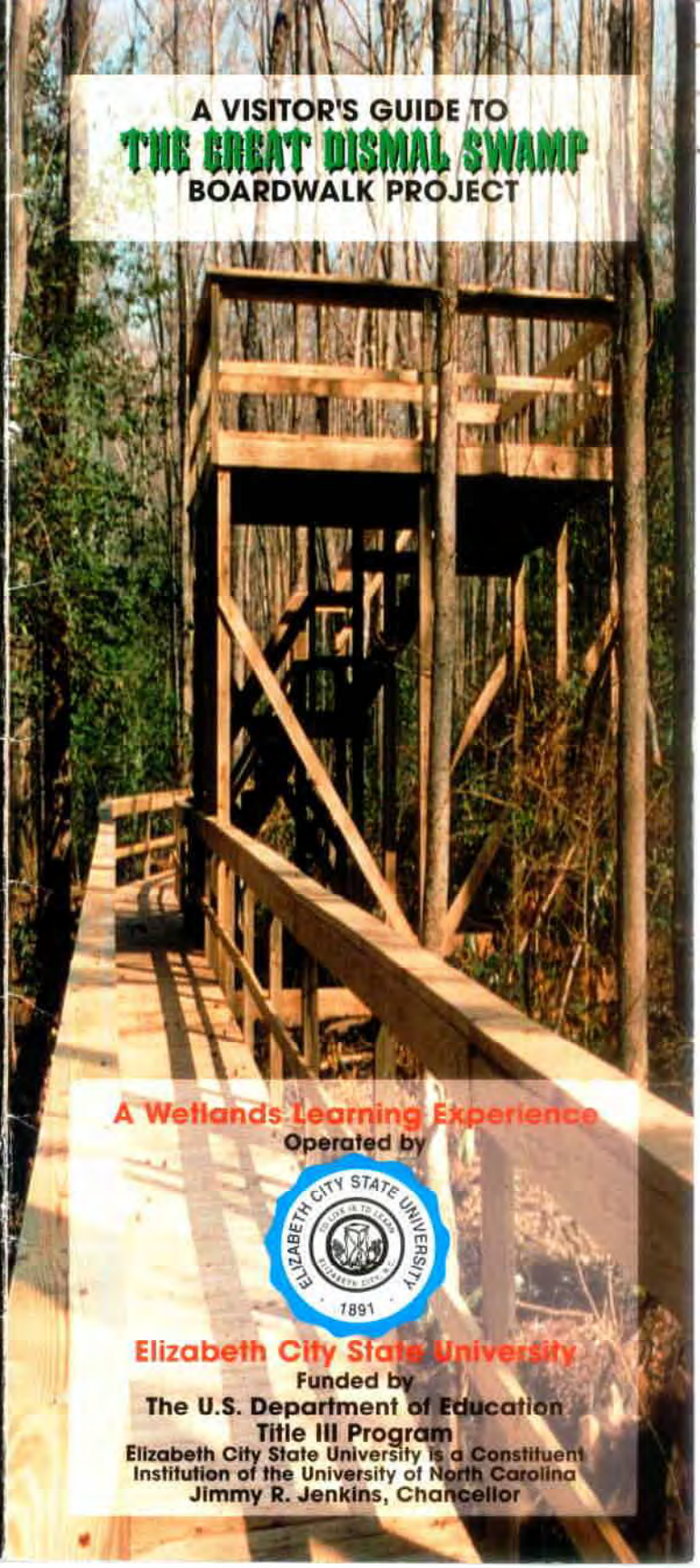
Visitors wishing access to the boardwalk should contact:

Dr. Maurice Powers
ECSU Box 858
Elizabeth City, NC 27909
(919) 335-3375 or
(919) 336-4577

Guided tours are available at no charge
Some photos courtesy of U.S. Fish and Wildlife Service

This brochure is an educational contribution from Elizabeth City State University

A VISITOR'S GUIDE TO THE GREAT DISMAL SWAMP BOARDWALK PROJECT



A Wetlands Learning Experience

Operated by

Elizabeth City State University

Funded by
The U.S. Department of Education
Title III Program

Elizabeth City State University is a Constituent Institution of the University of North Carolina
Jimmy R. Jenkins, Chancellor

A SELF-GUIDING BOARDWALK TOUR OF A WETLANDS ENVIRONMENT

Development and Purpose

The Dismal Swamp Boardwalk Project was completed and dedicated by Elizabeth City State University in the spring of 1994. The wetlands property, consisting of 639 acres, was acquired by the University from the Department of Health, Education and Welfare. The half-mile long boardwalk and observation tower were constructed with Title III funds, and its primary function is to provide access to a wetlands wilderness area for use in research and educational activities.

How Old is the Dismal Swamp?

Evidence from geology and fossil plants indicate that the Dismal Swamp began forming at the close of the Pleistocene Ice Age around 12,000 years ago. The last great ice advance of the Pleistocene was coming to an end, and the climate slowly began to warm. As the glacial ice melted, sea level which had dropped about 300-feet below present levels, was raised rapidly for the first several thousand years. As sea level rose, so did the water table and wetlands formed along flooded stream valleys, gradually extending inland to the present western margin of the swamp. Sea level reached its present elevation about 3,000 years ago, and by that time peat was developing throughout the entire wetlands area. Trees making up the forests gradually changed, as the climate warmed, from northern species, including jack pines and spruces, to the present day cypress-gum associations. The forest groups of today have been fairly stable for the past 3,500 years.

Post 166 Face the end of the boardwalk and look 45 degrees to your right, and a distance of about 75 feet for a large pine tree - Pond Pine or Swamp Pine (Pinus serotina)

Swamp pines grow to 80 feet with trunks 2 feet in diameter. This excellent example has tangled, crooked branches which are typical of the tree. It grows well in wetlands, even in peat-laden soils. It is not commercially valuable, but its seeds provide food for rodents and birds. Its cones are smaller and more globe-shaped than loblolly or pitch pines, and spines on the cones are tiny.

Post 121-122 Area to the right
Peat underlies this area to a depth of several feet. The rotting logs, twigs, leaves, and a variety of plants still add to the peat. For the past 6,000 years, peat has been forming over most of the Dismal Swamp. Peat is the first step in the development of coal. If about 10 feet of peat became deeply buried, compacted, and heated by geothermal heat in the earth, it would probably yield about 1 foot of coal.

Post 148.4 2FT.R - Tulip Tree. Yellow Polar. Tulip Poplar (Liriodendron tulipifera)
Although this tree is often referred to as a poplar, actually it has very little relation to poplars and it is a relative of magnolias. Tulip trees grow in good soil to as much as 150 feet plus, and many have trunk diameters of 5 feet or more. The leaves are large and have a unique notched tip. The wood of the long straight trunks is easily worked and finds many uses such as veneer for furniture, furniture frames, boats, toys, etc. Look for other larger examples of this tree as you move along the boardwalk.

Post 153.3 IFT.R - Carolina Jessamine, Yellow Jasmine (Gelsemium sempervinens)
The flowers of this beautiful yellow trumpet vine have a nice fragrance, but all parts of it are poisonous. It is even toxic to bees! Strychnine has been commerically extracted from these plants.

Post 164 2FT.R - Carpet Moss
There are several varieties of moss in the Dismal Swamp. The moss sometimes covers logs and old stumps, and helps in the decay process. Each log seen lying in the swamp in various stages of decay has its own mini-environment of plants and animals which benefit from the log in one way or another.

Post 165.2 0.5FT.L - Greenbriar
The common greenbriar is a tough climbing vine with sharp prickles. It sometimes grows in thick clusters which are very difficult to penetrate.

What are Wetlands?

Wetlands come in all sizes and shapes. They may be found in prairies, at high elevations in mountainous areas, in hill country, and especially in deltas and coastal lowlands. The area of immediate concern is a parcel of The Great Dismal Swamp, a coastal plain fresh water wetlands in northern Currituck County. It is difficult to define wetlands because there is so much variety. However, they are all generally low compared to the surrounding area. They are often waterlogged or covered by shallow water for all or part of a year, and they support plant and animal communities which have adapted to water budgets with marked seasonal variations.

Why are Wetlands so Important?

The extremely important coastal fishing and shellfishing economy of North Carolina demands clean healthy estuaries, and it is the bordering wetlands which determine the condition of estuarine waters. Wetlands perform as natural filters which clean the nutrients and sediments from waters that drain into the estuaries. They also provide for pollution retention, flood control, habitats for wildlife, ground water recharge, and aquatic life production.

Increased nutrient levels from agricultural runoff, construction of canals, and lumbering operations have combined to deteriorate the effective role that wetlands play in providing clean water runoff at controlled rates for the estuaries and primary nurseries along their fringes. Without these controls the nurseries will cease to function, and most of the animal life in the coastal waters of North Carolina will disappear: no wetlands, no seafood. According to information from the U.S. Fish and Wildlife Service and others, about 50 percent of the nation's swamps and marshes (wetlands) have been effectively destroyed just during the last 40 years.

Things to Look For.

The careful observer may see evidence of a variety of mammals that inhabit the swamp. White-tailed deer, black bear, grey squirrel, bats, otter, mink, raccoon, grey and red foxes, and bobcat have been observed and hunted or trapped in the swamp.

Wetland habitats provide the ideal environment for a diversity of amphibians and reptiles. Lizards, salamanders, frogs, toads, and turtles share the swamp habitat with 21 varieties of snakes. The poisonous snakes are the copperhead,canebrake rattler, and cottonmouth.

The ideal time for observing the greatest variety of birds in the swamp is during the spring migration--from April through June. More than 200 species of birds have been identified in the Dismal Swamp.

Wetlands may be second only to the great rain forests in life diversity and the impact they have on world ecosystems. Yet, they are indeed fragile and need our serious consideration if they are to survive.

DISMAL SWAMP BOARDWALK

Points of Interest

Alternating posts along the boardwalk are numbered. Numbers in the brochure correspond to numbers on the hand rail. All arrows are on the right hand rail, but point either to the right or left indicating the location of the tree or plant being identified. For example, the first entry would be 1.4 the distance between post number 1 and post number 2; 1 foot from the boardwalk toward the right. Enjoy your walk.

Post 1.4 1FT.R Poison Ivy growing on Sweet Gum tree.
You know the old saying, "Leaflets three, leave it be." Watch for this plant as you continue your walk. The blue sign is high because when it was lower a bear tore it off the tree and chewed on it.

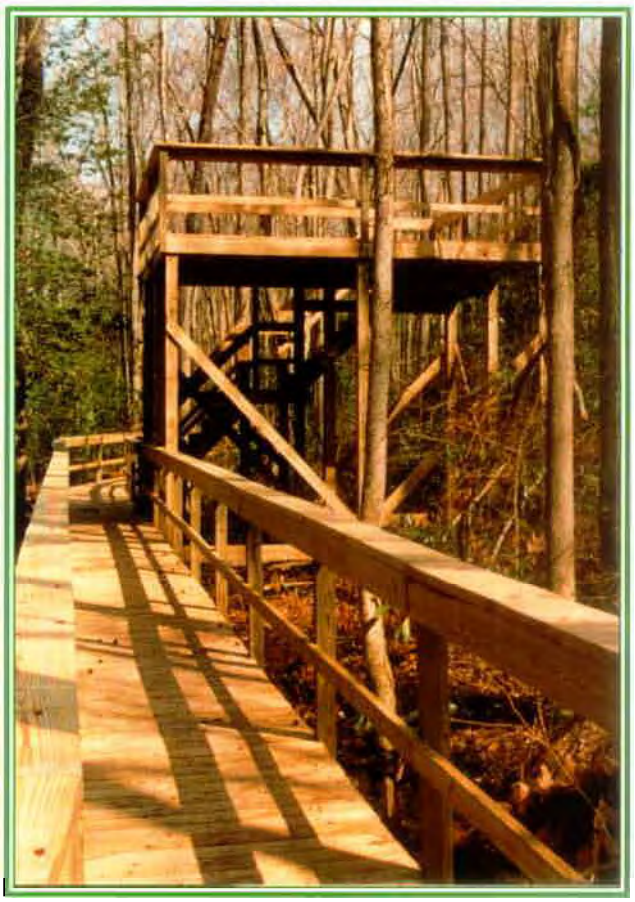
Post 2.4 20FT.R on Ditch Bank - Willow Oak (Quercus phellos)
The Willow Oak is not related at all to the willow tree. It is a large imposing oak which grows to 90 feet tall with a trunk diameter of almost 4 feet. It has willow-shaped leaves, hence its name. In winter, its large size and dark color may visually dominate the area around it. A large willow oak can produce two bushels of acorns in a season, and this provides excellent food for squirrels, deer, turkeys, quail, and other animals. Wood from this tree is heavy and hard. It is sold as "red oak" and used for stairs, furniture, and interior finishes. It is planted by many people as a shade or ornamental tree. Notice the scar on the tree where a huge limb broke off during a storm and crashed through the board walk. The fallen limb was almost immediately claimed for fire wood!

Post 50.0 6FT.R - Muscadine Grape
Several varieties of grapes grow wild, and they are sought after by man and many other animals. The vines may grow well up into tall trees, and they very well may outlive the tree.

Post 53.8 7FT.R
Woodpeckers may unknowingly damage trees in their relentless search for insects and worms. The large number of holes in this tree would suggest that the woodpeckers hit the jackpot.

Post 59 6FT.R - Shelf Mushroom (Polyporous sulphureus)
These mushrooms are a showy growth of fungus. The shelf mushroom changes color from yellow to nearly white as it matures.

Post 67 Tower
The tower offers the opportunity to selectively see the canopy trees, second story growth and shrubs and vines. A pair of binoculars makes it possible to seek out birds and other animals.



Post 42.0 6FT.L - Wild Blueberry
The wild blueberry is best known for its sweet juicy fruit, which is used in pies, puddings, ice cream, cereal, and muffins. Bears truly love blueberries and so do a variety of other mammals and birds. In early spring the flowers are beautiful dainty little creamy white bells that hang downward in clusters from the bush.

Post 42.7 0.5FT.L - Sweet Bay (Magnolia virginiana)
This lowland medium size tree is wellknown for its sweet smelling creamy white flowers, as well as for its aromatic leaves which are used in cooking soups, stews, and roasts. The wood is pale brown and used for making furniture and other wood products. It grows well in sandy acid soils and in wetlands. The tree produces bright red seeds which are eaten by a variety of animals.

Post 43.5 7FT.R - Burl on Water Oak
The large burl on this tree is actually a tumor, referred to as a gall tumor. It is the result of bacterial infection which initiates rapid cellular growth.

Post 47.3 1.5FT.R-Atlantic White Cedar (Chamaicyparis thyoides)
The lumber from this tree is soft, durable, and very light. It is so valuable that the tree has been cut to the danger point. It is used in construction, boat building, and as shingles. The wood is aromatic and also has good resonance. Hence it was used to make organ pipes. Extracts and tinctures from the tree are used in medicines. It may grow to 80 feet and has a diameter of 2 feet. It is a good wetlands indicator.

Post 8.5 3FT.R - Loblolly Pine (Pinus taeda)
This imposing pine grows to 140 feet tall and may have a trunk over 3 feet in diameter. It thrives well from sea level to over 2,000 feet, and it is common in all of the mid-atlantic and southern coastal states. The loblolly grows and develops a long trunk with a high crown. This feature makes the tree valuable for lumber and pulp. Tree ring counting on fallen pines in this area indicates that the large pines are in excess of 80 years old. The loblolly is very important to wildlife. The seeds are consumed by a variety of mammals and birds. Squirrels eat the green fruit as well as the matured seeds.

Post 11.0 3FT.L - Bamboo Reeds and Bald Cypress Knees
Reeds grow well in drained low areas, and the leaves are good browsing for deer. The cypress knees are said to provide oxygen for the tree roots: this feature enables the cypress to grow in stagnated water. The reeds and knees are good indicators of a wetlands environment.

Post 11.8 at the rail on right-Bald Cypress (Taxodiumdistichum)
The bark of this tree is smooth but fibrous, and it has small rounded cones about one inch in diameter. Cypress may grow up to 120 feet tall and the trunk diameter may exceed 3 feet. It is a majestic tree and claims kinship to the Redwood. The wood is soft, straight grained, light weight, and very durable. Lumber is used for many kinds of construction work including houses, fences, shingles, and railroad ties. The tree drops its needles during winter, and it is unusual for its vertical root growths known as Cypress Knees.

Post 12.8 5FT.L - Water Oak (Quercus nigra)
The water oak is commonly found in low ares where it is associated with sweet gum, loblolly pine, and swamp chestnut. The tree takes 20 years to mature to the flowering stage. It produces large crops of acorns every year or two. The acorns are eaten by deer, ducks, raccoons, squirrels, quail, and other birds. The water oak's wood is fairly hard, close grained and a brownish color. It is sold as a rather inferior grade of "red oak" lumber. The tree may reach 80 feet tall and develop a trunk 3 feet in diameter.

Post 14.6 2FT.L - American Holley (Ilex opaca)
This beautiful holly is commonly found in low moist bottomlands where it may attain a height of nearly 50 feet and trunk diameter of 2 feet. Its evergreen spiny leaves and red berries are popular at Christmas. Many song birds and game birds eat the berries. The wood is white, hard, and tough, but seldom used except for small carvings and utensils.

Post 19.2 1FT.L - Black Gum, Gum Tumpelo, Sour Gum (Nyssa sylvatica)
The black gum has pretty red leaves in the fall. It grows to 60 feet and may have a diameter of 2 feet. Berry-like fruits develop about 3/4" long, and these are relished by the black bear and a large variety of birds. Wood from the black gum is used in the manufacture of furniture, boxes, veneer, and paper pulp. The tree may grow in standing water and develop characteristic swollen bases.

Post 30.2 2FT.L - Sweet Gum (Liquidambar styraciflus)
The star-shaped leaves on this tree have a pleasing spicy odor when crushed. The sweet gum is a stately tree which may reach 140 feet in height and the wood polishes well. It is considered a very important hardwood lumber tree in the south, where it is used for interior finishes, furniture, toys, boxes, and even firewood. Leaves change in the fall to a variety of colors with red dominating. In the spring, flowers appear with spherical heads. The fruits dry to hard prickly balls which may be spray painted and used as Christmas tree ornaments. Some people even use the sap from the tree as chewing gum.

Post 39 2FT.L - PawPaw (Asimina triloba)
The pawpaw is a small tree with large pretty yellow leaves in the fall. In the spring it has purple flowers which mature to edible fruit in late summer. Bears, raccoons, squirrels, wild turkeys, and other animals, including man, eat the fruit. The pulp of the fruit has been used to make yellow dye. This understory tree does best in low wet soils, where it may often form thickets.

Post 39.5 8FT.L - Red Maple (Acer rubrum)
Maple trees are well known for their beautiful fall colors, and the graceful red maple is no exception. It is a hardy tree that will grow just about anywhere. It has a tendency to "take over" after logging operations or destructive fires, and along with sweet gum it is the most common second growth tree along roadways and ditches. The tree trunk grows to as much as 100 feet with a trunk that may reach 5 feet in diameter. It has light brown, fairly hard wood, that is used in furniture, cabinets, flooring, and as a veneer. The fruit which spirals from the trees is relished by rodents.

Enclosure 9. NSAHR NWA Nature/Education Trail Maps (North and South)

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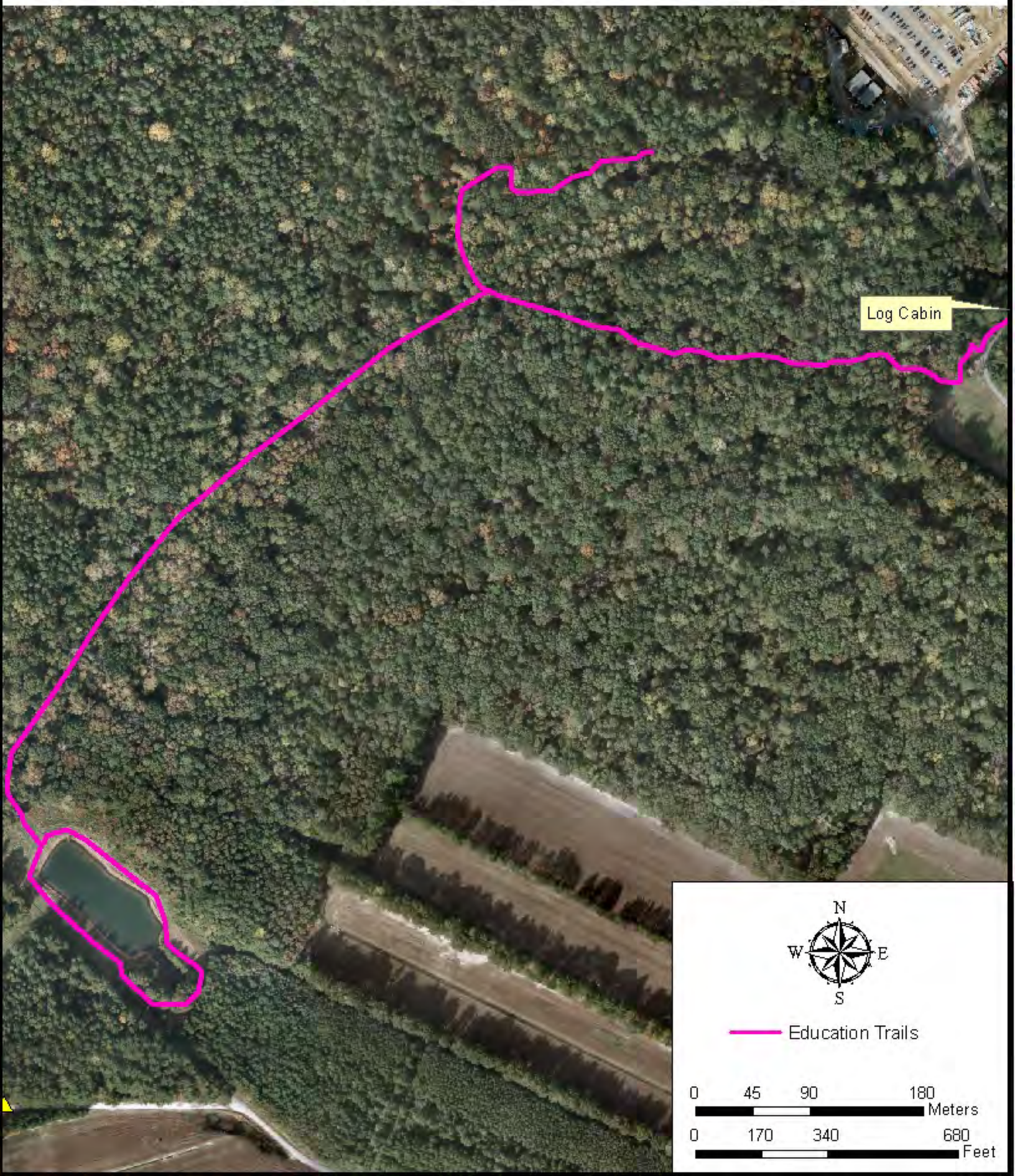
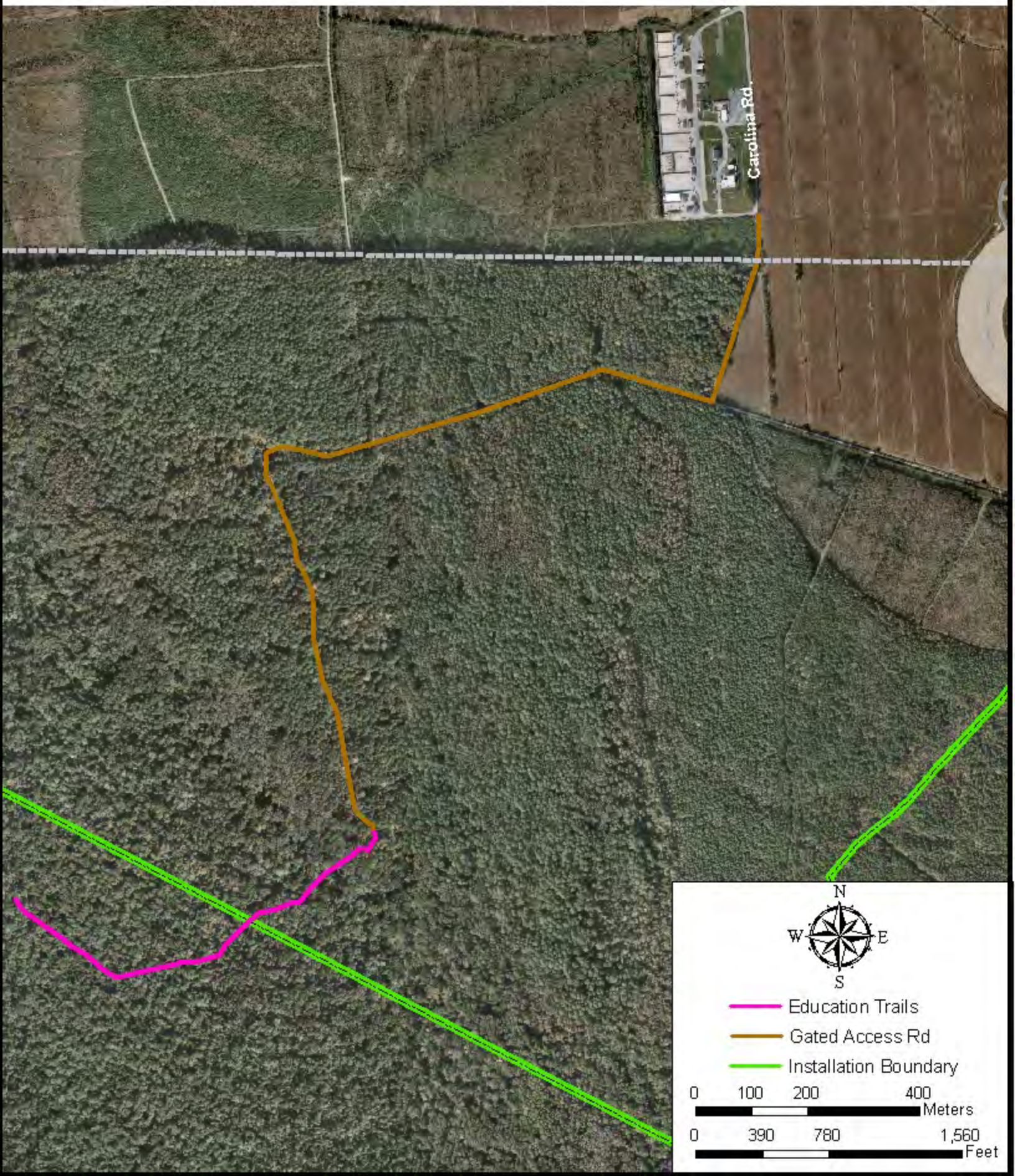
Naval Support Activity Hampton Roads Northwest Annex

NWA North-Nature/Education Trail Map



Naval Support Activity Hampton Roads Northwest Annex

NWA South-Nature/Education Trail Map



Enclosure 10. Zoonotic Disease: When Humans and Animals Intersect

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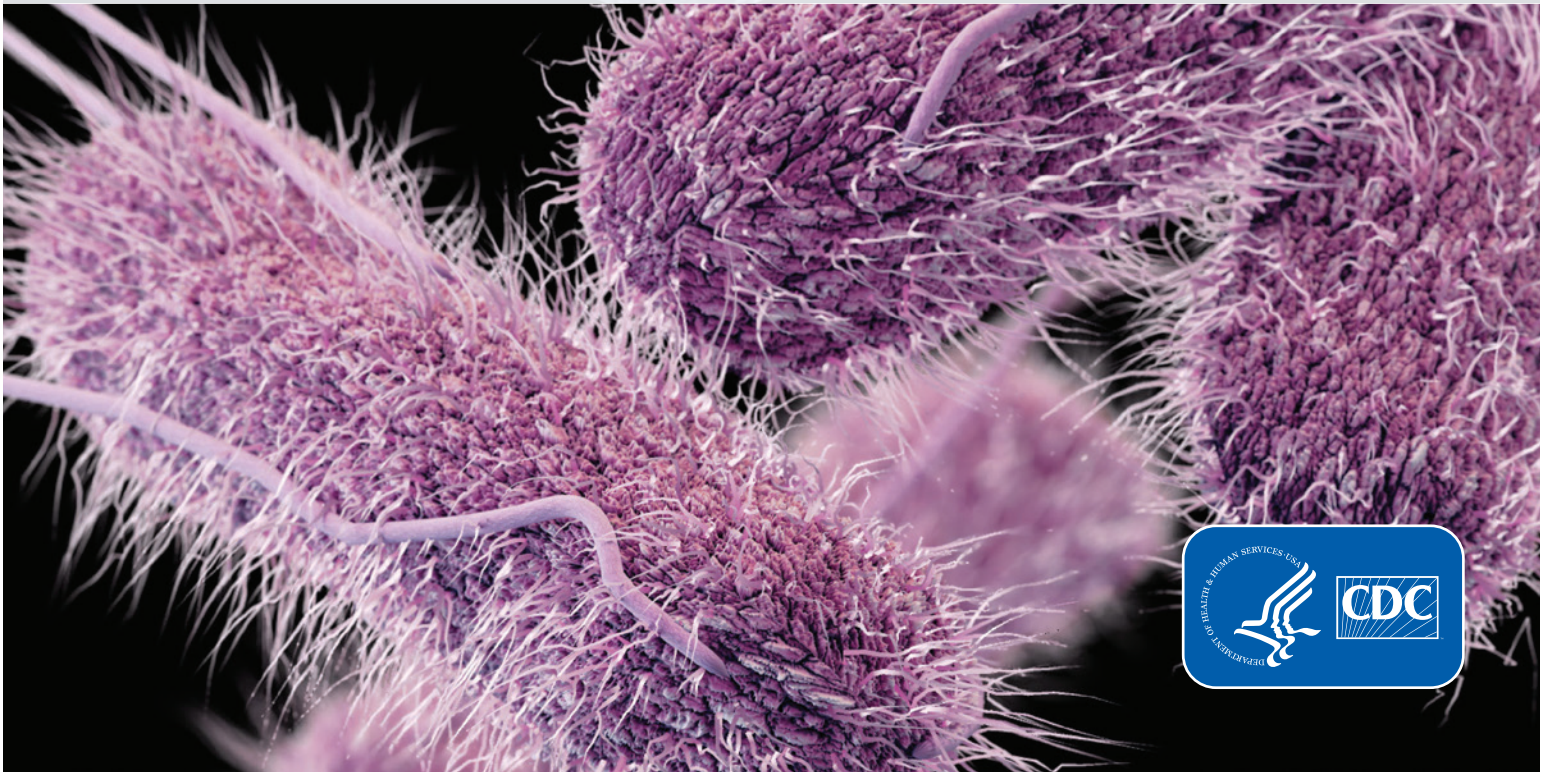
Accessible version: www.cdc.gov/ncezid/what-we-do/our-topics.html

EMERGING AND ZOONOTIC INFECTIOUS DISEASES



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WHAT WE DO

If CDC is in the headlines, chances are good that it's a story we're involved in. That's because the work of the **National Center for Emerging and Zoonotic Infectious Diseases** **(NCEZID)** is about protecting America's health, safety, and security. We do this by keeping people safe from hundreds of infections ranging from A to Z–anthrax to sepsis, *Salmonella* food poisoning to Zika.

NCEZID is ground zero when there's an outbreak of infectious disease. We have world-class scientists, researchers, laboratories, and emergency responders to protect people from

- Foodborne, waterborne, and fungal infections
- Deadly diseases like Ebola
- Bioterror threats like anthrax
- Infections like rabies, Lyme disease, and Zika that spread between people, animals, and bugs
- Illnesses spread in healthcare settings and drug-resistant threats
- Illnesses that cross borders and affect travelers and people entering the country

Infectious diseases can pose a major threat to our national security.

NCEZID was at the forefront of CDC's battle to contain the spread of Ebola virus in Africa in 2014.

ABOUT OUR NAME:

National Center for **Emerging and Zoonotic Infectious Diseases**

Emerging diseases are infections that have increased recently or are threatening to increase in the near future. These infections could be

- newly discovered (like the sometimes-deadly Bourbon virus that was identified in 2014 in Bourbon County, Kansas).
- completely new to an area (like Zika virus in the Western Hemisphere).
- reappearing in an area (like dengue in south Florida, Texas, and Hawaii).
- caused by bacteria that have become resistant to antibiotics, like the so-called "nightmare bacteria" CRE (carbapenem-resistant Enterobacteriaceae).

Zoonotic means infectious diseases spread between animals, insects, ticks, and people. Examples include

- Lyme disease (spread by ticks)
- *Salmonella* infections (spread by poultry and other animals)
- rabies (spread by mammals)

Infectious diseases are illnesses caused by germs (such as bacteria, viruses, and fungi) that enter the body, multiply, and cause an infection.

- Some infectious diseases are contagious, that is, spread from one person to another.
- Other infectious diseases can be spread by germs carried in air, water, food, or soil. They can also be spread by insects, ticks, or animals.

75% of new or emerging infectious diseases in people are spread from animals.

FRONT COVER
Top: Ebola (virus)
Bottom: *Salmonella* (bacteria)

In 2016, almost 900 people got *Salmonella* infection from keeping chickens and ducks in backyard flocks. Children have an even greater chance of getting sick from handling live poultry.

RESPONDING TO OUTBREAKS

Perhaps what NCEZID is best known for is responding to outbreaks of infectious disease. Here are a few large-scale responses that NCEZID has led since 2010:

- 1st outbreak of Zika virus in the Western Hemisphere, which was linked to birth defects
- Largest Ebola epidemic in history, which killed more than 11,000 people
- Fungal meningitis outbreak caused by contaminated steroid injections
- 2nd-largest outbreak of West Nile virus infections that sickened 5,600 people in the US
- Outbreak of cholera in Haiti, which killed at least 10,000 people

We work to protect Americans from well-known outbreaks (Ebola) to outbreaks you're more likely to encounter—like *Salmonella* food poisoning.

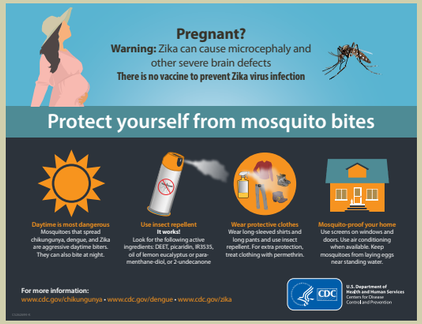
NCEZID provides rapid assistance to states and foreign ministries of health through formal requests called epidemic-assistance investigations, or Epi-Aids. Each year, NCEZID conducts almost half (~25) of all CDC's Epi-Aid investigations of outbreaks—large and small, domestic and international. Recent examples of Epi-Aids and other outbreak investigations that NCEZID participated in include:

- ***E. coli* (*Escherichia coli*) infections among children** who visited a goat farm in Connecticut
- Emerging, drug-resistant **fungal infections (*Candida auris*) that spread among patients** in healthcare settings
- Rarely seen **bloodstream infections (*Elizabethkingia*)** in patients in Wisconsin
- Illness caused by ***E. coli*-tainted flour** that infected people in more than 20 states
- ***Listeria* bacteria in packaged salads** that hospitalized 19 people, killing 1

IMAGE (LEFT): NCEZID staff collect samples while investigating an *E. coli* outbreak linked to a Connecticut dairy goat farm that sickened more than 40 people, many of them young children. Recommendations (like reduce direct contact with goats and their soiled bedding; provide handwashing stations) will help prevent illness in the future.

DID YOU KNOW?

NCEZID scientists helped confirm the connection between Zika virus infection during pregnancy and microcephaly and other birth defects.



TAKING A ONE HEALTH APPROACH

More than half of all infections that people get are spread by animals. Diseases like rabies, *Salmonella* infection, and West Nile virus are examples of zoonotic diseases—diseases that can be shared between animals and people. Animals can sometimes serve as early warning signs of potential illness in people. For example, birds often die of West Nile virus before people get sick with West Nile virus fever.

NCEZID's One Health Office recognizes that the health of people is connected to the health of animals and the environment. A One Health approach encourages collaborative efforts of many experts (like physicians and veterinarians) working across animal, human, and environmental health to improve the health of people and animals, including pets, livestock, and wildlife.

What we're doing:

- The One Health Office is working with multiple partners to **educate rural youth in agricultural organizations** like 4-H and the Future Farmers of America about preventing the spread of diseases shared between people and animals like zoonotic influenza viruses. The project has reached thousands of young people and their families in Arizona, Georgia, Iowa, Michigan, Minnesota, and Ohio, many of whom are actively involved in exhibiting livestock or farming.
  - One important outcome of the project was the rapid response to an outbreak of flu in people who had attended agricultural fairs in Ohio and Michigan. Partnerships formed during the project helped pinpoint the source of illness—infected swine exhibited at the fairs.
- On the global front, One Health is taking a strategic, targeted approach to controlling infectious disease. Experts from the One Health Office lead **One Health Zoonotic Disease Prioritization Workshops** so that countries with limited resources can focus on the top zoonotic diseases (for example, rabies and Ebola) of greatest national concern. Workshop participants include a wide-ranging group of people who protect health—of people, animals, or the environment—and they identify that country's top 5 diseases to target. Prioritizing diseases means countries can more efficiently build

lab capacity, conduct disease surveillance, plan outbreak response and preparedness activities, and create disease prevention strategies to reduce illness and death in people and animals.

Pet owners need to know about zoonoses and how to prevent them, so they can enjoy their pets without getting sick.

KEEPING BORDERS SECURE AND TRAVELERS SAFE

One of CDC's best-kept secrets is the people in NCEZID who focus on preventing the importation and spread of infectious diseases into the United States. More than a million people travel to the United States each day. Americans stay on the go, too, taking about 74 million trips each year. All international travelers face increased risk of getting and spreading infectious diseases.

What we're doing:

- NCEZID oversees 20 **quarantine stations**, strategically located at US airports, land borders, and seaports. Staff at these Q stations, as they are called, work hard to protect the public's health from threats, both foreign and domestic. The work extends to cover all ports of entry (more than 300) into the United States. Every day NCEZID staff work with Customs and Border Protection and other federal agencies, the airlines and cruise lines, and state and local public health departments to prevent the spread of infectious disease to US communities.
- The **Travelers' Health website** provides outbreak updates and travel notices, travel-related disease information, interactive maps, and other destination-specific recommendations for travelers and their healthcare providers.
- NCEZID publishes The **Yellow Book** (*CDC Health Information for International Travel*), the definitive US travel medicine reference for clinicians advising patients before and after travel.
- We **alert travelers at airports** about disease outbreaks and steps they can take to protect themselves.
- NCEZID **responds to sick travelers** who arrive in the United States at major airports, seaports, or land border crossings.
  - For example, when sick passengers are on a flight, the airline lets CDC know. We evaluate whether they might be contagious to others on the plane.

A CDC quarantine public health officer takes a call from an airline crew alerting him that a flight is about to land at Los Angeles International Airport with a sick passenger onboard. *Courtesy of Julie Konidakis*

- We **restrict the importation of animals** and products that may carry disease, such as monkeys, bats, small turtles, cats, and dogs.
- Because we are located at airports, we can **send life-saving drugs** on the next flight to save the life of someone with malaria, botulism, or diphtheria. These drugs are difficult to obtain commercially, but we make them available to US clinicians for patients who meet certain requirements.

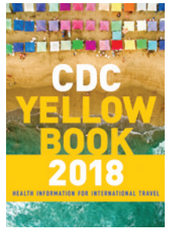
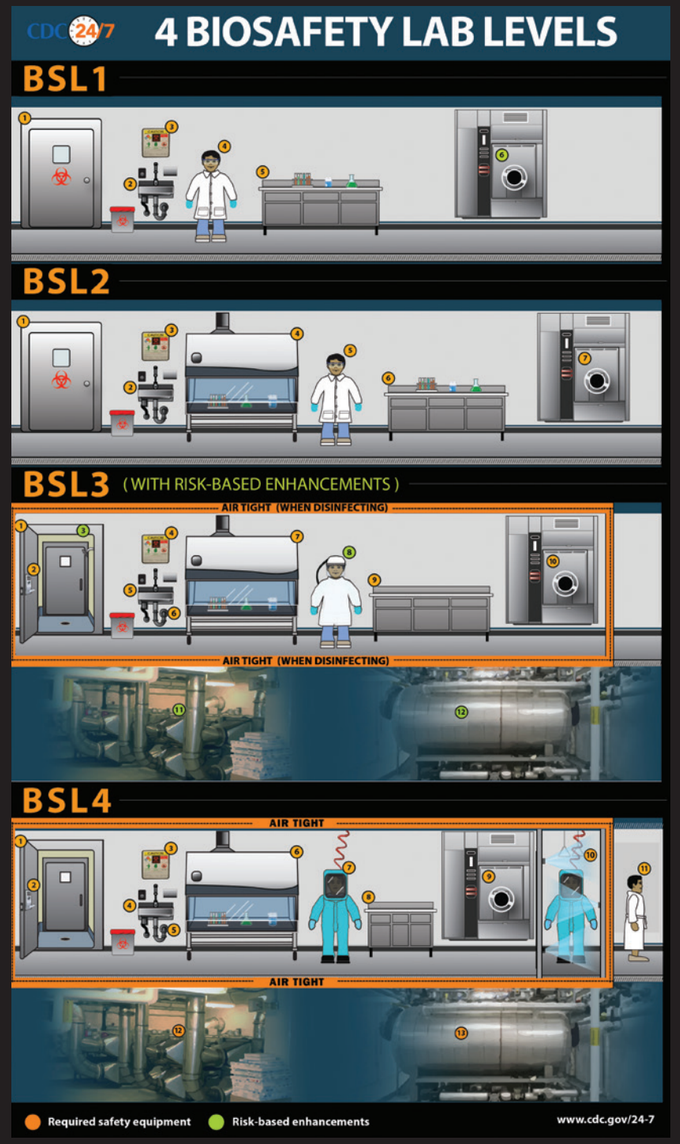


IMAGE (LEFT): The flight map shows ~60,000 flight patterns in a 24-hour period. Blue lines are shorter flights; purple lines longer flights. *Courtesy of Dr. Kamran Khan, BlueDot*

- **BSL1** – these labs handle agents that pose minimal risks and are not known to consistently cause disease in healthy adults
- **BSL2** – these labs handle agents that pose only moderate risks to lab staff or the environment
- **BSL3** – these labs handle agents that can cause serious or fatal disease
- **BSL4** – the highest level of lab safety in the world, these labs handle the deadliest germs that cause life-threatening and frequently fatal disease

NCEZID laboratorians quickly detect harmful pathogens—whether spread by people, animals, insects, food, or a bioterrorist.



LABORATORY EXPERTISE

NCEZID laboratories serve as vital reference laboratories for the United States and the world, aiding in critical disease detection, investigation, training, and public health research. In addition to managing the Laboratory Response Network (*see p. 29*), NCEZID provides oversight for a number of highly specialized laboratories.

NCEZID laboratories include:

- The **Infectious Disease Pathology Lab** is the primary unit at CDC that tests and evaluates tissues from patients with infectious diseases of unknown origin; they can test for more than 200 viruses and bacteria.
- **Viral special pathogens** labs work with some of the world's most dangerous viruses that need to be handled at the highest biosafety level (BSL4) containment laboratory (*see p. 10*). Laboratorians sometimes deploy to the field, as they did during the Ebola epidemic to set up a laboratory in Bo, Sierra Leone.
- **Bacterial special pathogens** labs work on anthrax and other potentially deadly bacteria.
- **Rickettsial zoonoses** labs provide expertise in the diagnosis of diseases such as Rocky Mountain spotted fever and discovery of other tickborne disease pathogens. Tests developed by the labs have improved the speed and sensitivity of rickettsial pathogen detection.
- **PulseNet** labs and enteric (gastrointestinal) diseases labs are critical in rapidly identifying foodborne pathogens and helping control foodborne disease outbreaks.
- **Healthcare-associated infections** (HAIs) laboratories look at causes of infectious illnesses occurring in patients who receive health care. They also issue protocols that partners can use for testing for specific pathogens causing HAIs.
- The **Biotechnology Core Facility** is a collection of six laboratories that use cutting-edge technologies like genomic sequencing to test for infectious and biothreat agents. It also evaluates emerging technologies for improving diagnostic tests as part of the Advanced Molecular Detection Program (*see page 17*).

Some important work NCEZID laboratories have produced includes:

- Discovering and **characterizing new infectious disease threats**.
- Providing an **early warning system** for new or emerging viruses like chikungunya.
- **Monitoring changes** in known germs that hurt people, including new drug-resistant strains like carbapenem-resistant Enterobacteriaceae (CRE) in hospital settings.
- **Preparing reference materials** (strains, cultures, and blood samples) that help confirm germs and providing quality assurance for other laboratories.

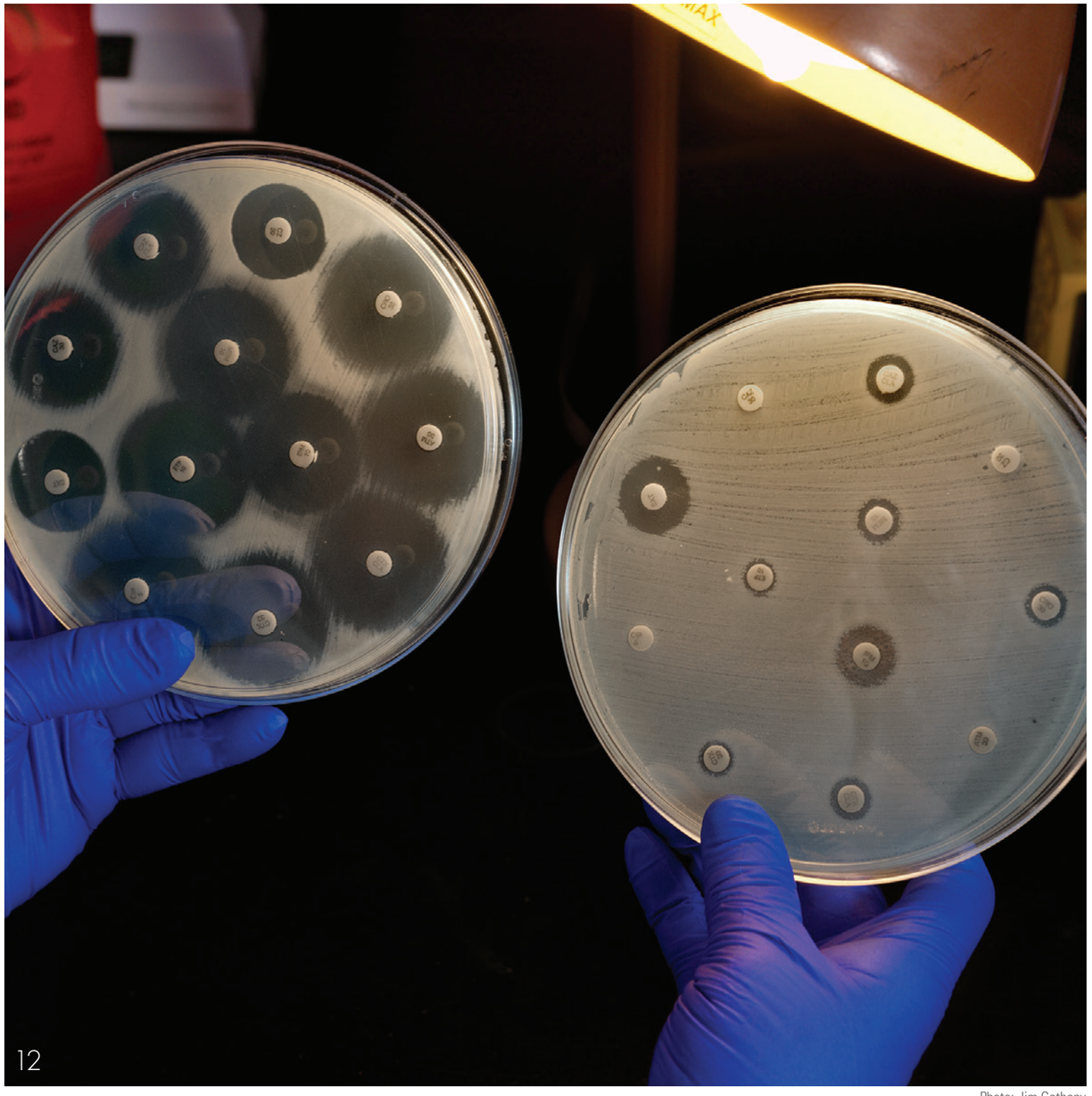


Photo: Jim Gathany

FIGHTING ANTIBIOTIC RESISTANCE

Each year in the United States, at least 2 million people become infected with bacteria that are resistant to antibiotics. Antibiotic resistance (AR) is the ability of microbes to resist the effects of drugs—that is, the germs are not killed, and their growth is not stopped. At least 23,000 people die each year as a direct result of these infections. Although some people are at greater risk than others, no one can completely avoid the risk of antibiotic-resistant infections. Infections with resistant organisms are difficult to treat, requiring costly and sometimes toxic alternatives. Some of the current trends in resistance:

- Antibiotics are among the most commonly prescribed drugs used in human medicine, but up to 50% of the time antibiotics are not prescribed properly (for example, often given when not needed or with incorrect drug dosing or duration).
- The germs that contaminate food can become resistant because of the use of antibiotics in food animals as well as people. Studies have shown that the use of antibiotics in food animals can lead to resistant infections, like those caused by *Salmonella* and *Campylobacter* in people.
- The other major factor in the alarming growth of antibiotic resistance is spread of resistant strains of bacteria from person to person, or from contaminated sources in the environment.

What we're doing:

In 2016, Congress appropriated $160 million for CDC to fight antibiotic resistance. With this investment, NCEZID is working with others to detect, respond, contain, and prevent resistant infections. Some key activities include:

- **Investing in states and communities** across the US for better response, containment, and prevention of AR threats.
- Establishing **the AR Lab Network** made up of CDC labs, 7 regional labs in health departments, and expanded capacity of all state and local health department labs. The new lab network will conduct nationwide testing to fill data gaps and inform how we respond to some of the most serious antibiotic-resistant threats like the nightmare bacteria CRE (carbapenem-resistant Enterobacteriaceae), gonorrhea, and *Salmonella*.
- **Funding innovation** to understand how antibiotics disrupt a healthy microbiome, the community of naturally occurring microbes in and on our bodies.

We are in a post-antibiotic era where doctors and patients are faced with untreatable infections.

IMAGE (page 12): What antibiotic resistance looks like. The bacteria on the right plate almost touch the discs of antibiotics, meaning they are antibiotic resistant. The antibiotics are ineffective against the bacteria. The bacteria on the left plate can't grow next to the discs of antibiotics, meaning the bacteria are susceptible and can be treated with antibiotics.

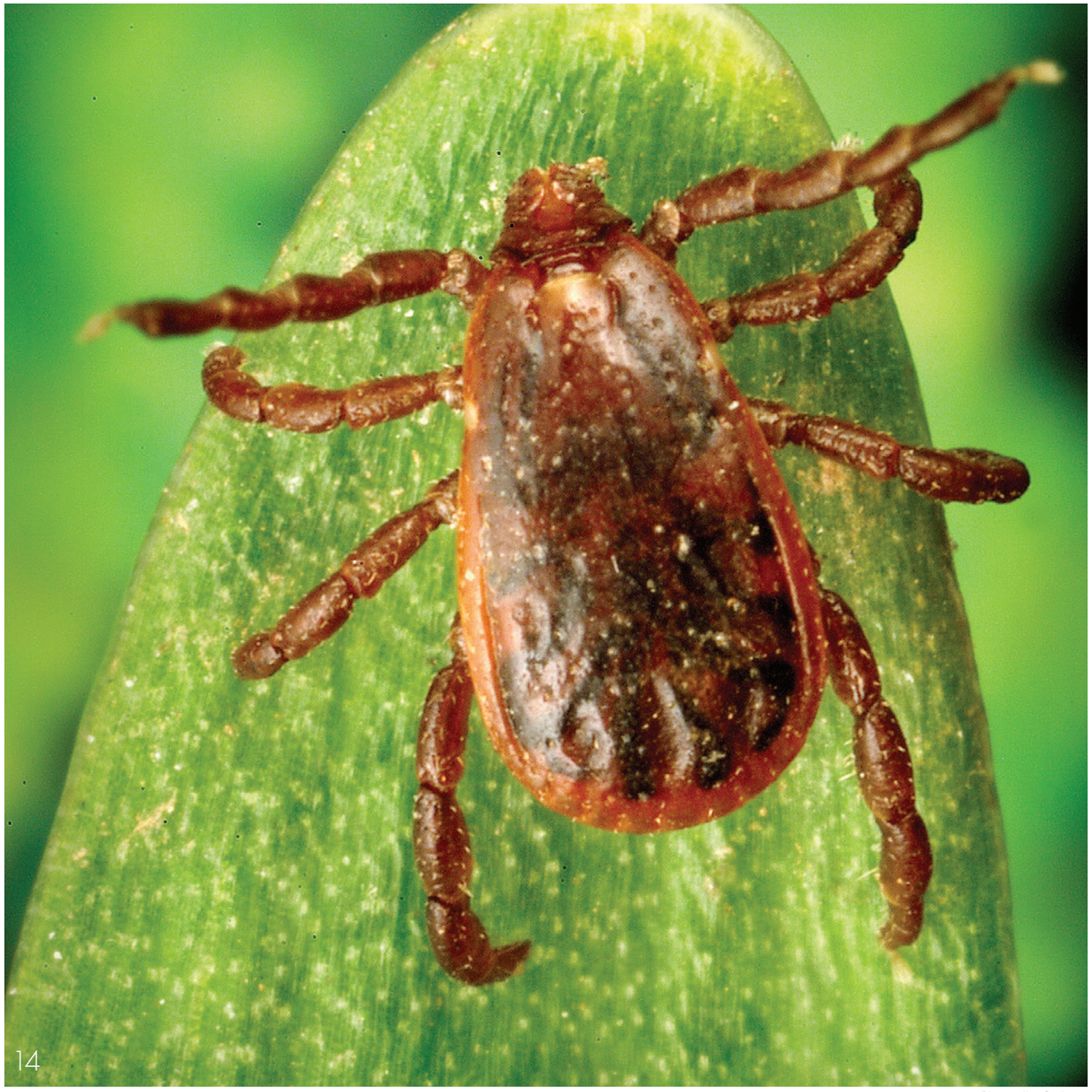


Photo: Jim Gathany

VECTOR-BORNE DISEASES (caused by bites from mosquitoes, ticks, or fleas)

Everyone—in the United States and around the world—is vulnerable to diseases spread by infected insects or ticks, also called vectors. Increasing global travel and urbanization are contributing to vector-borne disease outbreaks in new regions and countries. These diseases can be difficult to prevent and control, particularly since vaccines are available for only a few of them. NCEZID's work, directed by national and international leaders in vector-borne pathogens, is focused on priority diseases, including:

- Zika (causes severe birth defects), chikungunya (causes debilitating joint pain), and dengue (can be deadly), which are caused by bites of infected *Aedes aegypti* and *Aedes albopictus* mosquitoes. Forty percent (40%) of the world's population is at risk for dengue infection.
- West Nile virus is now native to the United States, and outbreaks are reported each summer. The deadliest West Nile virus outbreak in the United States occurred in 2012. Although most people infected with West Nile virus will have no symptoms, about 1 in 5 will experience fever with other symptoms, and less than 1% will develop a serious, sometimes fatal disease.
- Lyme disease is the most commonly reported vector-borne illness in the United States, with an estimated 300,000 infections occuring each year. Other tickborne diseases like Rocky Mountain spotted fever are also a serious public health problem and can be deadly within days if not treated promptly with antibiotics.

What we're doing:

- NCEZID has worked with partners on recent **vector-borne outbreaks** including Zika and chikungunya in Latin America, dengue in Hawaii, plague in Yosemite National Park, and Rocky Mountain spotted fever in Arizona and New Mexico.
- Early in the Zika outbreak, NCEZID scientists **developed a new test** called the Trioplex that detects Zika virus, dengue, and chikungunya in a single test.
- CDC is partnering with the Minnesota Department of Health and the Mayo Clinic to obtain up to 30,000 clinical specimens from patients with suspected tickborne illness over a 3-year period. CDC will use genetic sequencing methods to **identify the specific tickborne bacterium** that caused these patients' illnesses.
- NCEZID scientists have found **nootkatone,** an ingredient found in Alaska yellow cedar trees, some herbs, and citrus fruits, to be an effective repellent and insecticide for use against mosquitoes, ticks, and other pests. Efforts are now underway to bring this product to market.

Photo: Jim Gathany

Since 2004 in the US, scientists have discovered 7 new tickborne viruses in people.

IMAGE (LEFT): The brown dog tick is one of the ticks that spreads Rocky Mountain spotted fever.

INNOVATING SOLUTIONS

Pathogens constantly evolve. Protecting Americans demands that we develop better tools to keep us one step ahead of emerging infectious diseases. Innovation is taking place across NCEZID.

What we're doing:

Examples of innovations worked on by NCEZID scientists include:

- **Advanced Molecular Detection (AMD)** combines two powerful technologies (DNA sequencing and advanced computing) to solve complex infectious disease mysteries—the who, what, where, when, and how microbes harm people. Since the Office of Advanced Molecular Detection was established in 2014, AMD has played a pivotal role in:
  - Identifying the genetic makeup of Ebola and Zika during each of those outbreaks.
  - Solving foodborne outbreaks involving *Listeria* infection faster by linking food sources to clusters of illness.
- **New diagnostics** like these are ensuring that diseases are accurately and quickly diagnosed and treated:
  - A test kit for yellow fever gives results in 4 hours that used to take 2 days.
  - A new tool that screens for antifungal resistance when treating invasive candidiasis, the most common cause of healthcare-associated bloodstream infections in the United States. The new tool provides rapid and cost-effective screening tool for *Candida*.
- Safer and more effective **vaccines against rabies** for use in people and animals.
- An electronic platform called **ePathology** allows physicians and scientists from anywhere in the world to electronically submit images and scanned pathology slides to CDC pathologists for evaluation.
  - Doctors working in the most remote and resource-limited villages just need an internet connection to share slides of their patient's specimens with pathologists at NCEZID.

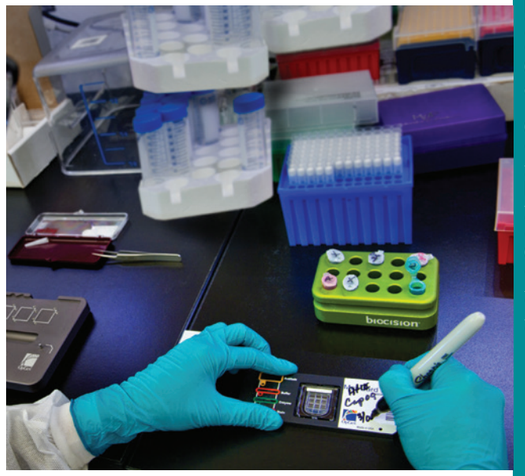


Photo: Jim Gathany

Advanced Molecular Detection means that it took 3 weeks to develop a test protocol for Zika. Before AMD, it would have taken 3 months.

HEALTHCARE-ASSOCIATED INFECTIONS

Healthcare-associated infections (HAIs)–infections patients can get while receiving medical treatment in a hospital or other healthcare facility–are a major, yet often preventable, threat to patient safety. On any given day, about 1 in 25 hospital patients has at least one HAI.

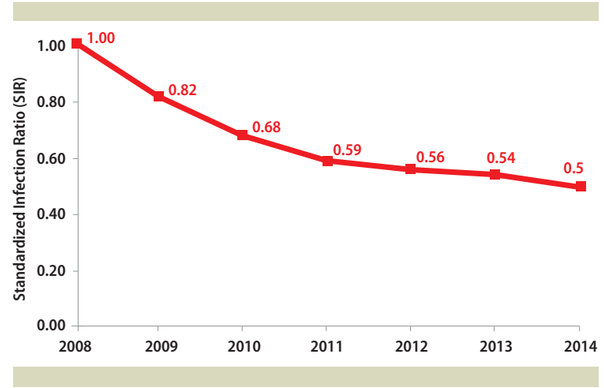
Modern healthcare employs many types of invasive devices and procedures to treat patients and to help them recover. Infections can be associated with devices used in medical procedures, such as central lines, catheters, or ventilators. Infections may also occur at surgery sites, known as surgical site infections.

What we're doing:

Our mission is to protect patients and healthcare personnel and promote safety, quality, and value in healthcare delivery systems. NCEZID's HAI experts, together with healthcare and public health partners, work to bring increased attention to HAIs and prevention. And studies show it works: when healthcare facilities take steps to target prevention of specific HAIs, they can decrease these infections by more than 70%.

HAI data are used to identify problem areas, measure progress of prevention efforts, and ultimately eliminate HAIs. NCEZID provides data on HAIs through:

- NCEZID's **National Healthcare Safety Network (NHSN)** is the nation's most widely used HAI tracking system. NHSN provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate HAIs. In addition, NHSN allows healthcare facilities to track antimicrobial use and resistance, healthcare safety issues, and important healthcare process measures such as influenza vaccination status of healthcare personnel and infection control adherence rates.
- CDC's annual *National and State Healthcare-Associated Infections Progress Report* (HAI Progress Report) provides **a closer look at the HAIs** most commonly reported to CDC's NHSN. This report describes national and state progress in preventing central line-associated bloodstream infections, catheter-associated urinary tract infections, select surgical site infections, hospital-onset *Clostridium difficile* infections, and hospital-onset methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia (bloodstream infections).



Central line-associated bloodstream infections **declined 50%**

FOODBORNE DISEASE (food poisoning)

CDC estimates that each year roughly 48 million people (1 in 6) gets sick from a foodborne illness, 128,000 are hospitalized, and 3,000 die. Many different disease-causing microbes, or pathogens, can contaminate foods, so there are many different foodborne infections.

According to CDC estimates, the most common foodborne illnesses are caused by norovirus and by the bacteria *Campylobacter*, *Salmonella*, and *Clostridium perfringens*.

What foods are associated with foodborne illness?

- Fruits and vegetables consumed raw are a particular concern. Washing can decrease—but not eliminate—contamination.
- Raw meat and poultry, raw eggs, unpasteurized milk, and raw shellfish.
- Filter-feeding shellfish (like oysters) are especially likely to be contaminated with viruses and bacteria.
- Foods that combine the products of many individual animals, such as bulk raw milk, pooled raw eggs, or ground beef, are particularly hazardous because a pathogen in one of the animals may contaminate the whole batch.

What we're doing:

CDC provides the vital link between illness in people and the food safety systems of government agencies and food producers. We take action by:

- **Collaborating at the federal level** with the US Food and Drug Administration and the US Department of Agriculture's Food Safety and Inspection Service. State and local health departments and the food industry also play critical roles in all aspects of food safety.
- **Tracking** the occurrence of foodborne illnesses.
- Facilitating and **leading outbreak investigations**.
- Managing the **DNA fingerprinting network** for foodborne illness-causing bacteria in all states to detect outbreaks.
- **Using whole genome sequencing** to show which bacterial strains are most alike genetically.
- Attributing **illnesses to specific foods** and settings.
- Targeting **prevention measures** to reduce illness and death.
- **Providing data and analyses** to inform food safety action and policy.

***Listeria*, associated with soft cheeses, raw milk, and certain refrigerated foods, is a deadly foodborne bacteria. About 1 in 5 people who get sick from listeriosis die.**

WATERBORNE AND FUNGAL INFECTIONS

Water is essential for life but can also lead to illness when it is contaminated by disease-causing organisms. Examples of **waterborne disease** include:

- Cholera, a severe diarrheal disease, often caused by drinking *Vibrio cholerae*-contaminated water.
- An infection called microbial keratitis, which can occur when germs invade the eye. These germs can be associated with improper use and care of contact lenses.
- Cryptosporidiosis, giardiasis, and other gastrointestinal diseases caused by swallowing contaminated water.
- An infection caused by the rare but often fatal brain-eating ameba (*Naegleria fowleri*) that can occur when people go swimming or diving in warm freshwater places like lakes and rivers, and contaminated water enters through the nose.

Fungal diseases are a concern in the medical and public health community for several reasons. Increasing numbers of people with weakened immune systems (like cancer patients and organ transplant recipients) are especially vulnerable to fungal infections. Changes in healthcare practices provide opportunities for new and drug-resistant fungi to emerge in healthcare settings. Other fungal diseases, like valley fever, are caused by fungi that live in soil.

What we're doing:

NCEZID has world-class scientists who are experts in the fields of preventing and controlling waterborne and fungal diseases. Recent accomplishments include:

- Tested more than 150 clinical samples in the US for **free-living amebas**, including *Naegleria fowleri*, the "brain-eating" ameba.
- Launched **CryptoNet**, the first system that uses molecular fingerprints for tracking a parasite. *Cryptosporidium* is a major cause of US waterborne disease outbreaks.
- Released the 2nd edition of the **Model Aquatic Health Code** to help state and local health departments prevent drowning, injuries, and the spread of recreational water illnesses at public swimming pools and spas.
- Provided epidemiological field support to ministries of health in multiple countries to prevent and **control outbreaks of cholera and typhoid**.
- Helped conduct **fungal disease outbreak investigations**, including mucormycosis outbreaks in Kansas, Colorado, and Pennsylvania. Mucormycosis typically affects people with weakened immune systems, such as people who have had an organ transplant.
- Applied new **laboratory tools to detect valley fever** (coccidioidomycosis) in the environment and used whole genome sequencing to understand the emergence of this fungus in new geographic areas.
- Investigating **new cases of *Candida auris* infections**, an emerging drug-resistant fungus that can spread through healthcare settings and cause serious and sometimes deadly bloodstream infections that have limited treatment options.

A multistate outbreak of fungal meningitis sickened more than 750 people and killed nearly 65 in 2012. NCEZID fungal experts helped nail the culprit: contaminated injections of a steroid linked to a compounding pharmacy. Photo: Jim Gathany

DEADLY AND UNEXPLAINED DISEASES

Germs that cause Ebola, anthrax, rabies, smallpox, and plague, also called "high-consequence pathogens," require expert oversight, especially because of the threat of bioterrorism. NCEZID places a high priority on understanding and tracking these diseases domestically and globally, operating state-of-the-art laboratories that can identify them, and preventing their spread.

What we're doing:

- NCEZID studies diseases caused by **highly hazardous bacteria** (like anthrax) **and viruses** (like Ebola). After the Ebola epidemic of 2014, scientists continue to conduct follow-up studies with survivors to learn what long-term symptoms they may face, how long the virus can persist, and how some people are better able to survive Ebola.
- NCEZID scientists also investigate **unexplained deaths and diseases** of unknown origins. Uncovering new infectious diseases contributed to the identification of the agents that cause SARS and hantavirus pulmonary syndrome. Recently, NCEZID pathologists were amazed when they found a new disease—tapeworms growing inside a person essentially getting cancer that spreads to the person, causing tumors. It is the first-known case of a person becoming ill from cancer cells that arose in a parasite—in this case, the dwarf tapeworm, the most common tapeworm in people.
- An important part of the mission to keep deadly diseases at bay is to investigate and find new ways to **prevent zoonotic infections** that spread between animals and people. Although rabies is a vaccine-preventable disease, close to 60,000 people die from the disease around the world each year. The NCEZID Rabies Team has traveled throughout the world to reduce rabies in countries like Ethiopia, Vietnam, and Haiti, where rabies from dogs is common.

The dwarf tapeworm is the most common tapeworm found in people.

NCEZID has world-renowned experts in the world's deadliest diseases like Ebola, anthrax, and rabies.

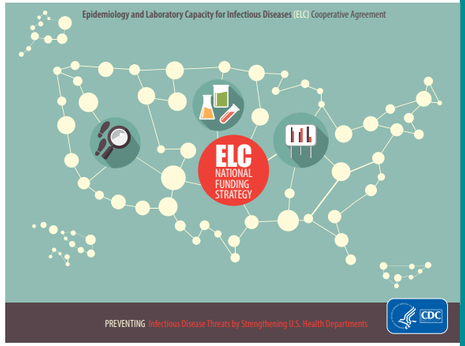
IMAGE (LEFT): In Haiti, the Rabies Team and partners vaccinated more than 37,000 dogs in just 18 days in 2017 as part of a months-long campaign.

SUPPORTING STATES

State, local, and territorial health departments work to combat emerging and reemerging infectious diseases (like Zika), improve public health (like food safety surveillance), and respond to public health emergencies like outbreaks of *E. coli* or *Salmonella* infections. NCEZID supports their work in a variety of ways.

What we're doing:

- Each year, CDC awards millions of dollars to states through the **Epidemiology and Laboratory Capacity for Infectious Diseases (ELC) Cooperative Agreement**, one of CDC's key nationwide cooperative agreements, which is managed by NCEZID.
  - The ELC oversees an array of cross-cutting epidemiology, laboratory, and health information systems activities that help domestic public health departments respond to complex infectious disease threats like Zika and antibiotic resistance.
- NCEZID's innovative online tool, **MicrobeNet**, provides laboratorians in all 50 states unprecedented—and free—access to CDC's library of information about more than 2,400 rare and emerging infectious bacteria and fungi.
  - This tool helps doctors and laboratorians get the information they need to accurately diagnose unknown causes of diseases faster and save lives.
- The **Arctic Investigations Program** (AIP) focuses on reducing and preventing infectious diseases that disproportionately affect Alaska Native people. For more than 40 years, AIP has collaborated with partners to tackle infectious disease threats by using state-of-the-art diagnostics, epidemiology, outbreak investigations, and targeted research.
  - Approximately 20% of rural Alaska homes lack running water and sanitation services. AIP studies showed that running water and sanitation in homes prevent the spread of infectious diseases like bloodstream infections, pneumonia, and skin infections. This work resulted in policy changes that have made it easier to get water and sewer grants, which can help to provide more homes with running water.
- The **Emerging Infections Program** (EIP), a network of state health departments and their collaborators, quickly translates surveillance and research activities into informed policy and public health practice. For example, EIP work has been instrumental in evaluating and honing strategies for preventing severe disease in newborns caused by group B *Streptococcus*.



Every year, NCEZID awards millions of dollars to states to help them control infectious disease.

Photo: Jim Gathany

PROTECTING AMERICANS FROM BIOTERRORISM

At NCEZID, our first priority is to keep people safe. Preparing for infectious disease threats—naturally occurring or intentional—is one of the mission-critical activities of NCEZID. We do not know when—or if—a national health emergency like the anthrax attacks of 2001 might happen again. What we do know is that if anthrax or another biological agent were intentionally released, NCEZID will be central to CDC's response because of three primary and unique assets:

1. We have the scientific expertise. At CDC, the scientists who specialize in the scariest pathogens work at NCEZID. NCEZID's epidemiologists and microbiologists are among the world's leading experts in highly pathogenic bacteria and viruses like those that cause anthrax, botulism, plague, smallpox, and Ebola. They also handle less-familiar but dangerous germs that cause brucellosis, tularemia, Q fever, Lassa fever, Rift Valley fever, and other viral hemorrhagic fevers.

These specialized NCEZID scientists are vital in helping CDC and its partners prepare by developing diagnostic tests and updated guidance for clinicians, laboratories, public health officials, and the public. All of this would be critically important to saving lives during a large-scale public health emergency caused by bioterrorists.

2. We oversee work in CDC's high-containment labs (HCL). Many of the dangerous pathogens that could cause major outbreaks or be used in bioterrorism are securely handled in HCL labs (*see p. 10*). The biosafety level (BSL)-3 lab handles pathogens that could cause serious illness, but could be treated. Pathogens that are even more deadly and for which no vaccine or treatment is available require containment in the most secure facility, the BSL-4 lab.

3. We manage the Laboratory Response Network (LRN). The LRN is a unique network of more than 130 laboratories established in collaboration with the Federal Bureau of Investigation and the Association of Public Health Laboratories to respond to bioterrorism, chemical terrorism, and other public health emergencies. The network includes state and local public health laboratories, as well as veterinary, agriculture, military, law enforcement, and water- and food-testing labs. When an emergency strikes, the LRN quickly mobilizes as it did during the anthrax investigation of 2001 and in 2014 for the Ebola outbreak.

Bioterrorism has the potential to quickly kill millions of people.

IMAGE (LEFT): NCEZID scientists suiting up before they enter the BSL-4 laboratory.

NCEZID Working Around The World

TARGETING INFECTIOUS DISEASE AROUND THE WORLD

NCEZID scientists are in the forefront of global outbreak response, reducing the spread of diseases that cross borders, because as the Ebola and Zika epidemics have demonstrated, an outbreak overseas is only a plane ride away. Our scientists also strengthen health security in the United States by focusing on pathogens (like anthrax or plague) that could be intentionally spread by bioterrorists.

What we're doing:

- **Lead major outbreak responses**, providing the technical expertise and workforce for major outbreaks like cholera, Ebola, and Zika.
  - 500+ NCEZID staff deployed to Zika response
  - 1,000+ NCEZID staff deployed to West Africa for Ebola response
- During the 2014 Ebola outbreak, NCEZID worked with Sierra Leone to fast-track development of a national program to **decrease the spread of Ebola in healthcare facilities**. The program's success led Sierra Leone to add trained infection prevention staff to 25 government hospitals and 14 districts, ensuring that infection prevention and control remain a priority in healthcare.
- We've **developed many new tests** with partners that have helped us respond faster to outbreaks of emerging infectious diseases including Zika, Ebola, yellow fever, dengue, and plague.
- Our **ePathology** service lets our pathology experts share a microscope with scientists across the globe and provide real-time consultation for urgent cases or rarely seen pathogens.
- Strengthen **public health systems** to prevent global spread of disease, including robust surveillance systems to pick up diseases, disease detectives who can trace the source of the outbreak, and responsive and effective laboratories that provide confirmation.
- Reduce illness and death among **US travelers**, expatriates, and other globally mobile populations.

NCEZID epidemiologist greets children in a northern Tanzania village during a cholera outbreak rapid response.

An outbreak of infectious disease is always just a plane ride away.

BACK COVER:
Aspergillus fumigatus (fungus)

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www.cdc.gov/ncezid | Follow @CDC_NCEZID on Twitter

Photo: Jim Gathany

CS275215A

Enclosure 11. Poisonous Plants

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NIOSH

Fast Facts

Protecting Yourself from

Poisonous Plants

Any person working outdoors is at risk of exposure to poisonous plants, such as poison ivy, poison oak, and poison sumac. When in contact with skin, the sap oil (urushiol) of these plants can cause an allergic reaction. Burning these poisonous plants produces smoke that, when inhaled, can cause lung irritation.

Workers may become exposed through:

- Direct contact with the plant
- Indirect contact (touching tools, animals, or clothing with urushiol on them)
- Inhalation of particles containing urushiol from burning plants

Symptoms of Skin Contact

- Red rash within a few days of contact
- Swelling
- Itching
- Possible bumps, patches, streaking or weeping blisters
  NOTE: Blister fluids are not contagious

First Aid

If you are exposed to a poisonous plant:

- Immediately rinse skin with rubbing alcohol, poison plant wash, or degreasing soap (such as dishwashing soap) or detergent, and lots of water.
  - Rinse frequently so that wash solutions do not dry on the skin and further spread the urushiol.
- Scrub under nails with a brush.
- Apply wet compresses, calamine lotion, or hydrocortisone cream to the skin to reduce itching and blistering.
  - Oatmeal baths may relieve itching.
- An antihistamine may help relieve itching.
  - NOTE: Drowsiness may occur.
- In severe cases or if the rash is on the face or genitals, seek professional medical attention.
- Call 911 or go to a hospital emergency room if you have a severe allergic reaction, such as swelling or difficulty breathing, or have had a severe reaction in the past.

Poisonous plants, from left to right: poison ivy, poison oak, poison sumac.

Images courtesy of U.S. Department of Agriculture.

Protect Yourself

- Wear long sleeves, long pants, boots, and gloves.
  - Wash exposed clothing separately in hot water with detergent.
- Barrier skin creams, such as lotion containing bentoquatum, may offer some protection.
- After use, clean tools with rubbing alcohol or soap and lots of water. Urushiol can remain active on the surface of objects for up to 5 years.
  - Wear disposable gloves during this process.
- Do not burn plants or brush piles that may contain poison ivy, poison oak, or poison sumac.
  - Inhaling smoke from burning plants can cause severe allergic respiratory problems.

When exposure to burning poisonous plants is unavoidable, employers should provide workers with:

- A NIOSH-certified half-face piece particulate respirator rated R–95, P–95, or better. This recommendation does NOT apply to wildland firefighters, who may require a higher level of protection.
- These respirators should protect against exposure to burning poisonous plants, but will not protect against all possible combustion products in smoke, such as carbon monoxide.
- Respirators must be worn correctly and consistently throughout the time they are used.
- For respirators to be effective there must be a tight seal between the user's face and the respirator.
- Respirators must be used in the context of a written comprehensive respiratory protection program (see OSHA Respiratory Protection standard 29 CFR 1910.134).
- For more information about respirators, visit www.cdc.gov/niosh/npptl/topics/respirators/

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

www.cdc.gov/niosh/topics/outdoor/

DHHS (NIOSH) Publication No. 2010–118

Telephone: 1–800–CDC–INFO
TTY: 1–888–232–6348
E-mail: cdcinfo@cdc.gov

SAFER • HEALTHIER • PEOPLE™

Enclosure 12. Hampton Roads Installation Invasive Plant Species Pamphlet

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Kudzu vine (*Pueraria montana*)

photo courtesy of Carolina Silvics

additional resources for invasive plant species information

DoD Natural Resources, Invasive Species Management (www.dodinvasives.org)

National Invasive Species Council (www.invasivespecies.gov)

USDA National Invasive Species Information Center (www.invasivespeciesinfo.gov/)

U.S. Fish and Wildlife Service (www.fws.gov/invasives/)

U.S. Forest Service (www.fs.fed.us/invasivespecies/index.shtml)

Virginia Department of Conservation and Recreation (www.dcr.virginia.gov/natural_heritage/vaisc/)

North American Invasive Species Network (www.naisn.org/generalinformation.html)

NAVFAC Mid-Atlantic
9742 Maryland Avenue
Norfolk, VA 23511

For more information, contact:

Naval Air Station Oceana
Department of Public Works
Environmental Program
953 Hornet Dr., Bldg. 820, Suite 206
Virginia Beach, VA 23460-2190
(757) 341-1700

TETRA TECH

invasive plant species

"...the homeland is vulnerable to a different type of asymmetric attack, a biological attack from invasive species."

— Col. Robert J. Pratt

Tree-of-heaven (*Ailanthus altissima*)

photo courtesy of L. Eiser

Common invasive plants at:

- Naval Air Station Oceana
- NASO Dam Neck Annex
- Naval Auxiliary Landing Field Fentress
- Naval Support Activity Hampton Roads Northwest Annex (NSAHR NWA)

The purpose of this brochure is to provide a basic understanding of the most common invasive plants occurring at four Navy installations in the Hampton Roads region, the threats they pose, and what you can do to help control and prevent their spread.

what are invasive species?

Invasive species are plants, animals, or micro-organisms that are non-native and are likely to cause economic or environmental harm or harm to human health. They are often spread by wind, wildlife, and intentional or unintentional actions.

The Department of Defense and other Federal and state agencies have instituted policies and guidelines to prevent and control the introduction and spread of invasive species.

why are invasive plants a problem?

Invasive species can interfere with military operations and readiness, kill or shade out native plants, harm fish and wildlife and their habitats, and have negative economic impacts on crop yields and forest productivity. Furthermore, invasive species are a threat to availability of training areas, increase risk of wildfires, and can pose serious health and safety issues for people.

Economic losses and control costs have been estimated to exceed $120 billion per year (Pimentel et al. 2005)

Common reed (*Phragmites australis*)

photo courtesy of Carolina Silvics

Invasive Plant Species Watch List

Invasive Plant Species	NAS Oceana	NASO DNA	NALF Fentress	NSAHR NWA
Alligator weed (*Alternanthera philoxeroides*)	■	■	■	■
Asian spiderwort *(Murdannia keisak)*	■			
Autumn olive (*Elaeagnus umbellata*)	■	■		■
Beach vitex (*Vitex rotundifolia*)				
Border privet (*Ligustrum obtusifolium*)	■	■		
Callery pear (*Pyrus calleryana*)	■		■	
Chinese lespedeza (*Lespedeza cuneata*)	■	■	■	■
Chinese privet (*Ligustrum sinense*)	■	■	■	■
Chinese silvergrass (*Miscanthus sinensis*)	■			
Chinese wisteria (*Wisteria sinensis*)	■		■	■
Common dayflower (*Commelina communis*)	■	■	■	■
Creeping liriope (*Liriope spicata*)	■			■
Dwarf periwinkle (*Vinca minor*)			■	
English ivy (*Hedera helix*)	■	■	■	■
European water-milfoil (*Myriophyllum spicatum*)				
Gill-over-the-ground (*Glechoma hederacea*)	■	■	■	
Golden bamboo (*Phyllostachys aurea*)			■	■
Japanese honeysuckle (*Lonicera japonica*)	■	■	■	■
Japanese hops (*Humulus japonicus*)	■			
Japanese privet (*Ligustrum japonica*)	■			
Japanese stilt grass (*Microstegium vimineum*)	■	■	■	■
Johnson-grass (*Sorghum halepense*)	■	■	■	■
Kudzu vine (*Pueraria montana*)	■			
Lily turf (*Liriope muscari*)				■
Mimosa (*Albizia julibrissin*)	■		■	■
Multiflora rose (*Rosa multiflora*)	■	■	■	■
Pampas grass (*Cortaderia selloana*)		■		
Parrot feather milfoil (*Myriophyllum aquaticum*)	■	■		
Periwinkle (*Vinca major*)	■			
Phragmites (*Phragmites australis*)	■	■	■	■
Porcelain berry (*Ampelopsis brevipedunculata*)			■	■
Princess tree (*Paulownia tomentosa*)			■	
Shrubby bushclover (*Lespedeza bicolor*)	■			■
Tall fescue (*Festuca elatior* [*F. pratensis*])	■			
Thorny elaeagnus (*Elaeagnus pungens*)	■	■		
Tree-of-heaven *(Ailanthus altissima)*	■		■	
White mulberry (*Morus alba*)	■		■	
White poplar (*Populus alba*)	■			

Bold = High Priority Species

Additional resources for photos and detailed descriptions of these invasive plants are listed on the back of this brochure. Additional information on controlling invasive plants is available from Natural Resources Managers.

Chinese wisteria (*Wisteria sinensis*)

photo courtesy of K. Metcalf

what you can do about invasive plants

You can help stop invasive plants by identifying these species and taking actions to prevent their introduction and spread:

- Learn about the invasive species that are in your area and what is being done about them
- Be able to identify invasive plants
- Report new invasive species and infestations to the Natural Resources Manager
- Remove invasive plants from your property
- Plant non-invasive plants on your property
- Clean boats and trailers, off-road vehicles, boots, waders, and other pathways of spread to stop hitchhiking invasive species
- Use certified “weed-free” forage, firewood, hay, mulch, and soil
- Volunteer for organized efforts to remove invasive species from natural areas and support organizations that work with invasive species

Natural Resources Managers need your help to prevent and contain the spread of these invaders.

Early Detection and Rapid Response (EDRR) is critical to identify new areas of infestation, rapidly respond, and increase the chances of success.

The Department of Defense is a leader in natural resources management and controlling invasive species.

Appendix H

Environmental Management

Enclosure 1 **2016 Hazardous Materials Reutilization, Hazardous Waste Minimization and Disposal Guide**

Enclosure 2 **Erosion Control Plan**

Enclosure 3 **Climate Change**

Enclosure 4 **Vegetative Community Characterization Mapping**

Enclosure 5 **Wildland Fire Management Plan**

Enclosure 6 **Naval Support Activity Northwest Annex Prescribed Burn Plan and Smoke**

Enclosure 7 **SPCCs**

Enclosure 8 **NSAHQ SWPPP**

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Enclosure 1. 2016 Hazardous Materials Reutilization, Hazardous Waste Minimization and Disposal Guide

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2016 HAZARDOUS MATERIALS REUTILIZATION, HAZARDOUS WASTE MINIMIZATION AND DISPOSAL GUIDE

The purpose of this guide is to communicate regulatory requirements and management procedures relevant to the utilization of hazardous material, and minimization and disposal of hazardous waste. It is your responsibility to notify the hazardous waste Media Manager of new wastes requiring characterization. The hazardous waste Media Manager should be notified before the waste is generated if at all possible.

Implementing effective environmental management, by incorporating these procedures, shows our commitment to environmental stewardship through regulatory compliance, pollution prevention, and continual improvement.

Understanding how your job impacts the environment and what regulatory requirements apply provides for a reduction in environmental impacts, ensures environmental compliance through enhanced awareness and is essential in maintaining our Environmental Management System (EMS).

Annual training is required for all personnel managing hazardous waste and hazardous materials. Web-based training is available via ECATTS at https://environmentaltraining.ecatts.com/.

For questions regarding hazardous waste management or hazardous material use, please see Appendix 1 for Hazardous Waste Media Manager contacts for your installation.

This guide is for the following Naval installations in the Hampton Roads area ONLY.

Naval Station Norfolk, NSA Hampton Roads, Lafayette River Annex, Craney Island, Naval Weapons Station Yorktown, Yorktown Fuels, Cheatham Annex, New Kent ROTHR, Joint Expeditionary Base Little Creek-Fort Story, St. Julien's Creek Annex, South Gate Annex, Scott Center Annex, Naval Medical Center Portsmouth, Naval Air Station Oceana, Dam Neck Annex, NSA Northwest Annex, Fentress Air Field,Dare County Bombing Range

DOCUMENT TITLE: Hazardous Materials Minimization, Hazardous Waste Reutilization and Disposal Guide

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PREPARED BY: Hazardous Waste Program Managers | APPROVED BY: EQMB

REVISION NO.	EFFECTIVE DATE	DESCRIPTION OF REVISION	APPROVAL SIGNATURE	APPROVAL DATE
A	2005	ORIGINAL ISSUE		
B	Dec. '07	Updated POC, aerosol and oil filter information; added Universal Waste Guidance, changed ECAP Tech to CHRIMP Tech and updated inspection checklists		
C	March '08	Updated POC information and phone numbers, bio-hazardous waste information		25 Mar 08
D	Oct. '09	Updated compressed gas cylinder, bio-hazardous waste, Universal Waste, and POC information. Updated inspection checklists and included Joint Expeditionary Base Fort Story installation in guidance.		3 Nov 09
E	Aug. 10	Updated guidance throughout. Material Turn-In-Work Guidance		17 Aug 10
F	March 12	Updated guidance throughout. Streamlined format and waste SOPs.		26 Mar 12
G	Feb 12	Updated POCs, added guidance on C2R, THF.		20 Feb 13
H	May 13	Updates throughout		5/2/13

FORM EMS-2 (REV. B)

GUIDE INTRODUCTION

This guide applies to naval installations in the Hampton Roads area and was developed in accordance with applicable Navy instructions (Ref. A) and Federal and State laws. It is divided into four (4) main sections:

I. Waste Minimization Information
II. Hazardous Material Reutilization Information
III. Hazardous Waste Management and Disposal Information
IV. Management of Specific Materials/Wastes

The first three sections of this guide will provide you information on how to best manage your excess Hazardous Material (HM) or the Hazardous Waste (HW) that you may generate.

The **Waste Minimization Information** section will provide tips and information on how to generate less waste. Reducing waste generation is the most cost-effective way to manage waste. By not creating waste, an activity reduces its environmental footprint, protects the environment for future generations, and helps maintain the public image of the Navy as good environmental stewards.

The **Hazardous Material Reutilization Information** section provides various options other than disposal. Information and procedures are provided on how to return HM to Hazardous Material Minimization Centers (HAZMINCENs), shelf-life extension procedures, various recycling and/or cross-decking efforts, and material transfer procedures to DLA Disposition Services for public resale.

The **Hazardous Waste Management and Disposal Information** section of this guide details the procedures to be followed to dispose of an item.
HW disposal is the most costly and regulated method of managing expired or unneeded HM. The cost of disposal is often more than the purchase cost of the material, thus every effort should be made to avoid generation of a hazardous waste. The options in Sections I and II should be explored prior to HW disposal.

Section IV of this guide, **Management of Specific Materials/Wastes**, provides instructions for the management of specific HW that are generated most frequently in the Hampton Roads Region.

Useful contact information is listed at the beginning of each section. For a full list of points of contact related to this guide, see Appendix 1.

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REFERENCES

A. OPNANV M 5090.1 CHAPTER 27 "HAZARDOUS WASTE MANAGEMENT ASHORE," HTTP://WWW.NMCPHC.MED.NAVY.MIL/ENVIRONMENTAL_HEALTH/OPNAVINST_5090_1C.ASPX.
B. OPNAV 5100.23G, CHAPTER 7, "HAZARDOUS MATERIAL CONTROL AND MANAGEMENT" HTTP://DONI.DAPS.DLA.MIL/DIRECTIVES/05000%20GENERAL%20MANAGEMENT%20SECURITY%20AND%20SAFETY%20SERVICES/05-100%20SAFETY%20AND%20OCCUPATIONAL%20HEALTH%20SERVICES/5100.23G%20W%20CH-1.PDF
C. JOINT SERVICES POLLUTION PREVENTION AND SUSTAINABILITY LIBRARY HTTP://WWW.P2SUSTAINABILITYLIBRARY.MIL/QUERYNONAV.ASPX?TOPIC=244
D. DOD SHELF LIFE PROGRAM, HTTPS://WWW.SHELFLIFE.HQ.DLA.MIL/POLICY_DOD4140_27.ASPX
E. 40 CFR PART 261 "IDENTIFICATION AND LISTING OF HAZARDOUS WASTE"

I. WASTE MINIMIZATION INFORMATION

A) USEFUL CONTACT INFORMATION

– see Appendix 1.

B) WORK PRACTICES AND MATERIAL SUBSITUTION

– In an effort to reduce the generation of Hazardous Waste (HW), users of Hazardous Material (HM) should incorporate CHRIMP and the following business practices into their everyday work.

PLEASE NOTE!

When applicable, relevant technical manual guidance must be the prevailing factor in any decision to use a substitute for a hazardous material.

- **HM control and management**: Activities should adopt procedures to manage, minimize, and control the acquisition of HM. This is an excellent way to prevent waste, fraud and abuse as well as to ensure that HM is utilized prior to expiration. Having the correct amount of HM for a job and using the HM before it expires will save time and money in reduced HW. Please refer to Ref. B for specific guidance on HM Storage.

- **HM procurement through the Re-Use store:** HM may be available for no cost at the Reuse Store. Instead of bringing more HM (that must be managed in accordance with Navy guidelines) on Navy property, reuse another work center's overage. The Reuse Store is primarily located at NS Norfolk Building X-218. The Navy ERP (N-ERP) website provides Asset Visibility by Installation and Region and allows customers to see if material are available at their local HAZMINCEN for free issue or for purchase. N-ERP is a CAC enabled website so a CAC certificate is required but a login and password may not be required to check material availability. If the vessel wants a list of the Hazardous material that is carried at X-218, CHRIMP Techs can add the vessel to the distribution list.

- **HAZMINCEN Locations:**
  - NS Norfolk: Building LF-50 (Building X-218 Reuse Store)
  - NAS Oceana: Building 826
  - Fort Eustis Building 1205

  Note: NS Norfolk customers are encouraged to contact Building X-218 to confirm material availability of Reuse/SHIPR material (walk-ins are welcome).

- **Self-Help:** When working on a project, ensure that all appropriate work permits are obtained prior to starting your project. You can get free paint and other building materials for small jobs to spruce up your command at your base's Self-Help Center.

- **Process changes**: Is there a way to conduct the work without using a HM or creating a HW? The Navy is constantly testing safer, more environmentally friendly chemicals and processes. For the latest developments, call your P2 Media Manager or Naval Air Technical Data & Engineering Service Command (NATEC) representative (https://mynatec.navair.navy.mil).

- **Solvents**: Solvents can generate large volumes of HW with stringent management requirements and costly disposal. Consider replacing solvents containing methyl ethyl ketone (MEK (a.k.a. 2-butanone)), xylene, and toluene with less toxic materials such as EP-921. Clean parts requiring high purity solvents with fresh solvent and use the remaining solvent to clean other dirtier parts before replacing.

- **Material substitution**: Is there a less hazardous or more "environmental friendly" material that can be substituted for the HM? Green procurement is the purchase of **approved** environmentally preferable products and services in accordance with one or more of the established Federal "green" procurement preference programs.

- **Green Products**: Consider green products and/or services as the first choice in all procurement, including service contracts. DoN activities must purchase green products when planning to purchase products and/or services in the following categories (note that this list is not all inclusive):
    - Office products (including electronic equipment) and printing services
    - Fleet maintenance products
    - Building construction, renovation, maintenance, and janitorial products
    - Traffic control
    - Parks and recreation and landscaping services
    - Appliances and lighting

Federal green procurement preference programs

Products manufactured from recovered materials	https://www.epa.gov/greenerproducts
Environmental preferable products	https://www.epa.gov/greenerproducts
Energy efficient products	https://www.epa.gov/statelocalclimate
Bio-based products	http://www.biopreferred.gov/?SMSESSION=NO
EPA's Design for the Environment Safer Product Labeling Program	http://epa.gov/dfe/pubs/projects/formulat/formpart.html
Alternative fuels and fuel efficient vehicles	http://www.eere.energy.gov/topics/vehicles.html

To support the Green Procurement Program(GPP), Contracting and Purchasing personnel must take GPP training through Navy Schools, Defense Acquisition University, DLA's Buying Green Workshop, NAVSUP'S DON Consolidated Card Program Management Division (CCPMD) Website (https://www.navsup.navy.mil/ccpmd), and NAVFAC Environmental Compliance, Assessment Training and Tracking System(https://environmentaltraining.ecatts.com/).

Defense Logistics Agency (DLA) has developed an environmental products catalog that can be found at http://www.dscr.dla.mil/userweb/dscrld/epa/epinfo.htm. This catalog gives brief equipment descriptions, national stock numbers (NSNs), and environmental benefits of products.

- **Recycle/Reuse:** Instead of disposing of an item, is there another use for this material within your command? Can the item be recycled through the Regional Recycling Program (RRP)? If the item is not currently accepted through the Program, should it be?

The P2 media managers can assist in waste reduction efforts by identifying pollution prevention equipment and conducting process evaluations. Additional information and resources are available at Ref. C the Joint Services P2 library.

C) ***CONSOLIDATED HAZARDOUS MATERIAL REUTILIZATION AND INVENTORY MANAGEMENT PROGRAM (CHRIMP)***

In accordance with the Chief of Naval Operations (CNO) message dated 3 Jan 2003, all ships and shore installations are required to fully implement CHRIMP. All commands (ship or shore) can return excess and unused HM to the Fleet Industrial Supply Center (FISC) HAZMINCENs (see section I.B for HAZMINCEN locations). For more information please see section II.B of this guide.

D) ***REGIONAL SOLID WASTE AND RECYCLING***

- Information on Naval Facilities Engineering Command Mid-Atlantic (NAVFAC MIDLANT) Regional Resource, Recovery, and Recycling Program and other recycling programs can be obtained by contacting the Mid-Atlantic Regional Recycling Program (RRP) contact listed in Appendix 1.

- The Regional Recycling Centers are located at:
  - NS Norfolk: Building Z-309
  - NAS Oceana & Dam Neck Annex: Oceana Building 934
  - Joint Expeditionary Base Little Creek-Fort Story West: FS West Building 3661
  - NWS Yorktown and Cheatham Annex: Yorktown Bldgs. 718 & 2024

- To continue recycling in a safe and environmentally responsible manner, we need your help when preparing for delivery to the Recycling Center. It is important that you have a clear understanding of which materials are acceptable and which are not. To help you in preparing your loads and to ensure they will be accepted at the Recycling Center, the following information is provided. This does not encompass all possible items, rather it is a general list of most frequently delivered items.
  - Hours of operation are Monday-Friday 0700-1500 (no appointment necessary)
  - DD1348 required
  - No after-hours drop-off on certain turn-ins
  - For additional information contact the RRP

NOTE!

Items collected and received may change from time to time based on the commodities markets. If you find or have items not included below and you are uncertain about them, please call your installation Recycling Center.

1) Examples of materials that are recycled
   a. **Mixed stream office recycling:** All office recycling is accomplished through a mixed stream recycling method utilizing 90 gallon blue recycling bins. These bins are located in various areas in all buildings on the installation. The bins are picked up on prescheduled days and on call emergencies. All material is also accepted at all the Recycling Centers. The following materials are accepted in the blue recycling bins: white and colored paper; newspaper; phone books; plastic bottles; small cardboard containers; file folders; magazines; aluminum cans; envelopes.
   b. **Cardboard**: Flat cardboard may be placed in dumpsters marked "Cardboard Only". Cardboard is accepted at all recycling centers.
   c. **Metal Items**: Metal items may be placed in dumpsters marked "Metal Only". Metal items are also accepted at the Recycling Centers. Units with special needs should contact their Recycling Center, located on their installation.
   d. **Dock (Mooring) Lines**: All lines can be coiled, and secured to a pallet when dropped off at the Recycling Centers. (Not required at JEBLC Recycling Center.)
   e. **Drums (Metal or Plastic)**: Contact your Recycling Center before turning in empty drums/containers for special instructions. Drums containing one inch or more liquid will be rejected.
   f. **Empty Compressed Gas Cylinders**:NAVFAC MIDLANT ESD no longer accepts cylinders.
      1. Attempt first to return the CGC to the vendor.
      2. If the vendor will not accept, attempt turn-in through coordination with DLA's contract with Haas (.Cylinder Returns and Excess Turn-ins (866) 724-0932)

      If Haas will not accept, contact your HW Media Manager for disposal assistance. Disposal costs of CGCs are the responsibility of the customer.
   g. **Appliances**:
      - Useable appliances such as air conditioning and refrigeration (A/C&R) units, washers, and dryers may be turned in to DLA Distribution Services for possible resale. Contact DLA for guidance (see section II.E for details).
   - Unusable washers and dryers may be recycled.
   - Unusable AC&R units (e.g. refrigerators, air conditioners, water fountains, freezers, or any item that normally contains refrigerant), may be recycled IF:
      - All remaining refrigerant has been removed and unit is certified "refrigerant-free" by a certified technician. Contact NAVFAC-MIDLANT maintenance or your FMS to coordinate this service.
      - The run capacitors and start capacitors have been removed (a/c units).
      - The compressors have been removed (refrigerators and a/c units)
      - All oils have been removed and properly disposed of.

   h. **Motor Vehicle Parts**: Units must deliver their parts in government vehicles.
   - Engine blocks must be drained* of all fluids; oil filters and pans must be removed.
   - Transmissions must be open and drained* of all fluids.
   - Rear ends must be drained* and the plate removed.

drained oils can be turned in by calling the Environmental Services Desk (ESD)

i. **Batteries**: recyclable lead acid batteries are accepted provided they meet the following restrictions:

- Only **lead acid** batteries that are **not metal encased**. In special cases metal encased lead acid batteries may be taken by the Recycling Program depending on market conditions- contact your installation recycling manager for clarification.
- Batteries must be in good condition with caps securely in place. Batteries that are cracked or have missing caps must be disposed of as HW- contact the NAVFAC MIDLANT Environmental Services Desk (ESD) for disposal.
- The customer must deliver the batteries to the Recycling Centers in a government owned vehicle.
- All batteries not meeting the requirements listed above are to be turned over for disposal to NAVFAC-MIDLANT ESD.

j. **Toner Cartridges**: Cartridges must be placed in a clear plastic bag or in a box and sealed to prevent powder from spilling; place beside the 90 gallon Blue Recycling container for pickup.

k. **Expended Brass Casings**: All MPPEH residue (i.e., inert small arms spent brass casings .50 caliber or smaller), lead, and mixed metals or shrapnel will be turned-in to the local QRP via the NAVFAC MIDLANT QRP Hampton Roads Operations Manager or QRP MPPEH Supervisor. Please refer to COMNAVREGMIDLANTINST 5090.6 Appendix D (Installation Explosive Hazardous Waste Management Plan) for a full list of requirements regarding the management of MPPEH residue. Requirements for managing expended brass casings include but are NOT limited to the following:

- Small arms cartridge cases should be separated by metal types (i.e., steel, chrome, aluminum, brass). Under no circumstances should large .50 caliber and small .22 caliber, be mixed or co-mingled with any other size cartridge casings in the same container. They must be packed separately. Range residue, other than small arms cases, i.e. shrapnel or lead, will be placed in its own container and clearly marked.
- Expended brass casings must be managed in sealed and labeled 55-gallon drums in a facility or area where the drums are protected from the elements (i.e. rain, snow, etc.). At no time before or after certification and verification should water be allowed to enter the drums.
- Drums must be accompanied by a DD 1348-1A that includes the Generating Command/Range, Quantity, Date, Names and Signatures of personnel certifying and verifying that all shell casing are inert. (NOTE: Each shell casing requires a two-person 100% visible inspection that the shell casing is inert. QRP has been instructed to turn away expended brass that does not contain the appropriate paperwork with authorized dual signatures and certification statement.)

l. **Recycling Pallets-** For recycling pallets, tenants are responsible for transporting the pallets, whether broken or whole to a local recycling center. Broken pallets are accepted, and then sent out as recycled wood. Pallets are also available for reuse if picked up. For more information please contact the recycling manager that is responsible for your installation. Contact information is located in Appendix 1.

2) Some materials that are **<u>rejected</u> (*questions contact Recycling Manager or See Section IV)***

a. Any material containing hazardous or toxic substances, materials or waste
b. Gasoline, diesel fuel, propane or other petroleum products
c. Pressurized Cylinders and Fire Extinguishers
d. Asbestos of any kind (such as pipe insulation or surfacing materials)
e. Wire rope or cable in lengths greater than 6 feet
f. A/C&R units that are NOT certified CFC free or have run/start capacitors
g. PCB containing materials such as capacitors, ballast, and transformers
h. Fluorescent or mercury vapor lights and related fixtures
i. Radioactive materials or containers
j. Free flowing fluids of any kind
k. Dirt, debris, trash or waste of any kind
l. Food or food byproducts
m. Bedding or clothing products
n. Cooking oil or grease
o. Wood (accepted only at selected sites)
p. Yard waste
q. Tires (accepted only at selected sites)
r. Rags/Shop Towels
s. Lawn or plastic furniture
t. Speedy-Dry or absorbent materials or chemicals
u. U. Medical waste of any kind

II. HAZARDOUS MATERIAL REUTILIZATION INFORMATION

If you have excess or unused hazardous material, it is important that the following alternatives to disposal be considered. Disposal of HM should be utilized as a last resort.

- Returning to supply (HAZMINCENs) for credit or reuse
- Extending shelf-life
- Crossdecking use
- Turning in to DLA Disposition Services Norfolk (formerly DRMO)

A) USEFUL CONTACT INFORMATION

- see Appendix 1.

- **HAZMINCEN Locations:**
  - NS Norfolk: Building LF-50 (Building X-218 Reuse Store)
  - NAS Oceana: Building 826

B) RETURNING HAZARDOUS MATERIALS (HM) TO SUPPLY HAZMINCENs

If you purchase HM and determine the item is not needed, it can be returned to the HAZMINCENs for a refund or for reuse. Refunds are provided for new/unopened HM purchased from the HAZMINCEN. Please note that refunds are not given on special (non-stock) orders. FLC Norfolk also offers a Reuse Store located at Naval Station Norfolk, Building X-218. The Reuse Store will accept and issue excess or unused HM **free of charge**; however, any disposal associated with unused HM shall be funded by the customer. HM needs to be processed through HICSWIM or if it is BP-28 material, it must be processed through R-SUPPLY. HM destined for the Reuse Store can be turned in at any of the FISC HAZMINCENs across the region. To return excess/unused material, the item must meet the following conditions:

1) Material must be accompanied by 2 (two) copies of completed DD Form 1348-1A or DD Form 1348-1 created by HICSWIN (see Appendix 2 for instructions).

2) Material must be unopened and have original labels. (Partially used material may be considered for cross-decking or turned in for disposal.)

3) Container must be undamaged or minimally damaged (i.e. slightly dented) and have minimal rusting.

4) FLC Norfolk will accept Type I that has not expired and Type II shelf life material that has not been extended more than two times (see section II.C). Contact DLA Disposition Services for items that have been extended more than two times.

IF YOU HAVE MORE THAN 4 PALLETS OF EXCESS HM TO TURN-IN (SHIPS)

- Coordinate the offload/turn-in through the assigned CHRIMP Technician **24 hours** in advance of desired off-load.
- All HM leaving ships must be processed through the HAZMINCEN via HICSWIN.
- The offload procedure is as follows:
  PLANNING: Once informed of a request for an offload, the designated ship representative will contact the CHRIMP office.

REVIEWING: The CHRIMP technician will examine the items to determine what is still usable and what is excess used material.
TRACKING: Data management depends on the type of excess stock. HICSWIN will be the software used for all reuse material offloaded; R-Supply will be used for all BP-28 (Deep Stock) material offloaded. These programs have the capability to print four (4) copies of DD Form 1348-1A or 1348-1, "Material Turn-In." The 1348-1A or 1348-1 must have the ECAP acronym stamped on the document prior to turn-in.
DISPOSAL: should the HM require disposal, contact NAVFAC MIDLANT ESD services to arrange for pick-up by calling 757-341-0412/0460.

- Additional information regarding disposal procedures is detailed in Section III.

C) EXTENDING SHELF LIFE

- One of the most effective waste minimization programs that can be established is the active life-cycle management of hazardous materials before they become hazardous waste. All shelf-life material is either Type I or Type II.

- Type I shelf-life items are materials that have a set expiration date, which cannot be extended. Once this date has passed, the material cannot be used for its intended purposes and can be turned into DLA Disposition Services for resale. The containers must be unopened and in good shipping condition (no excessive rust).

- Type II shelf-life items are materials that do not have a specific expiration date. The manufacturer typically will recommend that the item be re-evaluated on a particular date. The label will usually state a "Test" or "Re-Inspect" date. Type II shelf-life items can be extended providing the material is still viable or usable. For most Type II materials, shelf-life extension tests are not complicated, do not require a laboratory, and can be done on the spot by anyone with a minimum of training (usually consisting of nothing more than visual checks for damage or deterioration). FISC Norfolk is available to assist with shelf-life extensions- please contact the HAZMINCENS for additional assistance.

- The General Services Administration (GSA) and all military services have developed separate storage standards. For example, shelf-life extension of paint can be accomplished according to the Federal Standard 793, "Depot Storage Standards". End users are authorized and encouraged to examine paint using FED-STD-793 guidelines or by using practical, end-use related tests to determine if the materials still meet their intended use. End users may extend the shelf life as long as the paint performs satisfactorily for their needs. Before disposing of paint, you are strongly encouraged to review FED-STD-793, paragraph 4. See NAVSUP P-485, Chapter 4, paragraph 4664 for further shelf-life material management guidance. For further assistance in determining if the shelf life can be extended, contact CHRIMP Technician on board or your supply officer. The best way to extend the life of all Type II materials is proper storage. For example, paints should not be stored below freezing and should be protected from rain or salt spray.

- DLA Aviation, formerly Defense Supply Center Richmond (DSCR), VA has a Quality Status List (QSL) which extends certain Type II Federal Stock Class (FSC) material. Included on the QSL are Federal Stock Classes (FSCs): 6635, 6750, 6810, 6840, 6850, 9110, 9150, and 9160. To obtain a copy of the microfiche that show the shelf-life extensions, contact DLA Aviation (see Appendix 1 for contact information).

- REFERENCES - "Shelf Life Identification Management and Control" (PIN# V805830) is a video available at any electronic media center. More information on DOD's shelf-life extension program may be found in Ref. D.

D) ***CROSSDECKING MATERIAL***

HM may be available for no cost at the Reuse Store. Instead of bringing more HM (that must be managed in accordance with Navy guidelines) on Navy property, reuse another work center's overage. The Reuse Store is primarily located at NS Norfolk Building X-218. The Navy ERP (N-ERP) website provides Asset Visibility by Installation and Region and allows customers to see if material are available at their local HAZMINCEN for free issue or for purchase. N-ERP is a CAC enabled website so CAC certificate is required but a login and password may not be required to check material availability.

PLEASE NOTE!

Prior to receiving HM from another activity, contact your Safety representative or CHRIMP Technician to ensure that the material is authorized for use. The material must be listed on your Authorized Use List (AUL) or Type Ships Hazardous Material List (T-SHML). Also your Safety representative or CHRIMP Technician can assist you in obtaining a Material Safety Data Sheet (MSDS) for the item.

E) ***DLA DISPOSITION SERVICES, NORFOLK***

- may accept material for resale that the HAZMINCENs cannot accept, even expired materials. Contact DLA Disposition Services to ensure acceptance and to arrange for the transfer of material. Requirements include:

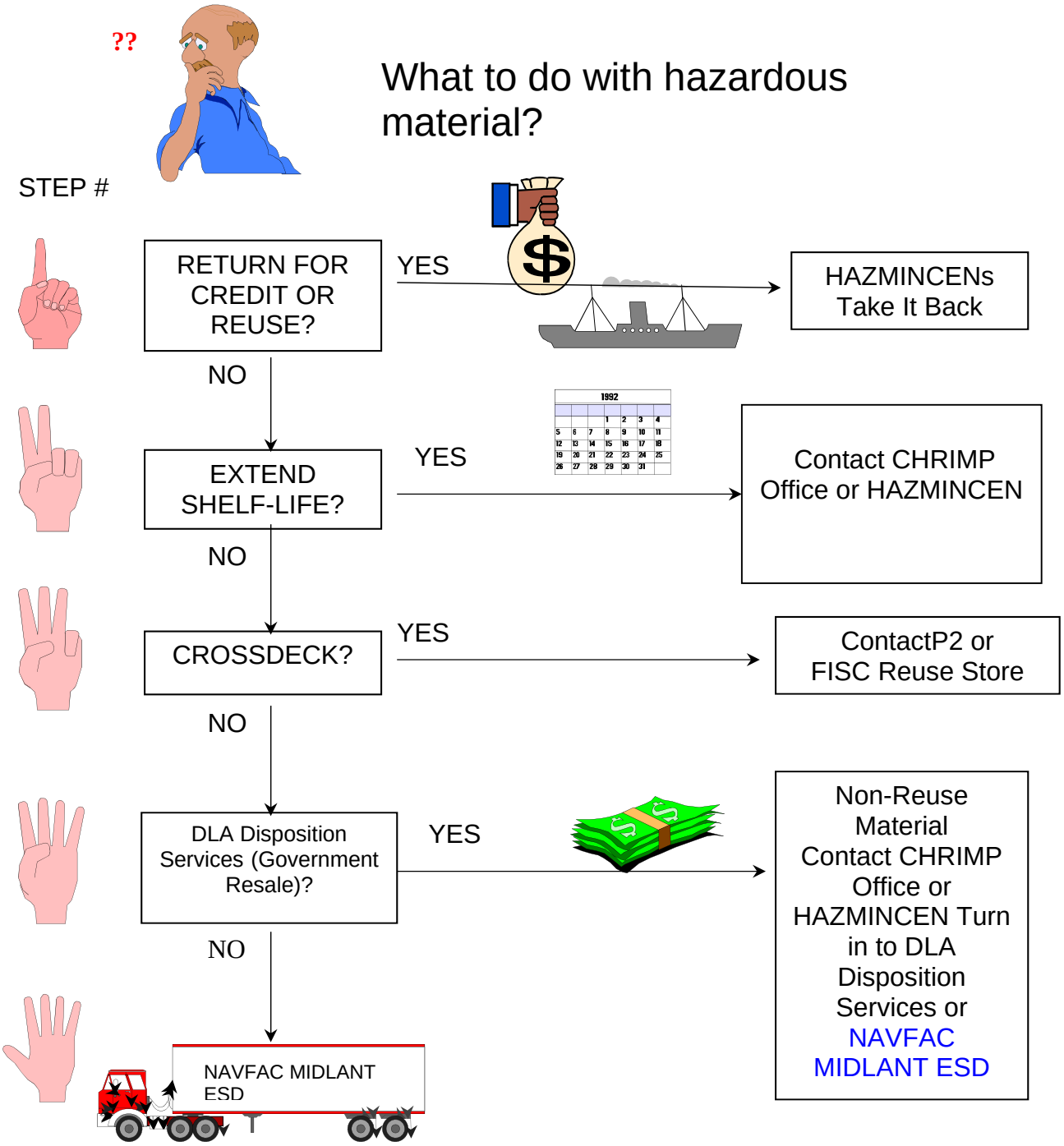
3) Containers should be in good condition-not rusted or dented
4) If kits are being turned in, all parts of the kit must be included
5) Paperwork required:
   a. Two (2) copies of completed DD Form 1348-1A, or 1348-1 created in HICSWIN for each item. (See Appendix 2 for instructions).
   b. MSDS for each item.
   c. The Occupation Safety and Health Administration (OSHA) Hazardous Chemical Warning Label must be present on the items (must be adhesive type label).
6) Examples of materials ACCEPTED by DLA Disposition Services Norfolk:
   - All flammable materials (solvents, paints, etc.)
   - All photographic chemicals
   - Corrosive material (acids, bases, etc.)
   - Used synthetic oils and used synthetic hydraulic fluids
   - Mercuric nitrate
   - Cleaning compounds
   - Greases, POLs
7) Examples of materials NOT ACCEPTED by DLA Disposition Services Norfolk
   - Oxidizers (hydrogen peroxide, emergency escape breathing devices, etc.)

- Dented or excessive rusted drums
- Open containers
- Compressed Gas Cylinders or Fire Extinguishers
- Used items that would be considered waste
- Items containing any level of polychlorinated biphenyls (PCBs)
- Any radioactive materials

If your HM is rejected, please request a 39-3U form, which provides specific information explaining why your HM was rejected. If the item was rejected for clerical reasons, make the necessary corrections and re-attempt transfer. Otherwise, contact the NAVFAC MIDLANT ESD for disposal of the item (see Section III for specific instructions).

NOTE!

As of August 27th 2014, Hazardous Waste Transporters are no longer required to have VA DEQ Permits.



NOTE- SELF TRANSPORT OF HW IS NOT PERMITTED!

Under no circumstances should HW be transported by a vehicle not authorized by NAVFAC MIDLANT Environmental. It is illegal to transport HW without meeting the required EPA and DOT training, certifications and commercial driver's license endorsements.

III. HAZARDOUS WASTE MANAGEMENT AND DISPOSAL INFORMATION

What is a Hazardous Waste?

In accordance with Ref. E, for a material to become a hazardous waste it must first become a solid waste. A solid waste is any discarded material that is not excluded by regulation. Discarded material can be a solid, liquid, or gas and is any which is:

- Abandoned
- Inherently Waste-Like (Hazardous Waste to be recycled)

A solid waste becomes a hazardous waste as defined in the Resource Conservation and Recovery Act (RCRA) when it is:

- Not excluded or exempted by RCRA (examples of wastes that are not hazardous waste due to exclusions or exemptions are scrap metal and household waste).
- A Characteristic Waste (determined by generator knowledge or testing). These include wastes that are:
    - Ignitable
    - Corrosive
    - Reactive
    - Toxic
- A Listed Waste. These include wastes specifically identified in RCRA of the Code of Federal Regulations. (ex; 2,4-Dinitrotoluene, benzene, phenol, nitroglycerine, etc.)

RCRA gives the Environmental Protection Agency (EPA) or delegated state regulatory agency the authority to control hazardous waste from "cradle to grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste.

If a HM is determined to no longer be suitable for its intended purpose and all other routes of utilization have been attempted, the last management alternative is disposal as waste. NAVFAC MIDLANT ESD, the region's HW transportation and disposal agent, will pick up HW at Hazardous Waste Accumulation Areas (HWAAs), Satellite Accumulation Areas (SAAs), Universal Waste Accumulation Areas (UWAAs) and other specified locations.

Funding for disposal of Fleet (FLT) activity's generated wastes has been established. Non-FLT activities are required to submit a valid Job Order Number (JON) when turning in waste. For assistance in establishing a job order number, contact the appropriate Hazardous Waste Media Manager or NAVFAC MIDLANT ESD or follow the procedure in Appendix 8. HW management and disposal instructions are listed below.

A) USEFUL CONTACT INFORMATION

- see Appendix 1.

B) ACCUMULATION OF HAZARDOUS WASTES – SHORE ACTIVITIES:

The EPA and the Virginia Department of Environmental Quality (VDEQ) regulate the management and disposal of HW. NAVFAC MIDLANT is the HW manager for the Navy in the Hampton Roads area. To ensure compliance, the appropriate Hazardous Waste Media

Manager must approve establishment of all HW accumulation areas **prior to use**, as well as closure of the areas **prior to the planned closure date**. In addition, the Hazardous Waste Media Manager must be informed of any issues that have the potential to affect the Navy's ability to comply with the governing environmental regulations. All HW must be accumulated in designated areas. If HM is stored in the same location as HW, ensure the areas are clearly marked to identify HM from HW. There are three main types of authorized hazardous waste accumulation areas: Satellite Accumulation Areas **(SAAs)**; Hazardous Waste Accumulation Areas **(HWAAs)**; and Universal Waste Accumulation Areas **(UWAAs)**.

1. SATELLITE ACCUMULATION AREA (SAA)

SAA PURPOSE: to allow proper management of HW as it accumulates without interfering with the work process. There are no limits on the number of waste streams that can be accumulated, but the TOTAL AMOUNT MUST NOT EXCEED 55 gallons (or 1 quart of acutely hazardous waste). Each waste stream shall be stored in a separate container and the container must be compatible with the waste being stored. If a SAA will be unattended due to unit deployment, project ending, etc., waste must be turned in to NAVFAC MIDLANT ESD and the Hazardous Waste Manager contacted to have the area shutdown two weeks in advance.

GENERAL REQUIREMENTS FOR ALL HW AREAS

- All containers must be labeled and kept closed except when adding or removing waste.
- Operators must be trained annually on proper area management and emergency response procedures.
- Areas must be identified with legible signs as a SAA with the point of contact's information, NO SMOKING, and emergency procedures and numbers.
- Areas must have adequate suitable spill control equipment to contain contents of the area should a spill occur. Spill equipment/supplies must be maintained. Follow spill reporting procedures in Appendix 3
- A fire extinguisher must be located within 50 feet of the area. An ABC type extinguisher is recommended. The fire extinguisher shall be routinely inspected in accordance with safety or fire departments requirements.
- Good housekeeping standards must be employed at all times. Keep areas orderly with adequate aisle space and clear of trash.

SAA SPECIFIC REQUIREMENTS: a SAA area must meet several criteria, including:

- Be located at or near the point of waste generation.
- Be under the control of the operator of the process that generates the waste.
- Operators must be trained annually on proper area management and emergency response procedures.
- Containers must be labeled with the words "Hazardous Waste" and the contents of the container.
- The container does not require an accumulation start date, however, if a container becomes full prior to pick up, it must be dated immediately, and moved to an approved HWAA or a permitted facility within 72 hours.
- May only store a max of 55-gal total of all HW (or 1 quart acutely hazardous waste).

SAA INSPECTIONS:
The checklist included in Appendix 5 provides a concise listing of the regulatory requirements of a SAA. It is **highly recommended** that each HW generator perform undocumented reviews of their SAA at least weekly, using the checklist. The Installation Environmental Office will perform SAA inspections at least quarterly to provide technical support, management guidance, and regulatory oversight.

SAA DISPOSAL PROCESS:
When a container is 75% full (or one quart of acute HW), contact NAVFAC MIDLANT ESD to schedule a pickup. Be sure to inform Dispatcher your area is a SAA site.

2. HAZARDOUS WASTE ACCUMULATION AREA (HWAA)

HWAA PURPOSE: to allow for the temporary accumulation of HW in preparation for transportation to a permitted treatment, storage or disposal facility.

GENERAL REQUIREMENTS FOR ALL HW AREAS
- All containers must be labeled and kept closed except when adding or removing waste.
- Operators must be trained annually on proper area management and emergency response procedures.
- Areas must be identified with legible signs as a HWAA with the point of contact's information, NO SMOKING, and emergency procedures and numbers.
- Areas must have adequate suitable spill control equipment to contain contents of the area should a spill occur. Spill equipment/supplies must be maintained. Follow spill reporting procedures in Appendix 3
- A fire extinguisher must be located within 50 feet of the area. An ABC type extinguisher is recommended. The fire extinguisher shall be routinely inspected in accordance with safety or fire departments requirements.
- Good housekeeping standards must be employed at all times. Keep areas orderly with adequate aisle space and clear of trash.

HWAA SPECIFIC REQUIREMENTS:
- Provide at least 14-days notice to the Hazardous Waste Media Manager prior to the need for a HWAA set-up to allow for area set up and timely notification to the VDEQ.
- Provide at least seven (7) days notice to the Hazardous Waste Media Manager prior to closure of a HWAA.
- Containers must be labeled with the words "HAZARDOUS WASTE", contents of the container, and the start date of when the waste is placed in the container.
- Must be inspected every seven (7) calendar days.

HWAA INSPECTIONS:
Operators of a HWAA must perform a documented inspection of their site every seven (7) calendar days and maintain those inspection records for three (3) years. The inspection is to be documented using the HWAA checklist that is included in Appendix 6. The checklist provides a concise listing of the regulatory requirements of a HWAA.

Any deficiency/violation must be corrected immediately. Deficiency corrections must be noted on the inspection sheet in the space provided. Corrective action taken, date accomplished, and initials of person performing corrective actions must be recorded.

The Installation Environmental Office will perform HWAA inspections at least quarterly to provide technical support, management guidance, and regulatory oversight.

HWAA DISPOSAL PROCESS:

At or before 45 days of accumulation, contact the NAVFAC MIDLANT ESD to schedule a pickup of the waste. If waste is not picked up by the ESD within their allotted service response time (1 week), recall the ESD immediately!

3. UNIVERSAL WASTE ACCUMULATION AREA (UWAA)

UWAA PURPOSE: to allow for the temporary accumulation of specific waste streams in preparation for transportation to a permitted treatment, storage or disposal facility.

GENERAL REQUIREMENTS FOR ALL HW AREAS

- All containers must be labeled and kept closed except when adding or removing waste.
- Operators must be trained annually on proper area management and emergency response procedures.
- Areas must be identified with legible signs as a UWAA with the point of contact's information, NO SMOKING, and emergency procedures and numbers.
- Areas must have adequate suitable spill control equipment to contain contents of the area should a spill occur. Spill equipment/supplies must be maintained. Follow spill reporting procedures in Appendix 3
- A fire extinguisher must be located within 50 feet of the area. An ABC type extinguisher is recommended. The fire extinguisher shall be routinely inspected in accordance with safety or fire departments requirements.
- Good housekeeping standards must be employed at all times. Keep areas orderly with adequate aisle space and clear of trash.

UWAA SPECIFIC REQUIREMENTS:

The current Universal Waste regulations apply to four types of widely generated HW: *batteries, pesticides, mercury-containing equipment, and lamps*. It should be noted that there is a separate recycle program for discarded rechargeable batteries and is encouraged to be utilized. Please refer to Appendix (7) for additional information. All UWAAs must adhere to various environmental regulatory requirements including:

- Containers must be labeled with the words "UNIVERSAL WASTE", contents of the container, and the start date of when the waste is placed in the container.
- A seven (7) day advance notice should be provided to the Hazardous Waste Media Manager to allow time for set up of the UWAA. For closure of a UWAA, contact the Hazardous Waste Media Manager before the planned closure date.

UWAA INSPECTIONS:

It is **highly recommended** that each generator perform monthly reviews of their UWAA using the checklist in Appendix (8).

The Installation Environmental Office will perform UWAA inspection at least quarterly to provide technical support, management guidance, and regulatory oversight. The standard operating procedure and inspection checklist for UWAAs are included in Appendix 8.

UWAA DISPOSAL PROCESS:
At or before 270 days of accumulation (9 months), prior to expiration of the one year accumulation period, contact NAVFAC MIDLANT ESD to schedule a pickup of the waste. Inform the NAVFAC MIDLANT ESD that your waste is stored in a UWAA.

C) WASTE PACKAGING REQUIREMENTS - SHIPS OR SHORE ACTIVITIES

Hazardous waste must be properly packaged in the original or an approved container. DOT requires specific packaging and training for shipment. Direct specific questions regarding container availability and packing requirements to the NAVFAC MIDLANT ESD.

NOTE! ONLY NAVFAC MIDLANT ESD OR A PRE-APPROVED CONTRACTOR IS PERMITTED TO TRANSPORT HW WASTE OFF BASE OR ON OPEN ROADS UNDER ANY CIRCUMSTANCES. IT IS ILLEGAL TO TRANSPORT HW ON PUBLIC ROADWAYS WITHOUT MEETING THE REQUIRED EPA AND DOT TRAINING, CERTIFICATIONS, COMMERCIAL DRIVERS LICENSE ENDORSEMENTS, AND PROPER SHIPPING DOCUMENTS.

D) MATERIAL / WASTE PAPERWORK REQUIREMENTS – SHIP OR SHORE

- Four completed copies of the DD Form 1348-1A, or 1348-1 created in HICSWIN, are required for turn-in of unusable HM or HW to NAVFAC MIDLANT ESD. Instructions on how to complete this form are listed in Appendix 2.
- Contact the NAFAC MIDLANT ESD at 757-341-0412/0460 and fax a copy of the completed DD Form 1348-1A, or 1348-1 created in HICSWIN, to 341-0436 prior to scheduling a pickup and to ensure prompt service.
- All four copies of the DD Form 1348-1A, or 1348-1 created in HICSWIN, are required at time of pickup. Copies are distributed as follows: client, MIDLANT driver, on container, and returned to FISC.
- For ships, one copy of the 1348-1 created in HICSWIN with the ECAP acronym stamped on the document and signed by the CHRIMP Technician is needed.
- For material that was not procured through the Navy stock system, a Material Safety Data Sheet (MSDS) is required.

E) MATERIAL / WASTE TURN-IN REQUIREMENTS – SHIPS

- Ships in local private shipyards: Ships will be provided with a POC to call to schedule a HAZMAT pickup. Contact the CHRIMP Office to initiate this action for you. Only CHRIMP Technicians are authorized to contact NAVFAC MIDLANT ESD to schedule a pickup of the waste. Allow adequate time for waste screening and quality control (QC) for CHRIMP and NAVFAC MIDLANT ESD.

- Ships at Norfolk Naval Shipyard: contact the NNSY Occupation, Safety, Health, and Environmental Office (Code 106), for assistance with HW disposal.

- Ships at Naval Weapons Station Yorktown: contact the NAVFAC MIDLANT ESD to arrange an offload.

- Ships at NS Norfolk (4 pallets or less) or JEB Little Creek (2 pallets or less): NAVFAC MIDLANT ESD offers several HW pickup points on the piers. The specific piers and pickup times are listed below. Each ship is to contact and coordinate with their assigned CHRIMP Technician. A representative from the ship must accompany the HW from the time it leaves the ship to the time it is picked-up by NAVFAC MIDLANT ESD. **Under no circumstances shall waste be left unattended or abandoned on piers**

Naval Station Norfolk Pier pickup schedule is: Monday – Friday

0800-0915	Pier 9
0800-0915	Pier 12
1000-1115	Pier 3
1000-1115	Pier 4

4 pallets or less

JEB Little Creek Pier pickup schedule is: Tuesday and Thursday

0800-0900	Pier 15
1000-1100	Quaywall

2 pallets or less

- Ships at NS Norfolk (more than 4 pallets) or JEB Little Creek (more than 2 pallets) must request and turn-in through the CHRIMP Office, the Logistic Support Representative (LSR) or the FISC Hazmat representative. Once informed of a request for off-load, the CHRIMP Technician will screen the material and determine what is still usable and what is waste. The CHRIMP Technician and NAVFAC MIDLANT ESD representatives will then coordinate the off-load. A representative from the ship must accompany the waste until it is picked up by the NAVFAC MIDLANT ESD. Under no circumstances shall waste be left unattended or abandoned on the piers. If possible, ships should utilize the pier pickup option over the course of several days instead of scheduling an offload. For special pickups, LSR or FISC Hazmat representatives do not screen unless it is known ahead of time and special arrangements are made, otherwise, call for special pickups.

PLEASE NOTE!

It is a violation of state and federal law to abandon HM/HW.

F) DUMPSTER REQUEST

- **Procedures for requesting a Hazardous Waste Dumpster-** coordinate with EV services for disposal.

IV. MANAGEMENT OF SPECIFIC MATERIALS/WASTES

A) USEFUL CONTACT AND WASTE PICKUP INFORMATION

– see Appendix 1

B) WASTE MANAGEMENT REQUIREMENTS

All waste turn-ins to NAVFAC MIDLANT ESD require four copies of the DD Form 1348-1A (for shore activities) or 1348-1 (for ships). For instruction on completing Form 1348, see Appendix 2.

A job order number (JON) is required for all environmental services. To establish a JON, follow the procedure in Appendix 9.

For items not listed below, please contact your installation Hazardous Waste Media Manager!

PLEASE NOTE!
BAGGED WASTE WILL ONLY BE ACCEPTED FOR PICK-UP IN CLEAR BAGS!
RED OR YELLOW BAGS SHALL NEVER BE USED!

1. ABSORBENT MATERIAL

- If the absorbent material was used to absorb HW or HM, it must be managed as a HW.
- If the absorbent material has been used to absorb oil, the absorbent will be managed in a similar fashion as oil. Oily absorbent materials should be fully utilized prior to disposal and must be placed in clear plastic bags and then containerized and turned in to the NAVFAC MIDLANT ESD.
- Please refer to section I for absorbent green alternatives. Using greener absorbents may increase product efficiency and reduce waste generation.
- See IV.B.28 for oily rag management.

2. AEROSOL CANS

Return unused aerosol cans to the HAZMINCEN for potential reuse. Contact your HAZMINCEN for more details. Also see the Material Reutilization Information (Section II) of this guide for additional alternatives to disposal. If the cans are rejected by the HAZMINCEN and the additional options listed in Section II of this guide are non-applicable, manage the aerosol cans as applicable below:

a. **Punctured Aerosol Cans:** Shore Tenants have the option to puncture aerosol cans using equipment approved by the Hazardous Waste Media Manager. The site POC is responsible for restricting access to the aerosol puncturer to ensure correct use. The contents of the punctured

cans must be collected and must be managed as HW: contact the Hazardous Waste Media Manager to establish the appropriate accumulation area prior to setting up the puncturing device. In addition, the MSDS should be provided to the Hazardous Waste Media Manager prior to set up of the accumulation area. Punctured aerosol cans may then be placed in Metals Dumpsters for recycling. **NOTE-Aerosol cans containing corrosives, freon, pesticides, insecticides, fungicides, chlorofluorocarbons (CFCs) or oven cleaners shall not be punctured**

THERE ARE NO NAVSEA APPROVED AEROSOL PUNCTURE DEVICES FOR SHIPBOARD USE. SHIPS ARE NOT AUTHORIZED TO PUNCTURE AEROSOL CANS!

b. **Un-punctured Aerosol Cans:** Contact the Hazardous Waste Media Manager to set up an appropriate accumulation area to manage aerosol cans. Aerosol cans must either have tops in place or nozzles removed prior to containerizing.

3. ANTIFREEZE

– is typically *managed as a non-RCRA regulated waste. Antifreeze will be managed by NAVFAC MIDLANT ESD. Contact NAVFAC MIDLANT ESD to schedule a pickup. Contact the Hazardous Waste Media Manager to determine proper disposition. Do not mix the antifreeze with solvents or metals, as the mixture could result in a hazardous waste.*

4. APPLIANCES/WHITE GOODS (A/C&R Equipment)– see Recycling Section

5. AQUEOUS FILM FORMING FOAM (AFFF)

– will be managed by NAVFAC MIDLANT ESD. Contact NAVFAC MIDLANT ESD to schedule a pickup. AFFF in original containers can be turned in to the Reuse Store (NS Norfolk Building X-218).

6. ASBESTOS

- For asbestos removal from shore command pipes, buildings, roofs, floors, ceilings, etc., contact NAVFAC MIDLANT ESD to schedule an asbestos removal or waste pick-up. Four completed copies of DD Form 1348-1A and a valid Job Order Number (JON) are required.

- For asbestos removal operations aboard ships or submarines contact the Ship Support Office.

- If you are unsure if you are dealing with asbestos, shore activities should contact the NAVFAC MIDLANT ESD and ships should contact the Navy Environmental Preventative Medical Unit #2 (NEMPU-2).

- For disposal of safes and file cabinets that possibly contain asbestos, shore commands should contact CNRMA Safety to confirm asbestos presence.

Disposal must be coordinated with your Hazardous Waste Media Manager. The safe must be double wrapped in plastic by the generator and delivered to DLA Disposition Services at St. Juliens Creek. Contact DLA to schedule an appointment and to ensure you have the proper paperwork. If transportation is required, call MIDLANT Transportation Services for assistance.

- For demolition and renovation operations, see section IV.8, entitled "Construction and Demolition Debris."

7. BATTERIES

- All batteries are not managed in the same manner. Below are the specific disposal guidelines.

- Alkaline Batteries: Alkaline batteries such as AAs, C, and D batteries can be disposed of as normal trash.

- Lead acid batteries: Lead acid batteries (car type) shall be turned into Recycling.

- Rechargeable batteries: The Call2Recycle program is designed to recycle your old, rechargeable batteries from items such as cell phones, lab tops, power tools, etc. at no costs to your facility. Rechargeable batteries that are accepted through Call2Recycle include Nickel Metal Hydride, Nickel Cadmium (a.k.a. NiCd or NiCAD, Lithium Ion and Nickel Zinc. Contact your HW Media Manager to set up your own program if the above batteries are present or need additional information (See Appendix 7).

- All other batteries: Such as lithium, NICAD, mercury, lithium sulfur dioxide, and magnesium dioxide, shall be managed as Universal Waste in accordance with Section III.B.3. The batteries will be packaged to prevent shorting, (i.e. one battery to one Ziploc bag or terminals taped over). Contact NAVFAC MIDLANT ESD to schedule a pickup.

8. BONDECOTE TENT DISPOSAL

- Disposal of Bondecote Tents will go through DLA Disposition Services (formerly DRMO). POC can be reached at (445-4077.)

9. CONSTRUCTION AND DEMOLITION DEBRIS

- Building materials from demolition or renovation operations which are suspected to contain lead, asbestos and/or other regulated waste should be characterized with representative sample(s) of the entire waste stream tested prior to disposal. Contact the Hazardous Waste Media Managers for specific guidance prior to project initiation and during the planning phase to ensure proper management and disposal. NAVFAC MIDLANT ESD is required to sign all manifest prior to off-site shipment. For safety-related issues, contact the Regional Safety Department or your command's Health and Safety official.

REMEMBER: IMPROPER MANAGEMENT AND DISPOSAL OF HAZARDOUS WASTE VIOLATES STATE AND FEDERAL LAWS.

10. CALCIUM HYPOCHLORITE and SODIUM HYPOCHLORITE

- are highly unstable (i.e.,strong oxidizers), and corrosive chemicals. There have been several instances when improper storage and handling of these chemicals has resulted in fires. In addition exposure can cause extreme damage to the skin and eyes.

Handle Hypochlorites carefully. Do not allow these containers or any packaging material to become wet. Store in compatible containers off the ground so that the containers do not come in contact with a wet floor. Inspect containers for physical integrity, notify ESD if you have any containers that are physically damaged so that they may be repackaged and disposed of promptly. Do not allow these chemicals to come in contact with combustibles such as swept material from the floor, oily rags, etc. Follow the directions specified in the Safety Data Sheets (SDS) for appropriate handling and in the event of a spill. Consult Safety and your HW Media Manager for additional information.

11. CONTRACTOR PROJECTS

– For all waste generated onboard a Naval installation, it is the liability and responsibility of the Navy to ensure proper management and disposal. Specific arrangements for transportation and disposal of the waste vary by contract. Please contact your HW Media Manager for questions related to waste generated during contracted projects prior to project initiation and during the planning phase to ensure proper management and disposal. NAVFAC MIDLANT ESD is required to sign all manifest prior to off-site shipment.

12. COOKING OIL

Used cooking oil/grease can be recycled. Do not mix hazardous materials (i.e. solvents/paints) with cooking oil or grease. Do not dispose of cooking oil or grease in trash dumpsters or any drains.

At NS Norfolk there are three 300-gallon containers available for the collection of used cooking oil/grease. The containers are located at the heads of Piers 3, 10, and 14. The collection containers are located near the trash and metal only dumpsters. *Do not store pallets of cooking oil against buildings, instead store them near the dumpster(s). If questions exist regarding the use of these containers, contact the Hazardous Waste Media Manager.

At JEB Little Creek, grease should be managed in pier-side containers or in appropriate containers at food locations.

13. CREOSOTE TIMBERS

Creosote Timbers are currently NOT being recycled. Contact your Hazardous Waste Media Manager for disposal assistance.

14. CYLINDERS – (Compressed Gas Cylinders – CGC)

NAVFAC MIDLANT ESD no longer accepts cylinders.

1. Attempt first to return the CGC to the vendor.
2. If the vendor will not accept, attempt turn-in through coordination with DLA's contract with Haas (.Cylinder Returns and Excess Turn-ins (866) 724-0932)
3. If Haas will not accept, contact your HW Media Manager for disposal assistance. Disposal costs of CGCs are the responsibility of the customer.

15. DESICCANTS

Some desiccants may be disposed of as solid waste; contact your HW Media Manager for disposal requirements.

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16. ELECTRONIC WASTES (E-WASTES)

– Coordinate disposal of E-Waste with respective installation solid waste manager listed in Appendix 1.

17. EXPLOSIVE WASTES

– for all ammunition explosive waste or waste classified by the DOT regulations as explosive the NOSSA-MMRAT-2.0-Military Munitions Rule Awareness Training Course will be required and is provided online through Naval Education and Training Command. Please contact your HW Media Manager for additional information to gain access to the training module.

18. FIRE EXTINGUISHERS

– NAVFAC MIDLANT ESD no longer accepts fire extinguishers. Contact your HW Media Manager for disposal requirements.

19. FLARES

- Unused/ Unwanted Flares will be shipped as hazardous material.

Ship to:
W25G1R
Letterkenny Munitions Center
RTE 997, Voelz Gate
Chambersburg, PA 17201-4150
MARK : ***FOR WOODY PIKE***

20. FLUORESCENT / OTHER LIGHT BULBS

- Fluorescent light bulbs (green-tip* and silver-tip), compact fluorescent bulbs, high intensity discharge, neon, mercury vapor, high pressure sodium, and metal halide bulbs are to be managed as Universal Waste. Please contact your HW Media Manager for guidance. * Low mercury bulbs, often referred to as **"Green tip" bulbs still contain low levels of mercury and shall be managed as Universal Waste.**

- Except at JEB Fort Story, all tube fluorescent light bulbs will be turned into the Self-Help Facility (one for one exchange) or managed as a universal waste in accordance with Section III.B.3. All other bulbs shall be managed as a universal waste and then turned in via 1348 to the NAVFAC MIDLANT ESD.
- At JEB Fort Story,EV services no longer is sending an employee over on Tuesdays to collect bulbs. EV services requires the tenant to submit a 1348 for pickup.
- Afloat commands- turn in via pier-side pickup (see Section III.C).

- PCB-containing fluorescent light ballasts are to be turned into NAVFAC MIDLANT ESD as PCB waste. To schedule a pickup call NAVFAC MIDLANT ESD. Any non-PCB fluorescent light ballasts can be turned in to RRP.

PLEASE NOTE!

Fluorescent light ballast that do not possess the marking "PCB free" are to be assumed to contain PCBs and should be managed accordingly.

21. FUEL FILTERS (OIL, JP-5, DIESEL AND GASOLINE)

- **Gasoline/JP-8 Filters, due to ignitability, shall be managed as hazardous waste.** Contact your HW Media Manager prior to generating gasoline filters for guidance.
- **JP-5, Diesel, and other Oil Filters**
  - Drain for a minimum of 72 hours to remove liquids (when cold draining filters, puncturing the top can aid in removing oil from filter)
  - Double bag drained filters in clear plastic bags (no more than 10 in one bag), and place in the trash or turn over to NAVFAC MIDLANT ESD or NAVFAC MIDLANT Oil Recovery for disposal.

22. HEPA FILTERS

HEPA filters from indoor firing ranges may contain lead and other particulates. Prior to a filter change out contact your HW Media Manager for proper staging of the filters and assistance in characterization for disposal.

23. INDUSTRIAL WASTEWATER

depending on the wastewater characteristics and facility permit requirements, some wastewaters may be treated at the Navy's Industrial & Oily Wastewater Treatment Plants (IWTPs) or will have to be disposed of off base via DLA. Do not mix industrial wastewater with any other wastes. For more information and assistance in disposing of industrial wastewasters contact your Water Media Manager.

24. LEATHER ITEMS

Leather materials generated from activities occurring in maintenance and welding shops, laboratories, and aboard ships shall be managed as hazardous waste and

turned into NAVFAC Environmental Services for proper disposal. This includes but is not limited to leather gloves, boots, and various PPE. Should an installation tenant or command require an accumulation area for the storage of such leather material, please contact your installation's hazardous waste media manager.

Leather materials generated from office spaces, including but not limited to chairs and sofas, will be turned into DLA for proper management. Should DLA not accept this material, please contact your installation's hazardous waste media manager for proper guidance.

25. LOW LEVEL RADIOACTIVE MATERIAL

(ex: smoke detectors, Tritium EXIT signs, Radium gauges & dials, some watches and compasses) is disposed of through the Radiological Support Office (RASO). LRWW must remain at the site of generation and must be disposed of by the RASO office. To coordinate disposal of these items, contact RASO with the following information:

- Manufacturer Name, Trade Name, and Model Number
- National Stock Number (if applicable)
- Radiological Hazard (if known) and Amount (if known)
- Quantity of each
- Location of Items

**********LLRW shall not be turned into the ESD at any time. **********

26. MEDICAL / BIO-HAZARDOUS WASTE OUTSIDE OF MEDICAL FACILITIES

- RMW is any solid waste that is suspected by a health care professional of being capable of producing an infectious disease in humans. Specifically, RMW includes cultures and stocks of microorganism and biologicals that are pathogenic to humans; human blood an body fluids; tissues and other anatomical wastes; sharps such as syringes, suture needles and scalpels; animal carcasses, parts and bedding from animals intentionally infected with organism pathogenic to humans; any residue resulting from a spill of RMW; and any solid waste mixed with RMW.

- In the event of an emergency and/or incident that generates a medical/bio-hazardous waste, tenants should contact their Facilities Management Specialist who will arrange for the proper management and disposal of this waste stream.

- Please contact your Hazardous Waste Media Manager if you have any questions regarding medical/bio-hazardous waste.

27. METHYL ETHYL KETONE PEROXIDE

Due to the reactive nature of this material and its high disposal costs; MEKP will be issued in either 1-ounce resin kits (NSN 6810-01-452-3268) or 2-ounce resin kits (NSN 6810-01-452-3273). Every attempt should be made to completely consume the accelerant (MEPK) in the process. To dispose of unusable quantities of MEKP, contact the NAVFAC MIDLANT ESD at for guidance.

28. OBA (OXYGENATED BREATHING APPARATUS) CANISTERS / EEBD (EMERGENCY ESCAPE BREATHING DEVICE) / NUCLEAR / BIOLOGICAL / CHEMICAL (NBC) FILTERS

Contact the NAVFAC MIDLANT ESD to arrange a pickup. The OBA canisters, EEBDs, and NBC filters need to be kept in the original packages. Do not attempt to disassemble the original packages.

29. OIL, USED

- **Used petroleum based** oils can be recycled. Label the container with the words **USED OIL**. Contact NAVFAC MIDLANT ESD for further instructions or to schedule a pickup.
    - At the point of generation it is acceptable to consolidate the following **petroleum-based** products Used Oil, Used Hydraulic Fluid, Used PD-680 Type II, or Used JP-5 in the same container.
    - **Mixtures of Used Oil and Used Gasoline or MoGas are prohibited and must be managed as HW.**

- **Used synthetic based oils** cannot be recycled and must be turned in to NAVFAC MIDLANT ESD. **Do not** mix synthetic oils/fluids with petroleum products and note synthetic on the container.

- **Ship Generated Oily Waste:**
    - **Acceptable Oily Wastes-** Non-contaminated bilge, ballast, and ship's fuel tank cleaning wastes, including butterworthing rinse water, may be disposed of as oily waste.
    - **For all other oil containing wastes**, contact the Water Media Manager who will determine proper disposal procedures.
    - **Ensure no contaminants** have entered the bilge water or oily waste.
    - **Unacceptable contaminants include**, but are not limited to: Aqueous Film Forming Foam (AFFF); sewage (black water and gray water); HM and HW; JP4, AVGAS, MOGAS, and gasoline; boiler cleaning wastes; anti-freeze; and FSII (Fuel System Icing Inhibitor).
    - **Oily Waste Transfers During Night Hours** (between sunset and sunrise) are not normally permitted due to reduced ability to immediately detect a spill; inability to determine amount and spread of a spill; and the need to recall and fund oil clean-up personnel. Approval for ships to discharge oily waste after dark must be obtained from the CO of the appropriate installation by phone call to the local Port Ops Officer. The following additional requirements must be in place:
        1. Extra Topside Safety Watches stationed at the discharge station and on the pier or SWOB to monitor the water for any oil sheens;
        2. Oil spill clean-up equipment on hand;
        3. Adequate lighting erected; and
        4. The Chief Engineer will be on board to supervise the evolution.
    - **AT NAVSTA Norfolk**
        1. Piers are equipped with oily waste collection piping and risers for off-loading bilge water and non-contaminated oily wastes. NAVFAC MIDLANT's Ship Support Office (SSO) will coordinate connections

and disconnections to the collection system through LOGREQS. To ensure adequate resources are available to respond in the event of a system casualty, discharges to the system are only permitted during daylight hours during the regular workweek.

2. Vessels must have a 2.5 in. male camlock fitting on their oily waste overboard discharge connection in order to connect. Vessel connections will be scheduled by SSO to occur approximately 24 hours after arrival. Following connection to the system, the vessel must check for leakage from the hose and connections by flushing the hose with seawater for 5 minutes. A "T" adapter is available from NAVFAC MIDLANT, which will allow use of a 1.5 in. fire hose to flush the hose. Disconnection from the system will occur approximately 48 hours before vessel departure. Prior to disconnection, the vessel must flush the hose with seawater for 10 minutes to remove residual oil. The vessel is responsible for lowering the hose to the pier and walking the residual seawater in the hose into the pier riser. If the vessel was issued a "T" adapter, the adapter must be returned to NAVFAC MIDLANT.
3. Individual off-loads of greater than 50K Gallons, or discharge rates greater than 200 gpm, must be coordinated through SSO to ensure the pier collection system capacity is not exceeded. It is the responsibility of vessels to periodically observe the connections and hose and to report any unusual conditions that may occur.
4. If the pier side collection system is nonoperational, NAVFAC MIDLANT SSO will arrange for collection services via a contractor or NAVFAC MIDLANT Oil Recovery Tanker Truck, square/FRAC tank, or SWOB. If the vessel uses their shipboard oil water separator, NAVFAC MIDLANT SSO will coordinate pick-up of oil from the shipboard used oil tanks.
5. Do not discharge viscous oils in to the discharge lines, this has been shown to cause failures (fuel spills).

- **At JEB Little Creek-Ft. Story**: The Ship Support Office (SSO) provides oily waste collection and handling services. For emergency requirements outside normal working hours, contact JEB Little Creek Port Ops.

- **At WPNSTA Yorktown/Cheatham Annex**: If possible, oily waste should be off-loaded before arrival. If off-load at the facility is required, approval by the Installation Commanding Officer prior to off-loading must be obtained and NAVFAC MIDLANT Oil Recovery should be contacted for disposal.

30. PAINTS

- **Empty paint can:** is defined as an original paint can that is free of liquids and contains less than 1 inch (or 3% by volume) of dried material.
  - Metal paint cans that meet this standard can be placed in dumpsters marked “metal only”; plastic cans should be placed in solid waste dumpsters.

  - **Paint cans that DO NOT meet this standard must be managed as HW and turned in to NAVFAC MIDLANT ESD for disposal and must not be allowed to air dry.**

- **Unused/unopened containers of paint**: should be returned to the HAZMINCEN for potential reuse. **Keep containers closed; do not allow to air dry.** Please see the Hazardous Material Reutilization Information section of this guide for more information and additional alternatives to disposal. If the cans are rejected by the HAZMINCEN, the items will be managed as a waste; follow the procedure listed below:
  - Liquid or solidified oil-based paint: is to be managed as a HW and properly labeled. Contact NAVFAC MIDLANT ESD to schedule a pickup. Excess un-used paint should be accumulated separately from solvent waste.
  - Oil-Based Paint/Solvent related items: such as brushes, rags, and rollers shall be managed as HW. *Immediately containerize and keep containers closed at all times. Air drying is prohibited.
  - Water-based (latex) paint: is to be managed as non-regulated. Properly label the container and Contact NAVFAC MIDLANT ESD to schedule a pickup. Keep cans closed. Air drying is prohibited.
  - Water Based (latex) Paint Debris: such as brushes, rags, and rollers will be managed as non-regulated and can be disposed of as solid waste.

31. PAPER SHREDDING

- Commands are responsible for transporting to/overseeing the shredding activity at Z-312. The cost is around $8/bag. Please contact the manager listed in Appendix 1 to schedule shredding services.

32. PARTWASHERS

- Parts washer units utilize various substances such as solvents to remove dirt, lubricants, and other foreign particles from equipment components. When this solvent becomes contaminated to the point where it must be replaced, contact your HW media manager to ensure proper waste characterization.
- If your operations change, contact your HW media manager to ensure proper waste characterization.
- Do not assume that an environmentally friendly cleaning agent will not produce HW. Waste characterization depends on factors including what is being cleaned. Contact your HW media manager to ensure proper waste characterization.
- HW solvent must be turned in to NAVFAC MIDLANT ESD for disposal.
- For units maintained by a private company (i.e. Safety Kleen), contact your HW media manager to ensure proper waste characterization and disposal. Prior to off-site shipment of this waste, information about the waste must be provided to NAVFAC MIDLANT ESD and a representative from the ESD must be present to sign the Hazardous Waste manifest.

33. PEST MANAGEMENT CONTROL

Contact NAVFAC MIDLANT ESD for Pest control services.

34. POLYCHLORINATED BIPHENYL (PCB)

PCBs were domestically manufactured from 1929 until their manufacture was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications including electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastics, and rubber products; in pigments, dyes, and carbonless copy paper; and many other industrial applications. The most common trade name is Aroclor. Askeral may also be present and requires specific testing. Although no longer commercially produced in the United States, PCBs may be present in products and materials produced before the 1979 PCB ban. Products that may contain PCBs include:

- Transformers and capacitors
- Other electrical equipment including voltage regulators, switches, reclosers, bushings, and electromagnets
- Oil used in motors and hydraulic systems
- Old electrical devices or appliances containing PCB capacitors
- Galbestos siding
- Fluorescent light ballasts (not green tips)
- Cable insulation
- Thermal insulation material including fiberglass, felt, foam, and cork
- Adhesives and tapes
- Oil-based paint
- Caulking, plastics, carbonless copy paper, floor finish

If you have items for disposal that you believe may contain PCBs, please contact NAVFAD MIDLANT ESD for guidance on disposal.

PCB-containing fluorescent light ballasts are to be turned into NAVFAC MIDLANT ESD as PCB waste. To schedule a pickup call NAVFAC MIDLANT ESD. Any non-PCB fluorescent light ballasts can be turned in to RRP.

PLEASE NOTE!

Fluorescent light ballast that do not possess the marking “PCB free” are to be assumed to contain PCBs and should be managed accordingly.

35. PRESSURE TREATED LUMBER

- Pressure treated lumber is currently being disposed of via landfill. Contact your Hazardous Waste Media Manager for disposal assistance.

36. RAGS / SHOP TOWELS/CLOTH ABSORBENTS

- **Oily Rags:** Place the rags in clear double plastic bags and label as "Used oil rags". Each bag should contain less than 35lbs. Two completed copies of DD Form 1348-1A, or 1348-1 created in HICSWIN, for each item are required for turn-in.
  - o **At Naval Station Norfolk*: Oily rags can be taken to the NAVFAC MIDLANT Oil Recovery located at Bldg. Q-50 Monday-Friday from 0700-1530.
  - o **At Naval Weapons Station Yorktown*: Oily rags can be taken to Building 2035 on Tuesdays and Thursdays from 0730 to 0900.
  - o *At *JEB Little Creek* and *NAS Oceana*, contact NAVFAC MIDLANT ESD at 341-0412/341-0460 to schedule a pickup.
- **Hazardous Waste (HW) Rags**: Rags that have been contaminated with HM/HW, such as MEK (a.k.a. 2-butanone), gasoline, solvent or paint thinner must be managed as HW and properly labeled. Contact NAVFAC MIDLANT ESD to schedule a pickup. Do not transport rags that are considered hazardous waste. *Immediately containerize and keep containers closed at all times. Air drying is prohibited.

- **Shop Towel Laundering Service:** The current Navy Shop Towel Afloat/Ashore Management Program (STAMP) contract for the Mid-Atlantic/Northeast Region; N00189-07-D-Z010 is available on the DENIX Website at https://www.denix.osd.mil or from the Rag Recycling Contract Administrator. Note: All Naval vessels in port and shore activities are covered by this STAMP contract.

  The current shop towel contract requires the customer to either use shop towels provided by the contractor or to own their own towels and have the contractor wash them. In the first scenario, the local contractor delivers an agreed upon quantity of towels to ship. On a schedule that has been agreed-upon, the contractor picks up soiled shop towels and replaces them with clean towels. The ship is then billed for the towels washed as well as the towels that are lost/missing. In the second scenario, the ship/government buys shop towels and has the contractor pick them up on an agreed-upon schedule and bills the ship for the cost of washing. To obtain further assistance, contact your CHRIMP Technician or the Rag Recycling Contract Administrator.

  The P2 Program may be able to provide 55-gallon-drum mounted wringers and small table top wringers that remove free liquids in rags, allowing for additional uses. P2 equipment is also available at DLA free of charge. For more information, contact the P2 Media Managers.

37. RAILROAD TIES

Railroad Ties must be sent to a permitted landfill for proper disposal. Disposal must be coordinated with the Regional Solid Waste & Recycling Program who will arrange for a dumpster. Railroad ties shall not be placed in regular solid waste dumpsters. Railroad ties *may not* be recycled, but they *may* be reused on a case by case basis.

38. REGULATED FOREIGN GARBAGE (FOREIGN FOOD WASTE)

- Regulated Garbage (Foreign Food Waste) includes, but is not limited to, food scraps, table refuse, food wrappers or packaging materials and other waste material from stores, food preparation areas, crews' or passengers' quarters and from aircraft or ships generated during international travel. Regulated Garbage also means meals and other foods that were available for consumption by passengers or crew on an aircraft but were not consumed. Plastic disks or plastic waste contaminated with foreign source food and garbage will be managed as Regulated Garbage.

GENERAL

- All Regulated Garbage is to be bagged, labeled with the words "Regulated Garbage" and placed in the Regulated Garbage container.
- Only Regulated Garbage and any item comingled with Regulated Garbage are to be placed into the container.
- All offloads of Regulated Garbage must be logged onto the Foreign Garbage Tracking Log. This form must be faxed or emailed to NAVFAC Integrated Solid Waste Management (ISWM), (757-341-0066/theresa.j.arnold@navy.mil).
- **ALL** Regulated Garbage must be removed from the installation within 72 hours of placement in the Regulated Garbage Container. NAVFAC ISWM will coordinate removal of the container by Stericycle, Inc.
- The seal and door on the Regulated Garbage Container must remain closed unless adding waste.
- For spills, contact the Emergency Communications Command at the respective installation. Spiller will be responsible to perform initial clean-up.
- EV Services will responsd to spills at Navy Installations in Hampton Roads and perform required decontamination.
- The Tracking Log, Fact Sheet and Training presentation are available on the Portal at http://www.navfac.navy.mil/navfac_worldwide/atlantic/fecs/mid-atlantic/about_us/environmental_norfolk/environmental_compliance.html

VESSELS:

- Port Operations, on behalf of the ship, contacts NAVFAC ISWM to order a container prior to ship's arrival. Port Operations will place the container near the ship at the pier.
- The Ship's designee will accompany the CBP inspector during the on-board inspections prior to off-loading Regulated Garbage. The CBP Inspector will determine which food items are to be managed as Regulated Garbage.
- Ship's crew collects all Regulated Garbage in 3 mil plastic bags, labels the bags and places them in the Regulated Garbage container located near the ship at the pier.
- **ALL** food wastes generated within the first 24 hours after arrival must be placed in the Regulated Garbage container.

AIRCRAFT (Naval Station Norfolk and Naval Air Station Oceana)

- Commercial: Jet Services collects Regulated Garbage in 3 mil plastic bags and places in the Regulated Garbage container at the respective locations, LP-210 (Naval Station Norfolk) or Bldg. 3050–North Pad (NAS Oceana).
- Military: Military Crew collects Regulated Garbage in 3 mil plastic bags and places in the Regulated Garbage container at the respective locations.

39. SILVER / SILVER RECOVERY UNITS

Solutions used in silver recovery units (i.e. photography shops, weapons x-ray, dental or hospital/ship X-ray rooms) may require management as a HW. Contact the HW Media Manager for guidance on the management of these units.

40. SOIL GUIDANCE

Soil cannot be removed from construction sites without NAVFAC MIDLANT Environmental Office authorization. This also includes any soil/debris removed from stormwater drainage structures. Any movement of soil/fill material outside of project boundaries, meaning both soil brought onsite and soil from the site relocated to other areas, must be coordinated with the installation Hazardous Waste and the Pest program managers to ensure proper characterization, which may require testing, and environmental compliance. If the excavated soil is going to be reused in the construction site (i.e. for grading), no characterization is required. However, if obvious signs of contamination are observed (free product, staining, odors, etc.) the hazardous waste media manager should be contacted prior to reuse. Any soil that cannot be reused will need to be characterized prior disposal. Contact the HW Media Manager for additional information.

Soil should be stored in a manner that prevents rain from infiltrating the soil matrix and preventing any runoff into the surrounding soil or pavement (e.g. store the soil over and under plastic sheets surrounded by hay bales or in lined, covered dumpsters).

Soil to be used in IR sites

In order to use fill on a Navy Environmental Restoration site, it first must be sampled and analyzed for the following constituents:

TCL VOCs: EPA SW-846 8260B
TCL SVOCs: EPA SW-846 8270C
TCL Pesticides/PCBs: EPA SW-846 8081B_8082A
Total Metals: SW-846 6010 or 6020 (Total Analyte List)
Cyanide: SW-846 9012B
TPH: SW-846 METHOD 5035/8015B

The sample results must be reviewed and approved by the Environmental Restoration Program Manager before the fill maybe used on an Environmental Restoration site.

41. SOLVENTS (i.e. PD-680/Acetone/Alcohols etc.)

All Solvents shall be turned in to the NAVFAC MIDLANT ESD for disposal as HW. Ensure containers are kept closed at all times.

42. SPENT BLAST MEDIA

Spent blast media from blast booths or gloves boxes have the potential for recycling instead of disposal. Ensure blast media is reused/recycled within the blast booth/glove box until it is no longer feasible prior to disposal. Properly label waste container and contact NAVFAC MIDLANT ESD to schedule a pickup.

- Initiate conversation with your blast media supplier to investigate the potential of a take back or recycling program. Contact the installation HW Media Manager for guidance and assistance.

43. TETRAHYDROFURAN (THF)

THF is a chemical that is commonly used as a softener, cleaner, and a bonding enhancer for fiberglass, plastic and rubber, and may be found in such things as boat repair kits. THF degrades by auto-oxidation into crystalline form over time or if exposed to air for a time and presents an explosives risk. THF in crystal form is **highly unstable** and must be disposed of as an emergency response using detonation by EOD or a qualified contractor.

For any THF material, whether still in liquid form or crystallized, notify your base Safety and the Hazardous Waste Media Manager for proper disposal. **Do not** attempt to open, move, or transport the material until it can be properly assessed for continued use/storage/disposal. Targeted NIINS may include item 01-271-4835 and item 01-339-3640.

44. UNKNOWNS

If you discover an unknown waste, please contact your HW Media Manager for guidance.

45. X-2 OR X-3 MATERIALS (CHEMICALS & RESINS)

X-2 and X-3 materials must be de-militarized prior to disposal. Ships need to contact the item manager to receive de-militarized instructions. NAVFAC MIDLANT ESD will also provide this service for an additional cost. Contact NAVFAC MIDLANT ESD to schedule a pickup.

PLEASE NOTE:

To ensure proper handling, on the 1348-1A indicate the items are X-2 or X-3 material.

APPENDIX 1: POINTS OF CONTACT

Hazardous Waste and Pollution Prevention Media Managers

Director	341-0400
Hazardous Waste Media Manager By Installation	
Naval Station Norfolk, Craney Island	341-0478
St. Julien's Creek Annex, Southgate Annex, Scott Creek Annex,	341-0404
Joint Expeditionary Base Little Creek – Fort Story	341-0403
NAS Oceana, Dam Neck Annex, Fentress, Dare County, Northwest	341-0409
NWS Yorktown, Cheatham Annex, New Kent, NMCP	341-0402
Senior Program Manager-All sites	341-0408
Environmental Pollution Prevention Media Managers	341-0405 and 341-1021

Installation Environmental Compliance Departments

Joint Expeditionary Base Little Creek – Fort Story	
Director	462-5350
Lead Environmental Protection Specialist	462-5361
Environmental Protection Specialist	462-5355
Environmental Protection Specialist	462-5353
Environmental Protection Specialist	462-5356
Naval Station Norfolk	
Director	341-0523
Lead Environmental Protection Specialist	341-0516
Environmental Protection Specialist	341-0520
Environmental Protection Specialist	341-0515
Environmental Protection Specialist	341-0511
Environmental Protection Specialist	341-0517
NAS Oceana/ Dam Neck Annex	
Director	433-3437
Lead Environmental Protection Specialist	433-3435
Environmental Protection Specialist (Flight Line, CSFWL, VACAPES, RSO Fuels)	433-3434
Environmental Protection Specialist (Dam Neck, Dare County, MACS24)	433-2131
Environmental Protection Specialist (FRC, NEX, MWR)	433-3439
NWS Yorktown / Cheatham Annex/Yorktown Fuels/ New Kent	
Director	887-4086
Lead Environmental Protection Specialist & New Kent EPS	887-4881
Environmental Protection Specialist	887-4958
Environmental Protection Specialist (WPNSTA Yorktown)	887-4095
Environmental Protection Specialist	887-4384
NSA Hampton Roads	
Director	836-1862
Environmental Protection Specialist	421-8114
NSA Norfolk Naval Shipyard and Annexes	
Director	396-8270
Environmental Protection Specialist	341-0514

Environmental Services Department

NAVFAC MIDLANT ESD	341-0460/0412 Fax:341-0436
Environmental Operations Director/ Supervisor	341-0471
NAVFAC MIDLANT HWO Profile Chemist	341-2295
Asbestos & Insulation Branch	341-0474
NAVFAC MIDLANT Lab Services (LS)	341-0462, 341-0465 (fax)
NAVFAC MIDLANT Oil Recovery	341-1909, 341-0460 (fax)
NAVFAC MIDLANT Pest Services	341-0475

Regional Solid Waste and Recycling Program

Regional Director	341-1137
NAS Oceana / Dam Neck	433-2454
Joint Expeditionary Base Little Creek – Fort Story	462-7401
Naval Station Norfolk	445-8700
NSA Norfolk Naval Shipyard and Annexes	635-6310
NWS Yorktown / Cheatham Annex	887-4381
QRP-Qualified Recycling Program (Spent Brass)	433-2454 / 341-1136 / 636-4076
Waste Management Operator (Paper Shredding)	757-641-341-0944

Defense Depot Norfolk Virginia (DDNV)

Note: headquartered on Naval Station Norfolk but services the Mid-Atlantic Region	
Material Offload Scheduling (Trucks)	443-3131 or 443-3146
Material Offload Scheduling (Ships)	443-3120
X-2, X-3 Material Issue	443-3150

DLA Disposition Services

Note: headquartered on Naval Station Norfolk but services the Mid-Atlantic Region	
St. Juliens Creek Division	396-0137 xt.13
Re-sale Information	444-5826
Hazardous Material Turn-in (Receiving)	445-4450/445-9476
Waste Disposal – Supervisor	444-7685
Waste Disposal – Specialist	445-4077
Waste Disposal – Specialist	445-2976
DLA Cylinder Contractor (Haas)	1-866-724-0932
Electronic Waste (e-waste)	445-5115/2412

Fleet Industrial Supply Center (FISC)

Note: headquartered on Naval Station Norfolk but services the Mid-Atlantic Region	
LOGISTICS SUPPORT CENTER	443-1211
HAZMINCEN – NORFOLK LF-50 (HM support provided to Little Creek)	444-2024
HAZMINCEN – OCEANA Bldg. Z-826 (HM support provided to Northwest)	433-3730
HAZMINCEN – Ft. Eustis	878-2781
Reuse Store Facility (X-218)	445-7942
Reuse Store – Cylinder Issue	444-1810, 444-4528

Consolidated Hazardous Material Reutilization & Inventory Management Program (CHRIMP)

CHRIMP Afloat Site Manager	757-445-7943
CHRIMP Afloat Support Bldg. X-218 (AOE/CVN/LHA/LHD/JEBLC)	444-4789/0593
CHRIMP Afloat Support for Joint Expeditionary Base Little Creek – Fort Story West provided by HMPO office Norfolk (LSD, ARS/PC)	443-/1311/2546/2547/2558/2410
CHRIMP JEBLC Carl Emmons	757-351-9843

Other Commands/Departments

Commander Navy Region Mid-Atlantic Safety	322-2926 or 2927
NEMPU2	444-7671
Naval Air Technical Data & Engineering Service Command (NATEC)	https://mynatec.navair.navy.mil
PWC Maintenance Department – Norfolk	341-0788
PWC Transportation Department – Norfolk	341-0761
Port Operations	444-7345
Ship Support Office-Norfolk/JEFLCFS	341-0800/462-4090
Rag Recycling Contract Administrator Radiological Affairs Support Office (RASO)	717-605-6856 887-7610/887-4692

APPENDIX 2: INSTRUCTION FOR DD FORM 1348-1A, or HICSWIN DD FORM 1348-1

http://www.dispositionservices.dla.mil/turn-in/usable/dd1348-1a.pdf

I. GENERAL SAFE HANDLING GUIDANCE

1. Segregate material according to Federal Stock Class (FSC), compatibility and container size.
2. Segregate used from unused HM/HW.
3. Place leaking HM in appropriate salvage containers (5, 55, or 85 gallon).
4. Properly complete four copies of DD Form 1348-1A or HICSWIN 1348-1 for all waste turn-ins. Fax one copy to MIDLANT Environmental Services Desk (FAX: 341-0436) as follows:

II. REQUIREMENTS FOR DOCUMENTATION

NAVFAC MIDLANT, DRMO, & FISC require the following information on DD form 1348-1a, or Form 1348-1 created in HICSWIN**:**

Block:
02. Activity generating the waste, (Ex. Building # or Command/Ship & Hull #).

03. Activity accepting the waste (Ex. MIDLANT, DRMO, FISC, or UIC, etc.)

Mark for “DISPOSAL,” “RECYCLING,” “REUSE,” ”MIDLANT,” “DRMO,” FISC,” etc.

Generic name of product (listing any known contaminants).

18. Type of container (Ex. 55 gallon, 5 gallon, 10 -lb. Box)

19 (or 25-29) Number of containers

Total Weight of Shipment (May leave blank if turned into MIDLANT, they will weigh the materials MIDLANT takes custody of.)

Unit Identification Code (UIC) Number.

FSC and NIIN (The National Stock Number). Include the manufacturer.

Open Area Additional data - Enter MSDS or profile number, if known.

Open Area Job Order Number (JON) (required for non-FLT activities)

Open Area A point of contact (who has knowledge about the process that generated the waste) and phone number and email address.

Open Area Indicate that waste is from a SAA or HWAA and include date of oldest drum.

Open Area All activities not using HICSWIN, list the process that generated the waste, (Ex. Painting, degreasing, etc.)

Open Area Words “Approved for transfer” and a qualified signature

Open Area FISC ECAP stamp approval noted.

In addition to the general requirements, MIDLANT upon receipt of materials will add the following information:

Open Area Unique drum control number or barcode

MIDLANT will sign for custody of material (one copy return to client)

MIDLANT will enter date of acceptance.

For off-site transportation only:

MIDLANT will enter the DOT proper shipping name, UN or NA code, packing group, and EPA codes when appropriate.

When appropriate enter weight.

Open Area Emergency Response Guide number

In addition to the general requirements listed above, DRMO also requires the following information:

Boxes 52-53 Fund Code (Command Specific)

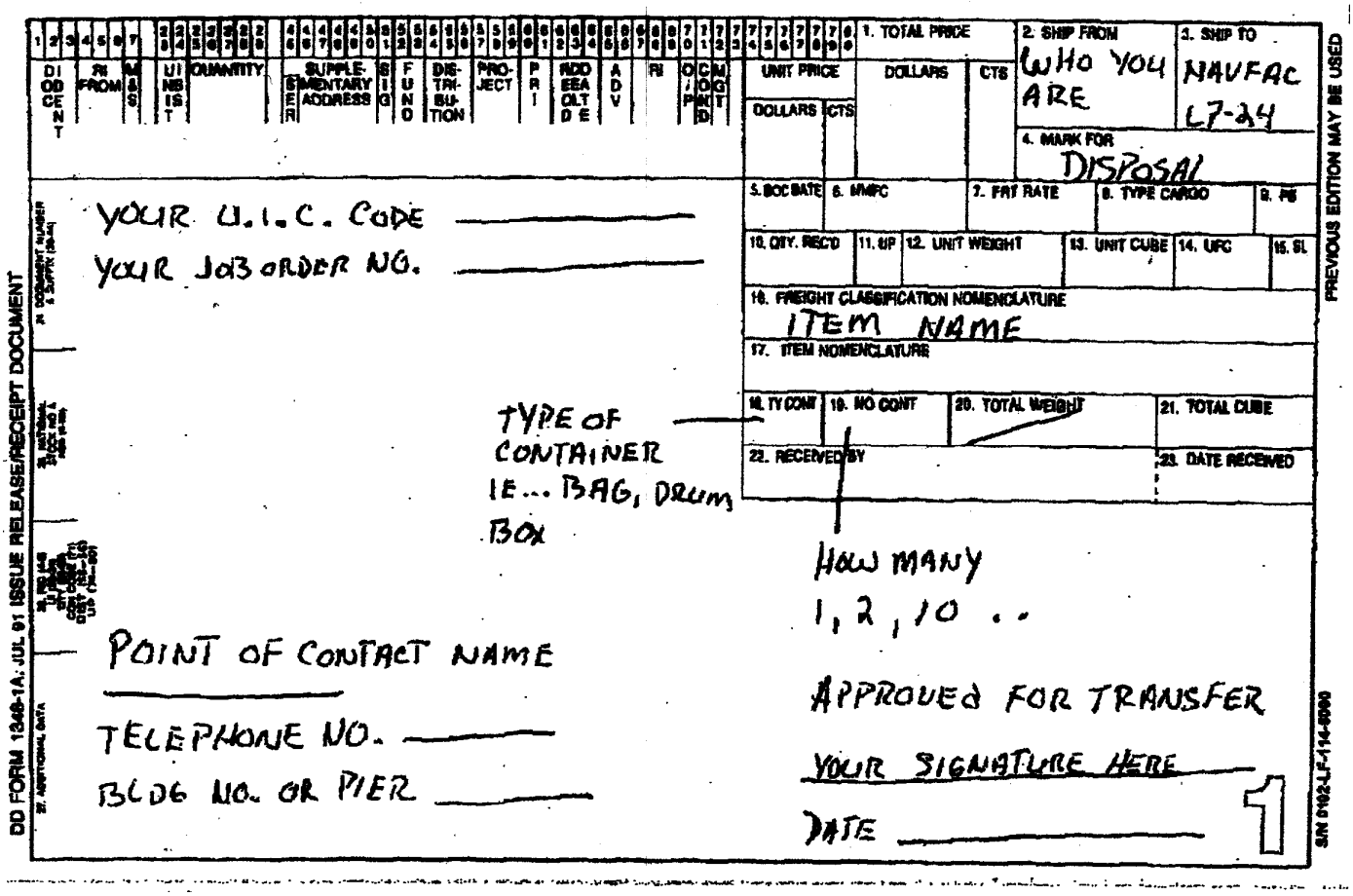
65-66 Demilitarization Code

74-80 Unit Price

Open Area DOT Certification statement: "The HM is packaged in containers as prescribed in DOT HM Regulations 49 CFR parts 170-189." Please note that original containers meet this certification.

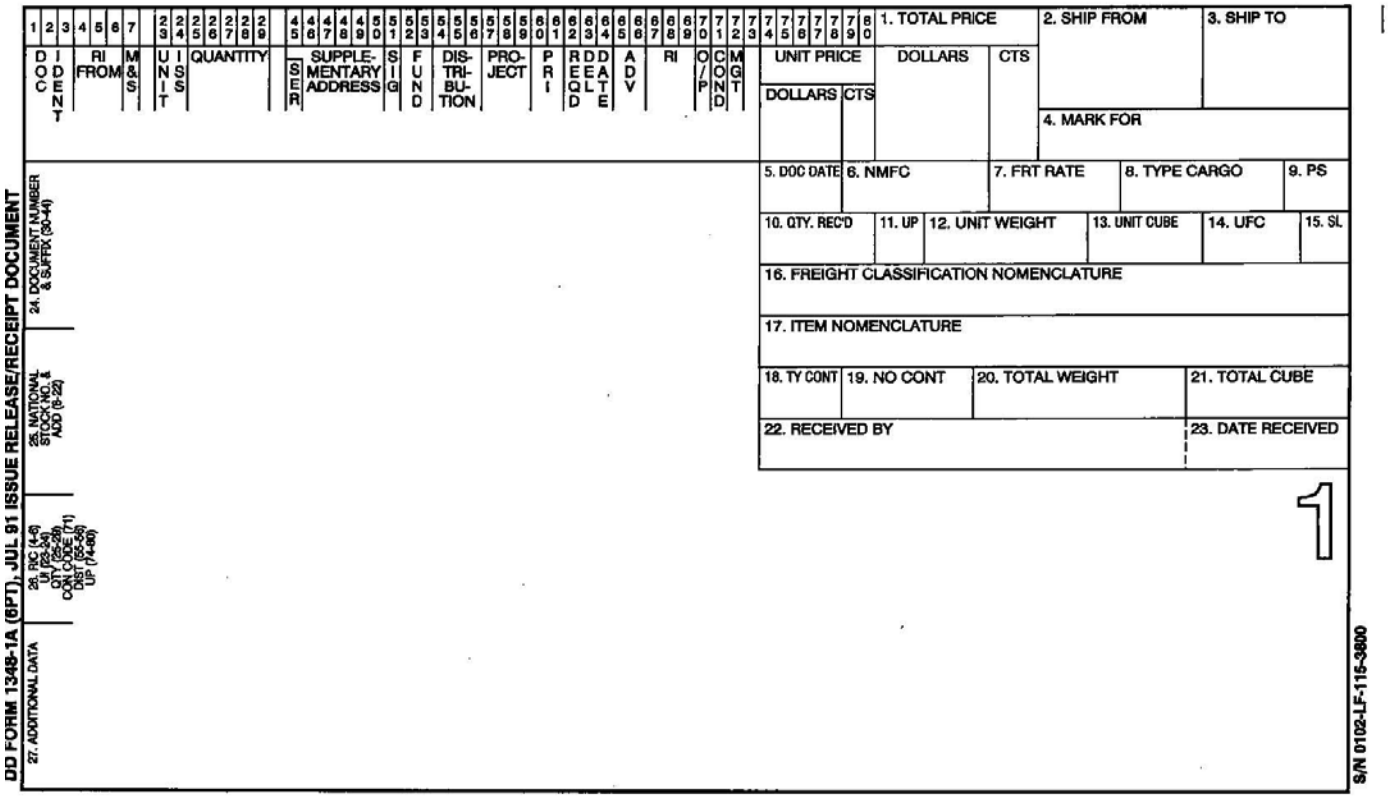
NOTE: Range residue must have a signed NOSSA statement on the 1348 for EV services to accept it. OP 5 Volume 1 Seventh Revision 13-15.5.1.3.c
"The material listed on this form has been inspected or processed by DDESB-approved means, as required by DOD policy, and to the best of my knowledge and belief does not pose an explosive hazard."

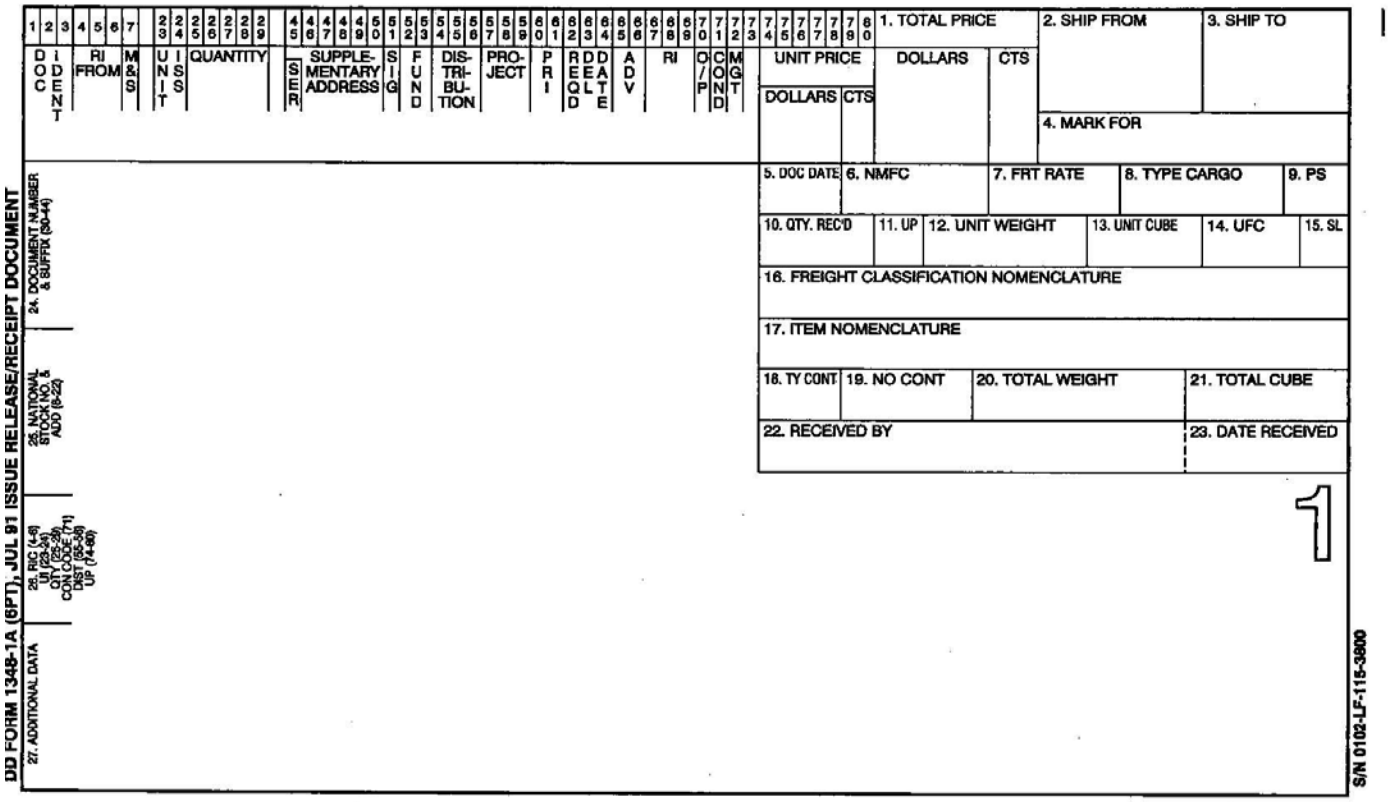
DD Form 1348-1A

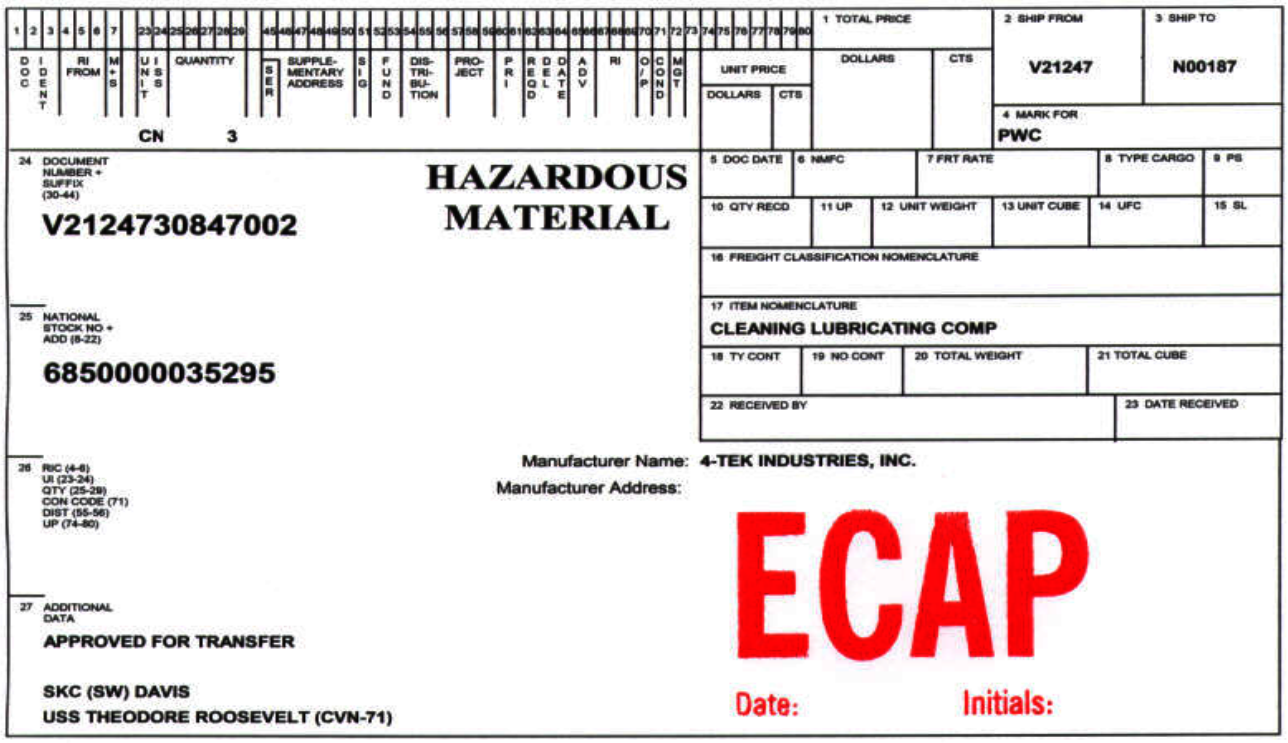


Blank 1348-1A Form

HICSWIN DD Form 1348







DOC | IDENT | RI FROM | M+S | UI | UNIT | QUANTITY | SER | SUPPLEMENTARY ADDRESS | SIG | FUND | DISTRIBUTION | PROJECT | PRI | REQD | DATE | ADV | RI | O/P | COND | MGT

CN 3

1 TOTAL PRICE

UNIT PRICE DOLLARS CTS

DOLLARS CTS

2 SHIP FROM V21247

3 SHIP TO N00187

4 MARK FOR PWC

24 DOCUMENT NUMBER + SUFFIX (30-44)

V2124730847002

HAZARDOUS MATERIAL

5 DOC DATE | 6 NMFC | 7 FRT RATE | 8 TYPE CARGO | 9 PS

10 QTY RECD | 11 UP | 12 UNIT WEIGHT | 13 UNIT CUBE | 14 UFC | 15 SL

16 FREIGHT CLASSIFICATION NOMENCLATURE

17 ITEM NOMENCLATURE

CLEANING LUBRICATING COMP

18 TY CONT | 19 NO CONT | 20 TOTAL WEIGHT | 21 TOTAL CUBE

22 RECEIVED BY | 23 DATE RECEIVED

25 NATIONAL STOCK NO + ADD (8-22)

6850000035295

26 RIC (4-6) UI (23-24) QTY (25-29) CON CODE (71) DIST (55-56) UP (74-80)

Manufacturer Name: 4-TEK INDUSTRIES, INC.

Manufacturer Address:

ECAP

27 ADDITIONAL DATA

APPROVED FOR TRANSFER

SKC (SW) DAVIS

USS THEODORE ROOSEVELT (CVN-71)

Date: Initials:

APPENDIX 3: SPILL REPORTING PROCEDURES

1. In the event of a spill of oil or a hazardous substance, Navy personnel may take action to stop, reduce, or contain the spill, provided they have the proper training and equipment to do so without risking personal injury/contamination.

2. Report **ALL** spills to the Emergency Communications Center (ECC) immediately. Notify the ECC if any cleanup assistance required (i.e. MIDLANT Spill Response Team).

Naval Station Norfolk	444-3333
NAS Oceana	433-9111
Dam Neck Annex	433-9111
NWS Yorktown	887-4911
JEB Little Creek	462-4444
JEB Ft. Story	422-7141
NALF Fentress	433-9111
DFSP Craney Island	396-3333
NNSY	396-3333
ROTHR New Kent	887-4911
St. Helena Annex	911
NSA Northwest	911
Dare County	911
NMC Portsmouth	396-3333

ECC will dispatch the appropriate station Command Duty Officer (CDO) and the Station Fire Department to the spill location. Upon arrival of the Fire Department, the command who reported the spill will relay all of the pertinent information to the Fire Department, who will serve as the Incident Commander (IC) for the duration of the spill containment, clean up and investigation process. The following information should be obtained:

INFORMATION REQUIRED WHEN REPORTING A SPILL

Name of person reporting the spill.	Quantity spilled
Command of person reporting the spill.	Cause of spill
Location of spill, Date & time of Spill	Substance spilled
Weather conditions including wind direction and speed and cloud cover	
Slick description including color and size	
Clean-up information: method, time and person(s) performing the clean up.	
Spill Cleanup assistance requirements	
Notifications made to other commands.	

3. The National Response Center (NRC) will be notified by the Emergency Communication Center (ECC). The command responsible for spill must contact the Installation Environmental Office to ensure the spill information is available.

4. The command responsible for the spill is required to report the incident, by sending a Navy spill message, in accordance with COMNAVBASENORVA/SOPA(ADMIN)HAMPINST 5400.1F and OPNAVINST 5090.1C, 5090.3, and 3100.6H. CHECK WITH SPILL PM.

5. If there are any questions on spill reporting requirements, call your Environmental Media Manager or Installation Environmental Office for more information. Personnel that fail to report a spill or who submit false or misleading information may be subject to criminal sanctions, including fines and/or imprisonment.

APPENDIX 4: CONTAINER PROCUREMENT & MARKING DEVICES

CONTAINER PROCUREMENT

If original containers cannot be used to store the HW, acceptable containers may be obtained by the following methods:

1. The RRP has free, used drums on a limited basis. Ensure these drums have been cleaned and do not contain any residual hazardous waste prior to reuse. Contact the RRP for availability.

2. New or reconditioned drums can be purchased through FISC, contact FISC Customer Service for more details.

    - 55 gallon steel with bung openings: NSN 8110-00-292-9783
    - 55 gallon steel with open tops: NSN 8110-00-030-7780
    - 55 gallon plastic with bung opening: NSN 8110-01-150-0677

3. Other containers may be used if they meet the DOT container requirements. Any container used to store a hazardous waste must be made of or lined with materials, which will not react with, and are compatible with the item(s) to be stored inside them. The container must possess the ability to hold the waste without being impaired. The containers must be able to be secured/sealed to ensure the contents will not spill during routine storage or transportation.

    Empty drums can be obtained through the NAVFAC MIDLANT ESD who will provide containers as a last resort with a DD- 1348.

MARKING DEVICES

Paint Pens may be used to mark the containers with the proper information. Ordering information for Paint Pens is listed below:

- White Paint Pen NSN 7520-01-207-4149
- Red Paint Pen NSN 7520-01-207-4161
- Yellow Paint Pen NSN 7520-01-207-4165
- Gold Paint Pen NSN 7520-01-207-4166

APPENDIX 5: SITE GUIDANCE FOR SATELLITE ACCUMULATION AREAs

Enclosure: Inspection Checklist for Satellite Accumulation Area (SAA)

HW Satellite Accumulation Area

CHECK TO ENSURE

- Drums are kept closed except when adding waste
- HW labels are facing outward
- Secondary containment is clean (if applicable)
- Max Capacity: 55-gallons, regardless of the # of HW containers
- When HW containers are 75% full, arrange for pickup (341-0412/ 0460)
- Do not date drum until is full (3 days to move to <90 days or dispose)

HW Container ***Legally Required*** Label

Must identify type of waste

ASD

Please call the Hazardous Waste Manager with any HW issues: _____

If an uncontrolled spill occurs , please call _____

SATELLITE ACCUMULATION AREA (SAA) CHECKLIST

INSPECTOR	INSPECTION DATE/TIME		AREA
HW CUSTODIAN	PHONE NUMBER	HW TRAINING DATE	CODE/UNIT

All checklist questions must be answered. All "NO" answers require the violation to be noted and corrected unless otherwise noted. Comment may include violation description, action, date action completed, and other pertinent details.

SATELLITE ACCUMULATION AREA Compliance Questions	***Circle Answer***	***Comment***
1. Is the SATELLITE ACCUMULATION AREA near the point of generation and under control of the operator of the process generating the waste?	Yes No	
2. Is the area free of any spills or container overfills (waste product on the container lid) and is good housekeeping maintained?	Yes No	
3. Is a fire extinguisher located and available within 50 feet and is the inspection current?	Yes No	
4. Is spill control equipment (Example: absorbents) available at the SATELLITE ACCUMULATION AREA?	Yes No	
5. Is the HW operator/site custodian annual training up to date?	Yes No	
6. Is a "SATELLITE ACCUMULATION AREA" sign with Primary and Alternate emergency contact information posted at the site?	Yes No	
7. Is a "NO SMOKING" Sign posted at the Satellite Accumulation Area?	Yes No	
If there is no hazardous waste currently stored at the site answer N/A for the remainder of checklist.		
8. Is the total volume of hazardous waste 55 gallons or less (OR 1 quart or less of acutely hazardous waste)?	Yes No N/A	
9. Are containers kept sealed at all times except when waste is added?	Yes No N/A	
10. Are containers in good condition (non-leaking or non-corroded) and compatible with the waste stored in them? (Example of incompatibility: corrosive waste in a metal drum).	Yes No N/A	
11. HW Labeling Checks **a.** does each HW container have a HW label?	Yes No N/A	
b. clearly visible and facing out for inspection?	Yes No N/A	
c. include the words, "HAZARDOUS WASTE?""	Yes No N/A	
d. include specific contents of the waste(s)?	Yes No N/A	
e. include the accumulation date? (Containers must only be dated once the total volume of the SATELLITE ACCUMULATION AREA reaches 55 gallons, or one quart of acute HW, then all the wastes must be removed within 72 hours).	Yes No N/A	
12. If the Satellite Accumulation Area container (I.E. 55 Gallon) has reached capacity has the container been dated and moved to the Hazardous Waste Accumulation Area site within 72 hours?	Yes No N/A	

For Environmental Personnel Only:
Check Inspection Type: Oversight___; Setup___; Closeout___

APPENDIX 6: SITE GUIDANCE FOR HAZARDOUS WASTE ACCUMULATION AREA

Enclosure: Hazardous Waste Accumulation Area Inspection Checklist for Containers Less Than or Equal to 119 Gallons.

HW (<90 Day) Accumulation Area

CHECK TO ENSURE

- Drums are kept closed except when adding waste
- HW labels are facing outward
- Secondary containment is clean
- Contact Environmental Services (341-0412/0460) to arrange HW container pickup no later than the 45th day from **ASD**
- Site **MUST** be inspected every 7 days (records kept for 3 years)
- Aisle space **MUST** allow for removal of HW and a 360 degree inspection
- No limit on volume storage

HW Container ***Legally Required*** Label

Must have a start date if waste is placed in drum (**ASD**)

Must identify type of waste

Please call the Hazardous Waste Manager with any HW issues: _____

If an uncontrolled spill occurs , please call _____

HAZARDOUS WASTE ACCUMULATION AREA (HWAA) CHECKLIST

INSPECTOR	INSPECTION DATE/TIME		AREA
HW CUSTODIAN	PHONE NUMBER	HW TRAINING DATE	CODE/UNIT

All checklist questions must be answered. All "NO" answers require the violation to be noted and corrected unless otherwise noted. Comment may include violation description, action, date action completed, and other pertinent details.

HAZARDOUS WASTE ACCUMULATION AREA Compliance Questions	***Circle Answer***	***Comment***
1. Are good housekeeping standards employed?	Yes No	
2. Is the area free of any spills or container overfills (waste product on the container lid)?	Yes No	
3. Is a fire extinguisher located and available within 50 feet and is Inspection current?	Yes No	
4. Is spill control equipment (examples: absorbents) available at the Site?	Yes No	
5. Are HAZARDOUS WASTE inspections conducted and properly documented every 7 days?	Yes No	
6. Are HAZARDOUS WASTE inspection records kept for 3 years?	Yes No	
7. Is the HW operator/site custodian annual training up to date?	Yes No	
8. Is a "HAZARDOUS WASTE ACCUMULATION AREA" sign with Primary and Alternate emergency contact information posted at the site?	Yes No	
9. Is a "NO SMOKING" sign posted?	Yes No	
If there is no hazardous waste currently stored at the site answer N/A for the remainder of checklist.		
10. Are HAZARDOUS WASTE containers in good condition (non-leaking or non-corroded) and compatible with the waste stored in them?	Yes No N/A	
11. For hazardous waste containing volatile organics, are individual HAZARDOUS WASTE containers either (circle applicable items) **a**. less than 26 gallons? **b**. 26 or greater but less than 119 gallons; and DOT approved? **c**. Is air emissions documentation allowing non-DOT containers maintained with the inspection records?	Yes No N/A Yes No N/A Yes No N/A	
12. Are incompatible wastes separated by a wall, berm, or overpack to prevent mixing?	Yes No N/A	
13. Are HAZARDOUS WASTE containers kept sealed except when waste is being added or removed?	Yes No N/A	
14. HW Labels **a.** does each HW container have a HW label?	Yes No N/A	
b. clearly visible and facing out for inspection?	Yes No N/A	
c. include the words, "HAZARDOUS WASTE?"	Yes No N/A	
d. include specific contents of the waste(s)?	Yes No N/A	
e. include the accumulation date?	Yes No N/A	
15. Are old Hazardous Waste labels & markings removed?	Yes No N/A	
16. Date of oldest HW container in the HWAA.		
17. Has a pickup request been submitted for all HW containers that have been accumulating for more than 45 days?	Yes No N/A	
18. Are adequate aisle spaces maintained for incident response?	Yes No N/A	

For Environmental Personnel Only: Check Inspection Type: Oversight___; Setup___; Closeout___

APPENDIX 7: SITE GUIDANCE FOR UNIVERSAL WASTE ACCUMULATION AREA

Enclosure: Universal Waste Accumulation Area (UWAA) Inspection Checklist

Universal Waste Accumulation Area

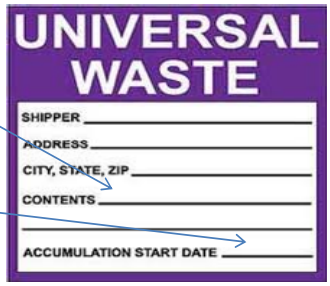
CHECK TO ENSURE

- Drum lids are secure and boxes sealed
- UW labels are facing outward
- **ASD** reflects the date when item is put at site
- Arrange for pickup (341-0412/0460) no later than the 270th day (9 months) from **ASD**

UW Container ***Legally Required*** Label

Must identify type of waste

ASD



Please call the HW Manager with any HW issues:

_____

If an uncontrolled spill occurs , please call _____

UNIVERSAL WASTE ACCUMULATION AREA (UWAA) CHECKLIST

INSPECTOR	INSPECTION DATE/TIME		AREA
HW CUSTODIAN	**PHONE NUMBER**	**HW TRAINING DATE**	**CODE/UNIT**

All checklist questions must be answered. All "NO" answers require the violation to be noted and corrected unless otherwise noted. Comment may include violation description, action, date action completed, and other pertinent details.

UNIVERSAL WASTE ACCUMULATION AREA Compliance Questions	***Circle Answer***	***Comment***
1. Is the area free of any spills or container overfills (waste product on the container lid)?	Yes No	
2. Are good housekeeping standards employed?	Yes No	
3. Is a fire extinguisher located and available within 50 feet and is Inspection current?	Yes No	
4. Is spill control equipment (examples: absorbents) available at the Site?	Yes No	
5. Is the HW operator/site custodian annual training up to date?	Yes No	
6. Is a "UNIVERSAL WASTE ACCUMULATION AREA" sign with Primary and alternate emergency contact information posted at the site?	Yes No	
7. Is a "NO SMOKING" sign posted?	Yes No	
If there is no Universal Waste currently stored at the site answer N/A for the remainder of checklist.		
8. Are Universal Waste containers kept sealed except when waste is being added or removed?	Yes No N/A	
9. Are Universal Waste containers in good condition (non-leaking or non-corroded) and compatible with the waste stored in them?	Yes No N/A	
10. Is each Universal Waste item or the container for the Universal Waste(s) labeled or marked with one of the following phrases? Circle the applicable item:		
a. "Universal Waste – Battery(ies)", or	Yes No N/A	
b. "Universal Waste – Pesticide(s)", or	Yes No N/A	
c. "Universal Waste – Mercury Containing Equipment", or	Yes No N/A	
d. "Universal Waste – Lamp(s)"	Yes No N/A	
11. Is each Universal Waste container for the universal waste(s) labeled with the accumulation start date?	Yes No N/A	
12. Are adequate aisle spaces maintained for incident response?	Yes No N/A	
13. Date of oldest UW container in the UWAA.		
14. Has a pickup request been submitted for all UW containers that have been accumulating for no more than 270 days (9 months)?	Yes No N/A	
15. Is the Universal Waste segregated/packaged and/or stored correctly? (i.e. Waste lithium batteries individually wrapped/packaged).	Yes No N/A	

For Environmental Personnel Only:
Check Inspection Type: Oversight___; Setup___; Closeout___

APPENDIX 8: PROCEDURE FOR ESTABLISHING A JOB ORDER NUMBER

In order to provide service to any customer, a job order number (JON) must be established with the NAVFAC Midlant Financial Management Business Line, Accounts Receivable Department.

To establish a job order number the customer must provide a Funding Document (NAVCOMPT form 2275) or a Requisition & Invoice (form DD-1149). The funding document should state under the description of work "MIDLANT ENVIRONMENTAL SERVICES " at minimum and should list the type of work requested. Forms may be obtained at the comptrollers' office for each command (phone: 341-1325/1318). A copy of the completed funding document must be sent to NAVFAC-MIDLANT (Accounts Receivable), FAX # (757) 341-1318. The NAVFAC MIDLANT Accounts Receivable Department can assign a job order as soon as the funding document is received. Work may be requested as soon as a valid JON is established.

Appendix 9: CALL 2 RECYCLE GUIDELINES

Call2Recycle

Rechargeable Battery Recycling Program Management Guidelines

This program is designed to recycle your old, rechargeable batteries from items such as cell phones, lab tops, power tools, etc. at no costs to your facility. Rechargeable batteries meet the definition of Universal Waste and must be properly managed during accumulation and sent for proper disposal or recycling.

Contact your installation Hazardous Waste (HW) Media Manager to get started with your own Call2Recycle collection box.

1) The HW Media Manager will provide the proper tools and training to successfully manage and recycle your rechargeable batteries. In addition to the provided on-site training, web based training may be accessed at https://environmentaltraining.ecatts.com/.

2) A POC will be designated as the responsible person for the collection box at the time it is established. The name and number of this POC will be documented on a site specific sign provided by the HW Media Manager. **Only this POC and those trained on the Call2Recycle program will be allowed to bag and place batteries into the collection box.** The sign also provides the POC with a battery recycling guide for reference.

3) Each battery shall be packaged in accordance with the directions on the box. Leaking or damaged batteries cannot be recycled and should be disposed of as HW. Your HW Media Manager can assist with this process. Adhering to these directions will help ensure safe storage.

4) The box must be dated when the very first battery is placed in it. Once the collection box is full or the 270 day limit has been reached (whichever comes first), tape the box closed and ship through UPS.

5) The collection boxes are already properly labeled and marked to comply with DOT and EPA regulations so additional labels or markings will not be required.

6) Site inspections will be performed quarterly by your assigned Environmental Protection Specialist to check for site safety, proper storage and correct batteries.

7) Please coordinate with the HW Media Manager to receive new collection boxes.

HW Compliance Director	341-0400
Hazardous Waste Media Manager By Installation	
Naval Station Norfolk, Craney Island, NSA Norfolk	341-0478
NWS Yorktown, Cheatham Annex, New Kent, NMCP	341-0402
St. Julien's Creek Annex, Southgate Annex, Scott Creek Annex	341-0404
Joint Expeditionary Base Little Creek – Fort Story,	341-0403
NAS Oceana, Dam Neck Annex, Fentress, Dare County, Northwest	341-0409

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Enclosure 2. Erosion Control Plan

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Final Erosion Control Plan

Naval Air Station Oceana,
Naval Auxiliary Landing Field Fentress,
Naval Air Station Oceana Dam Neck Annex, and
Naval Support Activity Hampton Roads Northwest Annex

May 2013

Prepared for:

Naval Facilities Engineering Command - Atlantic
6506 Hampton Blvd.
Norfolk, VA 23508

Contract No. N62470-12-D-7002
Task Order 002

Prepared by:

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APPENDICES

APPENDIX A**:** Photograph Log – Located on Compact Disk
APPENDIX B: Field Survey Forms - Located on Compact Disk
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ACRONYMS

BMP	best management practices
COMNAVREG	Commander, Navy Region, Mid-Atlantic
CWA	Clean Water Act
CY	cubic yards
ECP	Erosion Control Plan
E&S	Erosion and Sediment
EPA	Environmental Protection Agency
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
GIS	geographic information system
GMI	Geo Marine, Inc.
GPS	global positioning system
INRMP	Integrated Natural Resource Management Plan
MIDLANT	Mid-Atlantic
NAVFAC	Naval Facilities Engineering Command
NASO	Naval Air Station Oceana
NALFF	Naval Auxiliary Landing Field Fentress
NASO DNA	Nava Air Station Oceana Dam Neck Annex
NPDES	National Pollutant discharge Eliminiation System
NSA NWA	Naval Support Activity Hampton Roads Northwest Annex
SEE	Stell Environmental Enterprises, Inc.
SF	Square feet
SOW	Scope of Work
SWPPP	Stormwater Pollution Prevention Plan
U.S.	United States
VA	Virginia
VCDR	Virginia Department of Conservation and Recreation

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1 INTRODUCTION

Stell Environmental Enterprises, Inc. (SEE) prepared this Erosion Control Plan (ECP) under Naval Facilities Engineering Command (NAVFAC) Contract No. N62470-12-R-7002, Delivery Order No. 002. A survey of all erosion features was conducted at each of the following four installations, located in the Virginia Beach, Virginia (VA) area:

- Naval Air Station Oceana (NASO),
- Naval Auxiliary Landing Field Fentress (NALFF),
- NASO Dam Neck Annex (NASO-DNA), and
- Naval Support Activity Hampton Roads Northwest Annex (NSA-NWA)

The results of the erosion survey, documented in this ECP, will allow the installations to maintain compliance with regulations, such as the Environmental Protection Agency's (EPA) Clean Water Act (CWA); prevent release of sediment to streams, ponds and wetlands; maintain productive land use; and ensure the safety of personnel using the lands. The locations of these installations are shown in Figure 1-1.

This is the first erosion control survey undertaken at these installations. Based on conversations with the client, there have been no Notices of Violation associated with erosion or sediment release to the surface waters on or off-site. This survey will be proactive in identifying those areas that may or could be releasing sediment that could affect downgradient water quality in surface water. This survey will also be used to establish a baseline showing the location and extent of erosion that currently exists at each installation.

1.1 PROJECT OBJECTIVES

The purpose of the erosion survey is to identify erosion areas and to document those areas (Sections 4 and 5), and then describe measures to address those areas (Sections 6 and 7). Specifically, the objectives for this project are to:

- Identify the areas of existing and potential erosion at each installation;
- Document the survey process and results of the erosion survey; and
- Address the erosion areas by recommending the appropriate control measure which may include: construction to repair the erosion or reduce the potential for future erosion, implementation of a best management practice, or monitoring.

1.2 PROJECT SCOPE

To meet the project objectives, the scope of this project includes the following activities:

- Provide a desk-top analysis of existing information, including Integrated Natural Resource Management Plans (INRMPs), Stormwater Pollution Prevention Plans (SWPPPs), and numerous aerials, wetland maps, and geographic information system (GIS) information for each installation;
- Conduct a visual survey of accessible surface water features including streams, ditches, ponds, stormwater outfalls, unpaved roadways, agricultural areas, etc.;

- Document signs of erosion for the above areas by recording the type and cause of erosion, obtaining global positioning system (GPS) coordinates and photographs, and documenting soil types, and usage level; and
- Prepare the ECP to document observation results and provide recommendations to control or mitigate the erosion areas and the associated costs.

FIGURE 1-1
PROJECT LOCATION MAP

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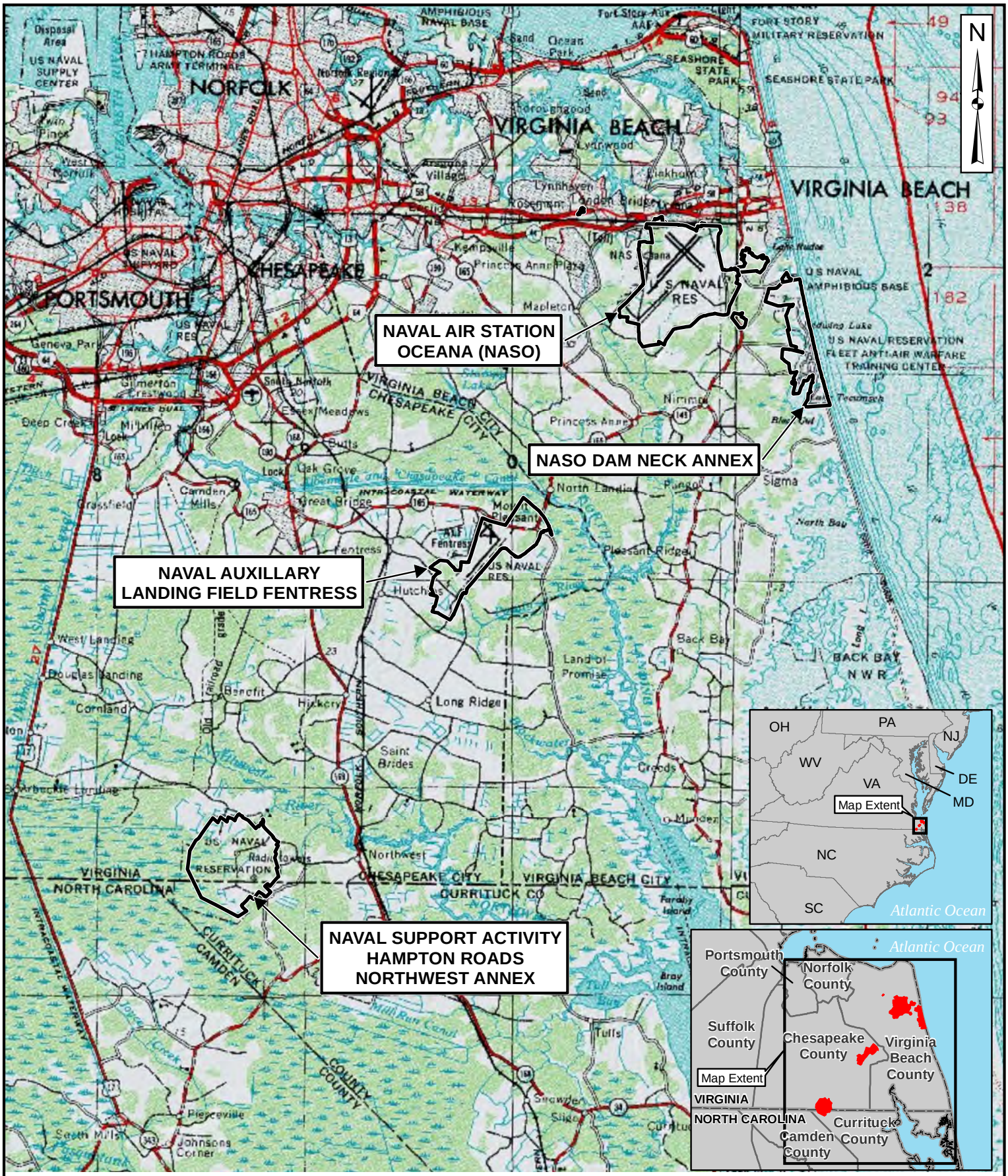

ArcUSA, US Census, ESRI, National Atlas of the United States

Copyright:© 2011 National Geographic Society, i-cubed

0 2 4 8 Kilometers

0 10,000 20,000 30,000 40,000 Feet

FIGURE 1-1: PROJECT LOCATION MAP

Naval Air Station Oceana (NASO), Naval Auxillary Landing Field Fentress, NASO Dam Neck Annex, Naval Support Activity Hampton Roads Northwest Annex
EROSION CONTROL PLAN
VIRGINIA BEACH, VIRGINIA

Stellee Environmental Enterprises, Inc.
...The Difference!
25 East Main Street
Elverson, PA 19520
(610) 286-0100
www.stellee.com

Completed by: JDD on 2/28/2013 G:\projects\1200 NAV Oceana\Erosion Control Plan Figures\Figure 1-1 Project Location Map.mxd

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2 JUSTIFICATION AND DRIVERS

2.1 MISSION

The mission of NASO is to provide every element of supply, material, maintenance, personnel, and training facilities required to ensure F/A-18 Hornet fighter squadrons achieve the requisite level of readiness necessary to deploy on command aircraft carriers as fully combat fighter and attach squadrons. NALFF serves as a major carrier landing training facility for aircraft stationed at NASO and Chambers Field. The mission of NASO DNA is to provide quality education and training in specified combat systems operations and maintenance, provide specialized skills training, and to provide training systems support to operational and systems commands. The mission of NSA-NWA is to coordinate the provision of shore activity support to tenant commands, which include all branches of the armed forces and the Coast Guard. A large amount of suitable land area without erosion features, ruts, steep slopes, and depressions is required to support the training activities for these missions. By minimizing erosion, the current amount of suitable, level land area and roadways can be maintained for training purposes to support each facility's mission (INRMPs for NASO, NASO DNA, NALFF and NSA-NWA).

2.2 REGULATORY DRIVERS

Numerous federal and state government regulations, standards, and guidance drive or influence erosion control activities at NASO, NALFF, NASO DNA and NSA NWA. The following is an identification and summary of the primary regulations, standards, and guidance that pertain to the erosion control measures discussed in this document:

Navy Erosion and Sediment Control Instruction - The Commander, Navy Region (COMNAVREG), Mid-Atlantic (MIDLANT) has developed minimum standards and criteria for the effective control of soil erosion, sediment deposition, and non-agricultural runoff from land disturbing activities at installations under its purview. These standards and criteria apply to land disturbing activities greater than or equal to 10,000 square feet (SF) in size and have the following objectives:

- Establish the criteria, procedures, and responsibilities for preparing and complying with Erosion and Sediment Control Plans for land disturbing activities.
- Establish a procedure for inspecting land disturbing activities and their associated erosion and sediment controls.

Navy Post Construction Stormwater Runoff Management Instruction - The COMNAVREG MIDLANT has adopted stormwater best management practices for development or redevelopment activities of parcels greater than or equal to one acre in size. This instruction also applies to land development activities for parcels less than one acre in size if the activities are part of a larger common plan of development. This instruction seeks to maintain compliance with state and federal environmental regulations through the following objectives:

- Require that the after-development runoff from land development and redevelopment activities is maintained as nearly as practicable to the pre-development runoff characteristics in order to reduce flooding, siltation, stream bank erosion, and property damage.

- Establish minimum design criteria for the protection of properties and aquatic resources downstream from land development and redevelopment activities to prevent damage resulting from increases in volume, velocity, frequency, duration, and peak flow rate of stormwater runoff.
- Establish minimum design criteria for measures to minimize non-point source pollution from stormwater runoff that would otherwise degrade water quality.
- Establish provisions for the long-term maintenance of stormwater management control devices and other techniques specified to manage the quality and quantity of runoff.
- Establish administrative procedures for the submission, review, approval, and disapproval of stormwater plans and the inspection of approved projects.

VA Erosion and Sediment Control Regulation. The VA Erosion and Sediment Control Regulation (4 VA Code 50-60-48) was developed to address erosion and sediment control. The *Virginia Erosion and Sediment Control Handbook*, 1992, was prepared as a guidance to assist in implementing the above regulation and was used in preparing this document.

- This regulation is based upon relevant physical and developmental information relating to the watershed and drainage basins of the Commonwealth of VA, including, but not limited to, data relating to land use, soils, hydrology, geology, size of land area being disturbed, proximate water bodies and their characteristics, transportation, and public facilities and services.
- Erosion control measures will include such surveys of lands and waters as may be deemed appropriate by the VA Water Pollution Control Board or required by any applicable law to identify areas, including multijurisdictional and watershed areas, with critical erosion and sediment problems.
- The regulation contains conservation standards for various types of soil and land uses to include criteria, techniques, and methods for the control of erosion and sediment resulting from land-disturbing activities.

United States (U.S.) EPA CWA – Section 104 (2)(n1) of the CWA promotes and encourages continuing comprehensive studies of the effects of pollution, including sedimentation, in the estuaries and estuarine zones of the U.S. on fish and wildlife, fishing, recreation, water supply and water power, and other beneficial purposes. The CWA addresses water quality impacts through multiple sections within the Act including nonpoint pollution control, discharges to potable water systems, and stormwater management. Nonpoint pollution and stormwater discharges play a major role in transporting sediment resulting from erosion into our nation's water resources; therefore, minimizing erosion will have a positive impact on water quality by limiting the sediment and pollutants that enter the potable, recreational, and navigable surface water on and downstream of the four installations.

Chesapeake Bay Preservation Act - The Chesapeake Bay Preservation Act, 1988, states that the Virginia Soil and Water Conservation Board will encourage and promote protection of existing high quality state waters and restoration of all other state waters to a condition or quality

that will permit all reasonable public uses and will support the propagation and growth of all aquatic life, including game fish, which might reasonably be expected to inhabit them. Minimizing erosion will have a positive impact by limiting the sediment and pollutants that enter state waters from portions of NASO.

2.3 NAVY POLICY

Navy policy on natural resources management, including surface water, is to manage natural resources to support and be consistent with the military mission while protecting and enhancing those resources for multiple use, sustainable yield, and biological integrity. Land use practices and decisions must be based on scientifically sound conservation procedures and techniques, and the use of scientific methods and an ecosystem management approach. (OPNAVINST 5090.1C 2007)

Employing ecosystem management will help maintain and improve the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and the environment required for realistic military training operations. (Department of Defense Initiative 4715.3 1996).

The basic principles and guidelines of ecosystem management are to:

- Preserve the function and integrity of natural ecosystems;
- Integrate human social and economic interests with environmental considerations;
- Involve all interested parties (stakeholders) in identifying management goals; and
- Adapt to changing conditions and requirements.

2.4 STEWARDSHIP

Environmental stewardship is essential to the safe, healthful, and compliant execution of the Navy's mission and the protection and preservation of natural resources. The Navy promotes environmental stewardship through projects that enhance the installation's natural resources, promote proactive conservation measures, and support investments that demonstrate the Navy's environmental leadership and environmental stewardship (Department of the Navy, NASO 2011). To achieve these ideals, NAVFAC has established an Environmental Management System that will:

- Comply with applicable laws, regulations and policies;
- Integrate environmental stewardship into operational decisions;
- Implement, modify, and sustain practices that minimize and prevent creation of waste and pollutants at its source;
- Develop objectives and targets to minimize environmental risk, and monitor progress towards those goals;
- Educate the Navy's workforce and supported commands on their responsibilities to the environment;

- Foster communication throughout the installation on our environmental commitments and performance; and
- Sustain the Navy's partnerships with public agencies and community organizations to mutually monitor and improve the quality of the environment.

3 EROSION PROCESSES AND TYPES OF EROSION

Soil erosion is the process by which the land's surface is worn away by the action of wind, water, ice, and gravity. Natural or geologic erosion has been occurring at a relatively slow rate since the earth was formed and is a tremendous factor in the creation of the earth as we know it today. The picturesque mountains of the west, the rolling farmlands of the Piedmont, and the productive estuaries of the Coastal Zone are all products of the geologic erosion and sedimentation process in Virginia. Except for some cases of shoreline and stream channel erosion, natural erosion occurs at a slow rate and is an important factor in maintaining an environmental balance (VA DCR 1992).

Water-generated erosion is the most severe type of erosion and is the type of erosion that is the focus of this report. Water-generated erosion occurs as a result of the impact of rain droplets on unprotected soil surfaces and is due to frictional forces on soil particles as those rain droplets combine and move across the surface of the land. The force due to impact of raindrops is primarily vertical and tends to detach soil particles, while the force of flowing water is primarily horizontal and acts to move detached particles from one place to another. Water-generated erosion can be broken down into the following types, as defined in the Virginia Erosion and Sediment Control Handbook (VA DCR 1992).

Splash erosion is the initial effect of rain upon the soil. Raindrop impact dislodges soil particles and splashes them into the air. These detached particles are then vulnerable to movement via surface water flow, including sheet, rill, gully, or channel erosion.

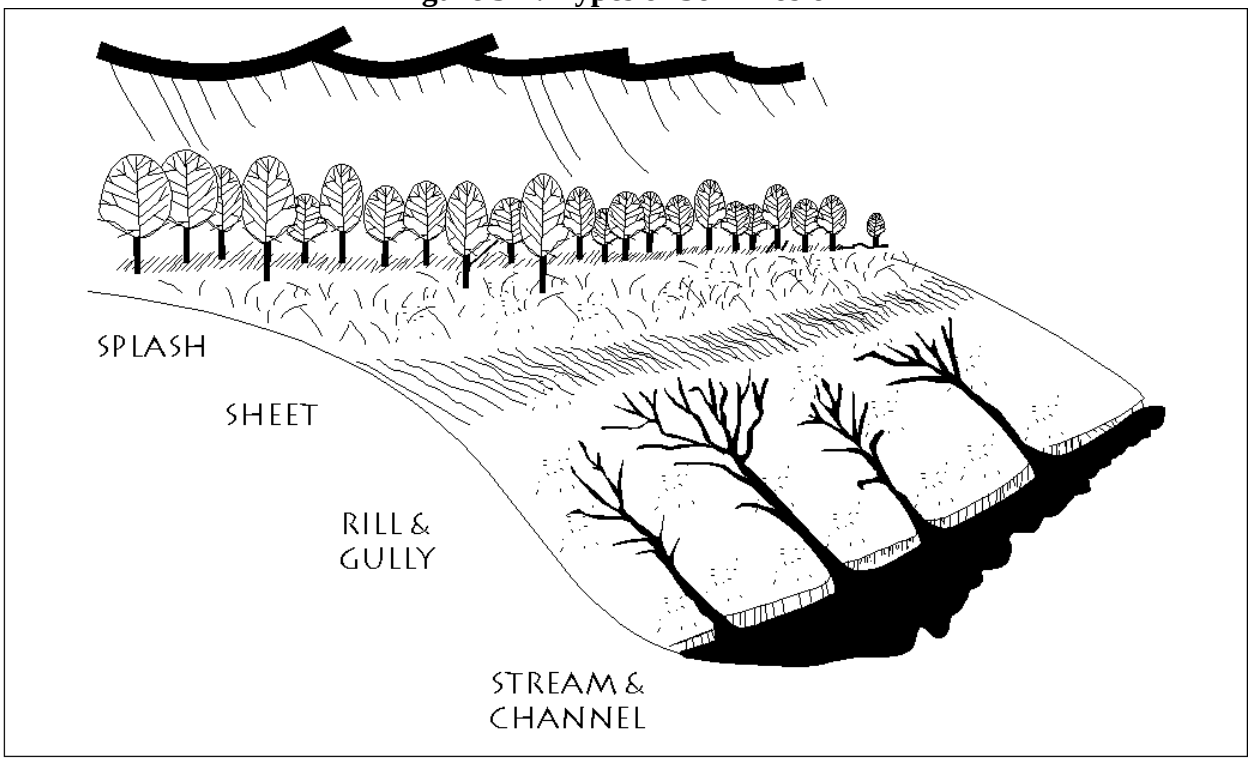
Sheet erosion is caused by the shallow flow of water over the land's surface before it concentrates. Although seldom the detaching agent, sheet flow transports soil particles detached by raindrop impact. Sheet erosion has been identified as a major cause of soil loss on agricultural fields. Sheet flow rarely moves as a uniform sheet for more than a few feet on land surfaces before concentrating in the surface irregularities.

Rill erosion occurs as sheet flow begins to concentrate in the low spots of irregular surfaces. As flow changes from sheet flow to shallow concentrated flow, the velocity and turbulence of flow increase. The energy of this concentrated flow is able to detach and transport additional soil particles. When this occurs, the running water begins to cut small channels. Rills are small but well-defined channels that are up to a few inches deep. They are easily mitigated in agricultural areas by harrowing and other surface treatments.

Gully erosion occurs when rills combine and the increased volume and velocity of water form larger and deeper channels. The main difference between rill erosion and gully erosion is magnitude. Gullies are often too large to be repaired by tillage equipment and typically require heavy equipment and special repair techniques.

Stream and Channel erosion takes place when the volume and velocity within a stream channel are such that bed and/or bank materials are moved and not replaced. Streambed scour is the removal of underwater material by waves or currents, especially at the base or toe of a streambank or shoreline.

Figure 3-1: Types of Soil Erosion



(Source: CEP 1998)

4 METHODOLOGY USED FOR FIELD ASSESSMENT

4.1 DESKTOP ANALYSIS

Prior to the field assessment, a desk top analysis was conducted by SEE to review information provided by NAVFAC and to identify potential sites to be surveyed. Information provided by NAVFAC for the desk top analysis primarily consisted of the most recent INRMPs for each installation and relevant GIS files for each base. Using this information, SEE identified areas to be investigated during the field assessment. These areas consisted of primary stormwater drainage ditches, natural streams, channelized natural streams, and lake and pond shorelines. The primary resources utilized by SEE were Water Resource Maps from the INRMPs (GMI 2006 and 2008) and the Wetland Centerline GIS layers (GMI 2002), provided by NAVFAC in October and November 2012. Additional clarification regarding survey areas was provided by Michael Wright, Navy Natural Resources Specialist, during a site tour held on November 13, 2012, at the onset of site assessment activities. This site tour consisted of a daylong driving tour of NASO, NASO-DNA, NALFF, and NSA-NWA.

4.2 FIELD SURVEY

The field assessment was performed by SEE between the dates of November 13, 2012 and January 23, 2013. A total of five nonconsecutive weeks of field assessment was conducted to complete the field survey at all four facilities.

Field assessment activities consisted of the field location of survey areas, visual inspection of these areas, and documentation of any notable erosion features observed upon inspection. Investigation methods included walking inspections, driving inspections where practical, and investigation by means of canoe. When possible, the surveys were conducted by starting downstream and continuing upstream so that any discharge of sediment from erosion to the receiving stream would be identified early in the survey. The identification of erosion features was primarily based on the visual observation of typical erosion features such as sparse vegetation, occurrences of sheet erosion, erosion rills and gullies, slope failures, and scour. The general process employed by SEE was conducted as follows:

- Follow shoreline of watercourse or surface water until an erosion feature was identified.
- Take one or more photographs of the erosion feature showing the extent of erosion.
- Document each feature's location using a Trimble GeoXH 3000 GPS device. GPS measurements were recorded manually in decimal format and also stored on the unit. The GPS measurements collected represent the center of the erosion feature. The target accuracy was three meters or less.
- Complete a field inspection form.
- Repeat the process for the remainder of watercourse or surface water features.

Field documentation of erosion features included the following information:

- General description;
- GPS coordinates that were both manually and digitally recorded;
- Designated use of the surrounding area (e.g. agricultural, training, recreational, etc.);
- Apparent usage level of the surrounding area (e.g. heavy, moderate, light);
- Vegetative condition of the surrounding area (e.g. sparse grass, dense brush, etc.)
- Photographic documentation;
- Nature of erosion and sedimentation issues observed;
- Condition of drainage structure, if applicable;
- Apparent cause of the erosion; and
- Physical dimensions pertaining to the erosion feature.

Initially, SEE sought to perform a direct visual inspection of every area, regardless of impediments such as heavy brush and thickly forested areas. This approach, while very labor intensive and time consuming, proved worthwhile in that it allowed SEE to confirm that major erosion issues were not of primary concern in these densely vegetated areas where natural occurrences of erosion were present. Upon reporting this and with NAVFAC approval, SEE limited direct visual inspection to areas that were reasonably accessible by foot, vehicle, or canoe.

Areas identified in the field for which mitigation cost estimates were not provided generally consisted of occurrences of natural erosion along drainage ditches or channelized natural streams located within wooded areas where mitigation of the erosion would result in greater disturbance of surrounding areas if the present condition were to be addressed.

A summary of the surface water locations surveyed at each installation is provided in Table 4-1. These surface water locations and erosion features for NASO, NASO DNA, NALFF, and NSA NWA are shown in figures 5-1, 5-2, 5-3, and 5-4 respectively.

Table 4-1: Survey Summary by Installation

Installation	Total Length of Surface Water Surveyed	Surface Water Areas Surveyed	No. of Photographs (incl. in Appendix A)	No. of Erosion Features Identified
NASO	32 miles	Outfalls, Aeropines Golf Course Ponds and Mitigation Site, Runway Ditches, Agricultural Ditches, West Neck Creek, Weapons Compound Ditches, Oceana Pond, Owls Creek, Sand Pit Ponds, Base Perimeter Ditches, Roadside Ditches, Concrete Ponds, Skeet Range, VACAPES Area	173	20
NASO DNA	9 miles	MACS 24 Area, DEVGRU Area, Lake Christine, Redwing Lake, Lake Tecumseh, Sadler Pond, Lotus Pond, Lily Pond, Roadside Ditches, Main Ditch between Redwing Lake and Lake Tecumseh	11	3
NALFF	11 miles	Pocaty Creek, Runway Ditches, Agricultural Ditches, Chesapeake City Channel	18	3
NSA NWA	11 miles	Mill Stream, Lunker Lake, Brig Area, ROTHR Ditches, Agricultural Ditches, Roadside Ditches	12	6

Notes:
DEVGRU – Development Group
MACS – Marine Air Control Squadron
NALFF – Naval Auxiliary Landing Field Fentress
NASO – Naval Air Station Oceana
NASO DNA – Naval Air Station Oceana Dam Neck Annex
NSA NWA – Naval Support Activity Hampton Roads Northwest Annex
ROTHR - Relocatable Over-the Horizon Radar
VACAPES – Virginia Capes

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5 ASSESSMENT RESULTS

The following sections present and discuss the results of the erosion survey by installation. Figures for each installation are provided at the end of this section. The primary causes of each erosion feature and the GPS coordinates are shown in Table 5-1.

5.1 NASO

A total of 20 erosion features, designated as NASO 01 through NASO 20, were identified during field assessment activities at NASO. The surface waters surveyed and locations of these 20 erosion features are shown in Figure 5-1 (end of section).

5.1.1 NASO 01

Erosion feature NASO 01 consists of multiple erosion features located along an approximate 500 foot reach of an agricultural field drainage ditch west of West Neck Creek. These features are designated as NASO 01(a) through NASO 01(d) and are discussed in further detail below.

5.1.1.1 NASO 01(a)

Erosion feature NASO 01(a) is located approximately 0.27 miles upstream of Outfall 001 via an agricultural ditch west of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-1. The GPS coordinates for this feature are latitude 36.7892 and longitude -76.0438. All GPS coordinates represent the center of the erosion feature.

NASO 01(a) is characterized by occurrences of sheet erosion and erosion rills at the southeast corner of the intersection of the main agricultural drainage ditch and a tributary ditch to the south. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the concentration of upgradient drainage over the sparsely vegetated area adjacent to the ditch.

Erosion at this feature extends southeast of the intersection of the main and tributary ditches and has an area of about 175 SF. The erosion rills are an average of 6 inches deep.

Photograph 5-1: NASO 01(a), Erosion Rills along Agricultural Field Drainage Ditch

5.1.1.2 NASO 01(b)

Erosion feature NASO 01(b) is located downstream of NASO 01(a), approximately 0.22 miles upstream of Outfall 001 via an agricultural branch of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-2. The GPS coordinates for this feature are latitude 36.7893 and longitude -76.0438.

NASO 01(b) is characterized by occurrences of sheet erosion and erosion gullies at the northwest corner of the intersection of the main agricultural drainage ditch and a tributary ditch to the north. In addition to the erosion, a small diameter pipe culvert, located within the tributary ditch immediately north of the main ditch, is partially obstructed with soil. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the concentration of upgradient drainage over the sparsely vegetated area adjacent to the ditch.

Erosion at this feature extends northeast in an approximate radius of eight feet from the ditch corner, corresponding to an area of about 50 SF. The erosion gullies range from six to 18 inches in depth.

Photograph 5-2: NASO 01(b), Erosion Gullies along Agricultural Field Ditch

5.1.1.3 NASO 01(c)

Erosion feature NASO 01(c) is located downstream of NASO 01(b), approximately 0.20 miles upstream of Outfall 001 via a channelized branch of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-3. The GPS coordinates for this feature are latitude 36.7894 and longitude -76.0425.

NASO 01(c) is characterized by occurrences of sheet erosion and erosion gullies at all four corners of the intersection of the main agricultural drainage ditch and two tributary ditches to the north and south, as well as an occurrence of localized slope failure along the southern streambank of the main ditch located downstream of the intersection. In addition to the erosion, a small diameter pipe culvert, located within the tributary ditch immediately north of the main ditch, is damaged. The soil type present at this feature is silty loam. The sheet and gully erosion present at this feature can be attributed to the concentration of upgradient drainage as flow from intersecting ditches combine resulting in a higher volume of runoff converging in one ditch.

The slope failure can be attributed to steeply sloped streambanks and streambed scour at the toe of the slope under peak flow conditions. This action contributed to unstable slope conditions by removing toe material that was supporting material on the slope. With material at the toe of the slope being removed, the slope material became mobile and collapsed into the channel.

Although erosion is present at this feature in slightly varying degrees on all four corners of the ditch intersection, the erosion generally extends in a radius of approximately 30 feet from the ditch intersection, corresponding to an area of about 2,800 SF. The erosion gullies south of the main ditch range in depth from six to 18 inches. Erosion gullies to the north of the main ditch range in depth from six to 36 inches. The slope failure occurs along the southern streambank of the main ditch located downstream of the intersection, and spans about 10 feet of the streambank.

Photograph 5-3: NASO 01(c), Erosion Gullies along Agricultural Field Ditch

5.1.1.4 NASO 01(d)

Erosion feature NASO 01(d) is located downstream of NASO 01(c), approximately 0.18 miles upstream of Outfall 001 via a channelized branch of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-4. The GPS coordinates for this feature are latitude 36.7894 and longitude -76.0422.

NASO 01 (d) is characterized by the occurrence of deep gully erosion along the northern and southern streambanks of the main agricultural ditch. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the combined concentration of upgradient drainage as runoff from multiple directions resulting in a higher volume of runoff converging in one ditch.

This erosion feature has an estimated area of approximately 500 SF. The gullies along the northern streambank range in depth from six to 42 inches. The gully along the southern streambank is approximately 36 inches deep.

Photograph 5-4: NASO 01(d), Erosion Gullies along Agricultural Field Ditch

5.1.2 NASO 02

Erosion feature NASO 02 is located along a drainage ditch running parallel to the main runway, approximately 2.10 miles upstream of Outfall 001 via a series of drainage ditches and a channelized branch of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-5. The GPS coordinates for this feature are latitude 36.8125 and longitude -76.0384.

NASO 02 is characterized by localized slope failure along the southeastern streambank of the drainage ditch. The soil type present at this feature is clayey silt. The slope failure can be attributed to steeply sloped streambanks and streambed scour at the toe of the slope under peak flow conditions. This action contributed to unstable slope conditions by removing toe material that was supporting material on the slope. With material at the toe of the slope being removed, the slope material became mobile and collapsed into the channel.

The slope failure occurs along the southeastern streambank, spans about 20 feet of the ditch, and is approximately four feet in height. The average thickness of the material mobilized by the slope failure is one foot. The estimated volume of collapsed material based on the above dimensions is approximately 3 cubic yards (CY).

Photograph 5-5: NASO 02, Slope Failure along Runway Ditch

5.1.3 NASO 03

Erosion feature NASO 03 is located at the outlet of a pipe culvert on the Aeropines Golf Course. The pipe culvert is located between a small drainage ditch and an unnamed pond. Both the pond and the ditch receive drainage from the golf course and do not discharge to any outfalls. No significant downstream impacts, including the transport of sediment, were observed as a result of NASO 03. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-6. The GPS coordinates for this feature are latitude 36.7911 and longitude -76.0382.

NASO 03 is characterized by the occurrence of streambed scour at the culvert outlet. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the lack of sufficient outlet and streambed protection required to dissipate the energy of water discharged by the culvert under peak flow conditions.

Approximately 35 feet of streambed scour is present. The streambed scour is an average of six inches deep and 18 inches wide, corresponding to an area of about 55 SF.

Photograph 5-6: NASO 03, Streambed Scour at Culvert Outlet

5.1.4 NASO 04

Erosion feature NASO 04 is located within the Aeropines Golf Course Mitigation Site, approximately 0.30 miles upstream of Outfall 001 via a channelized branch of West Neck Creek. The Aeropines Golf Course Mitigation Area is a forested wetland that was planted to replace other wetlands destroyed by development. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-7. The GPS coordinates for this feature are latitude 36.7914 and longitude -76.0406.

NASO 04 is characterized by the occurrence of sheet erosion. The soil type present at this feature can primarily be described as sandy with little fines or topsoil. The erosion present at this feature can be attributed to upgradient drainage over the sparsely to moderately vegetated area and the highly erodible soils that are prevalent in this area. Reportedly, vegetation survival rates have been poor in this area.

This erosion feature consists of two primary areas: (1) an approximate 7,000 SF of moderately vegetated area containing a silt fence that was never removed from the original mitigation project; and (2) an approximate 4,000 SF of sparsely vegetated area located upslope of the silt fence area. The corresponding total area of erosion is approximately 11,000 SF.

Photograph 5-7: NASO 04, Sheet Erosion at Aeropines Golf Course Mitigation Site

5.1.5 NASO 05

Erosion feature NASO 05 is located at the outlet of a drainage ditch pipe culvert at the Aeropines Golf Course, approximately 1.30 miles upstream of Outfall 001 via a channelized branch of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-8. The GPS coordinates for this feature are latitude 36.7914 and longitude -76.0291.

NASO 05 is characterized by the occurrence of erosion along an embankment adjacent to a culvert. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the concentration of upgradient drainage from the paved golf cart path above the culvert. The increased drainage velocity due to the paved surface is an additional contributor to the occurrence of erosion at this feature.

The footprint of the erosion feature is approximately 25 SF; the total embankment including the erosion, the area on both sides of the culvert and the area above the culvert is approximately 100 SF. The depth of the drainage ditch is approximately three feet.

Photograph 5-8: NASO 05, Gully Erosion at Aeropines Golf Course

5.1.6 NASO 06

Erosion feature NASO 06 is located along the bank of a pond at the Aeropines Golf Course, approximately 1.56 miles upstream of Outfall 001 via two unnamed golf course ponds, a drainage ditch, and a channelized branch of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-9. The GPS coordinates for this feature are latitude 36.7967 and longitude -76.0277.

NASO 06 is characterized by bank destabilization and sloughing of material along the pond bank. The soil type present at this feature is silty loam. A combination of mechanisms including a steep slope and scouring by small waves from the pond likely contributed to the destabilization.

The embankment as originally constructed had a nearly vertical two foot embankment. This steep slope along with small waves coupled with rising and falling pond levels over the years resulted in mobilization of the pond bank material, with separation occurring at the interface of the more densely rooted vegetative buffer and the less densely rooted bank soil, where well maintained grass is present.

The erosion feature spans about 220 feet of the pond bank. The thickness of the destabilized material ranges from approximately one to two feet. The average distance of separation from the main pond bank is approximately one foot.

Photograph 5-9: NASO 06, Pond Bank Destabilization at Aeropines Golf Course

5.1.7 NASO 07

Erosion feature NASO 07 is located at the outlet of a drainage ditch pipe culvert that discharges to a channelized branch of West Neck Creek at the Aeropines Golf Course. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-10. The GPS coordinates for this feature are latitude 36.7996 and longitude -76.0294.

NASO 07 is characterized by erosion of the culvert embankment and joint failure of the culvert piping. The soil type present at this feature is silty loam. The erosion can be attributed to the concentration of upgradient drainage above the culvert resulting in erosion around the concrete piping by scouring. The erosion has contributed to separation of the final pipe section of the culvert, although flow through the pipe has not been significantly altered or become obstructed due to the erosion. This area appears to be under some type of recent repair activity, as evidenced by signs of recent brush clearing and excavator operations.

The footprint of the erosion gully itself is approximately 20 SF. The surrounding area, including above and along both sides of the culvert, is approximately eight feet wide by 15 feet long or approximately 120 SF. The depth of the gully is approximately three to four feet.

Photograph 5-10: NASO 07, Embankment Erosion and Pipe Collapse at Aeropines Golf Course

5.1.8 NASO 08

Erosion feature NASO 06 is located along the bank of a pond at the Aeropines Golf Course, approximately 1.30 miles upstream of Outfall 001 via the unnamed golf course pond and a channelized branch of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-11. The GPS coordinates for this feature are latitude 36.8006 and longitude -76.0281.

NASO 08 is characterized by bank destabilization and sloughing of material along the pond bank. The soil type present at this feature is silty loam. A combination of mechanisms including a steep slope and scouring by small waves from the pond likely contributed to the destabilization.

The embankment as originally constructed had a nearly vertical two foot embankment. This steep slope along with small waves coupled with rising and falling pond levels over the years resulted in mobilization of the pond bank material, with separation occurring at the interface of the more densely rooted vegetative buffer and the less densely rooted bank soil where well maintained grass is present.

The separation located on the pond bank near the area of destabilized bank and is a result of concentrated drainage from the upslope area entering the pond and eroding soil from its bank.

The destabilized bank feature spans about 50 feet of the pond bank. The thickness of the destabilized material ranges from approximately one to three feet. The average distance of separation from the main pond bank is approximately one foot.

The separation is approximately eight feet in length and two feet wide. The total depth of the gully is approximately three feet.

Photograph 5-11: NASO 08, Pond Bank Destabilization at Aeropines Golf Course

5.1.9 NASO 09

Erosion feature NASO 09 is located at a drainage ditch pipe culvert at the Weapons Compound perimeter, approximately 1.2 miles upstream of Outfall 004 via a series of drainage ditches. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-12. The GPS coordinates for this feature are latitude 36.7988 and longitude -76.0447.

NASO 09 is characterized by a significant obstruction to flow present at the culvert inlet. The obstruction is a result of an accumulation of debris consisting of approximately one to two feet of leaves and pine needles over a 30 SF area at the culvert inlet. Additional debris likely exists within the culvert piping for an indiscernible length. No erosion was observed in this area, although the potential exists due to the obstruction.

Photograph 5-12: NASO 09, Culvert Obstruction at Weapons Compound

5.1.10 NASO 10

Erosion feature NASO 10 is located at a drainage ditch pipe culvert at the Weapons Compound perimeter, approximately 0.60 miles upstream of Outfall 001 via a drainage ditch and a channelized branch of West Neck Creek. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-13. The GPS coordinates for this feature are latitude 36.7933 and longitude -76.0408.

NASO 10 is characterized by a significant obstruction to flow present at the culvert inlet, resulting in streambank scour, scouring of the culvert embankment, and undermining of the overlaying roadway. The obstruction is a result of an accumulation of debris consisting of approximately one to three feet of leaves, pine needles, branches, and sediment over a 240 SF area at the culvert inlet. The soil type present at this feature is silty loam. A heavy accumulation of debris at the culvert inlet has resulted in a restriction of flow, causing significant erosion to occur in the immediate vicinity of the inlet. The eroded areas include the ditch streambank immediately upstream of the inlet and the culvert embankment supporting the overlaying roadway. The primary concern is erosion of the culvert embankment, which extends approximately one to three feet into the embankment and undermines the overlaying roadway. Stress cracks present in the roadway asphalt indicate that the culvert embankment is subsiding in the absence of supporting material. The approximate total height of the culvert embankment and the ditch streambank is six feet. In total, an estimated 40 feet of streambank (20 feet on each side) and embankment is affected in this area.

A Navy escort at the Weapons Compound had indicated that this area receives a substantial volume of drainage under peak flow conditions and that stormwater from the ditch crested the roadway during Hurricane Sandy in late 2012.

Photograph 5-13: NASO 10, Culvert Obstruction at Weapons Compound

5.1.11 NASO 11

Erosion feature NASO 11 is located at a pipe culvert along a runway drainage ditch, approximately 1.15 miles upstream of Outfall 004 via a series of drainage ditches. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-14. The GPS coordinates for this feature are latitude 36.8048 and longitude -76.0477.

NASO 11 is a pipe culvert in which the flared end section has detached approximately four inches from the main pipe. No erosion was observed in this area due to the detachment, although the potential for additional separation exists under peak flow conditions.

Photograph 5-14: NASO 11, Separation of Pipe Culvert along Runway Ditch

5.1.12 NASO 12

Erosion feature NASO 12 is located at a drainage ditch pipe culvert southwest of the main runway, approximately 0.35 miles upstream of Outfall 004. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-15. The GPS coordinates for this feature are latitude 36.7986 and longitude -76.0573.

NASO 12 is characterized by the occurrence of minor sheet and rill erosion along the culvert embankment. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the concentration of upgradient drainage over the sparsely vegetated area adjacent to the culvert.

Most erosion occurred in a horseshoe-shaped pattern around the upstream end of the culvert and encompasses an approximate footprint of 300 SF.

Photograph 5-15: NASO 12, Embankment Erosion at Culvert Southwest of Main Runway

5.1.13 NASO 13

Erosion feature NASO 13 is located at a fence line screen along a drainage ditch at Outfall 004. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-16. The GPS coordinates for this feature are latitude 36.8025 and longitude -76.0608.

NASO 13 is characterized by a significant obstruction to flow present at the fence line screen. No erosion was observed in this area, although the potential for future erosion exists due to the obstruction. The obstruction is a result of an accumulation of debris consisting of approximately three CY of branches, leaves, and pine needles.

Photograph 5-16: NASO 13, Screen Obstruction at Oufall 004

5.1.14 NASO 14

Erosion feature NASO 14 is located along the shoreline of the Owls Creek tidal area. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-17. The GPS coordinates for this feature are latitude 36.8259 and longitude -76.9861.

NASO 14 is characterized by the occurrence of erosion rills and gullies perpendicular to the shoreline. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to both the concentration of upgradient drainage and tidal impacts from Owls Creek.

Approximately 80 feet of eroded shoreline is present in this area. The erosion gullies are approximately eight inches deep and six inches wide. This area appears to be heavily utilized for recreational purposes.

Photograph 5-17: NASO 14, Shoreline Erosion at Owls Creek Area

5.1.15 NASO 15

Erosion feature NASO 15 is located at a drainage ditch pipe culvert in the Sand Pit Ponds area, approximately 625 feet upstream of Outfall 006. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-18. The GPS coordinates for this feature are latitude 36.8323 and longitude -76.0121.

NASO 15 is characterized by minor erosion occurring along the ditch streambank and the resulting partial obstruction of flow through the culvert. The soil type present at this feature can primarily be described as sand with little fines or topsoil. The erosion is attributable to the sandy soil and lack of vegetation or other stabilization measures in the area. The pipe culvert is partially obstructed by collapsed streambank material at its inlet and outlet, which is inhibiting drainage from the nearby Sand Pit Ponds.

The impacted area, which includes the culvert embankment and abutting streambanks, is approximately 1,800 SF.

Photograph 5-18: NASO 15, Minor Erosion and Culvert Obstruction at Sand Pit Ponds Area

5.1.16 NASO 16

Erosion feature NASO 16 is located at the facility's perimeter security fence along Oceana Boulevard near the Sand Pit Ponds area, approximately 0.25 miles upstream of Outfall 006. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-19. The GPS coordinates for this feature are latitude 36.8304 and longitude -76.0113.

NASO 16 is characterized by the occurrence of gully erosion beneath the security fence. The soil type present at this feature can primarily be described as sand with little fines or topsoil. The erosion at this feature can be attributed to the concentration of drainage from the adjacent roadway. The increased drainage velocity due to the paved surface of the roadway is an additional contributor to the occurrence of erosion at this feature. Due to the sandy soil and sparse vegetation in the area, this erosion feature has the potential to worsen rapidly if not addressed and may present a security issue due to its location along the perimeter security fence.

The erosion gully is approximately two feet deep, 20 feet long, and 10 feet wide resulting in an area of 200 SF.

Photograph 5-19: NASO 16, Gully Erosion along Oceana Boulevard near Sand Pit Ponds Area

5.1.17 NASO 17

Erosion feature NASO 17 is located in a drainage ditch parallel to the main runway, approximately 0.60 miles upstream of Outfall 006. NASO 17 spans a main ditch from the outlet of a pipe culvert to the intersection with a perpendicular downstream ditch, and includes a section of the downstream ditch near the intersection. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-20. The GPS coordinates for this feature are latitude 36.8287 and longitude -76.0200.

NASO 17 is characterized by slope failure occurring along the streambank. The soil type present at this feature is silty loam. The slope failure can be attributed to steeply sloped streambanks and streambed scour at the toe of the slope under high flow conditions. This action contributed to unstable slope conditions by removing toe material that was supporting material on the slope. With material at the toe of the slope being removed, the slope material became mobile and collapsed into the channel.

Slope failure has occurred along an approximately 350 foot section the main drainage ditch. Both sides of the streambank are impacted, although erosion along the southeastern embankment is more severe. The height of the streambank is approximately 10 to 12 feet. The total impacted area along the main ditch is approximately 8,400 SF.

Along the intersecting ditch, slope failure has occurred along an approximately 50 foot section of the northeastern streambank. The height of the streambank is approximately 10 to 12 feet. The total impacted area along the intersecting ditch is approximately 600 SF.

Photograph 5-20: NASO 17, Slope Failure along Runway Ditch

5.1.18 NASO 18

Erosion feature NASO 18 is located at a drainage ditch pipe culvert southwest of the main runway, approximately 0.40 miles upstream of Outfall 004. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-21. The GPS coordinates for this feature are latitude 36.7983 and longitude -76.0575.

NASO 18 is characterized by the occurrence of minor sheet and rill erosion along the culvert embankment and some minor embankment scour. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the concentration of upgradient drainage over the sparsely vegetated area adjacent to the culvert.

An approximate 5,000 SF area, including the culvert embankment and roadway, is impacted by erosion.

Photograph 5-21: NASO 18, Embankment Erosion at Culvert Southwest of Main Runway

5.1.19 NASO 19

Erosion feature NASO 19 is located at a large diameter pipe culvert at Outfall 002. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-22. The GPS coordinates for this feature are latitude 36.8305 and longitude -76.0454.

NASO 19 is characterized by occurrences of gully erosion, embankment scour, and slope failures in the general vicinity of the outfall. The soil type present at this feature is fine sandy loam. Although dense vegetation and fallen leaves presented difficulties in assessing the full extent of erosion present at this feature, notable erosion of the culvert embankment was observed. The erosion present at this feature can be attributed to loose soils, steeply sloped embankments, and the large volume of drainage that this area receives under peak flow conditions. The potential for future downstream impacts exists should erosion persist in this area.

Erosion associated with NASO 19 generally occurs in a 120 foot horseshoe-shaped footprint around the culvert embankment. The bank height is approximately 12 feet. A deep erosion gully is also present along the southern embankment and measures approximately four feet deep and three feet wide. A total area of approximately 1,500 SF of erosion is present at this feature.

Photograph 5-22: NASO 19, Embankment Erosion at Oufall 002

5.1.20 NASO 20

Erosion feature NASO 20 is located at the convergence of a roadside drainage ditch and multiple pipe culverts at Outfall 005, immediately outside of the perimeter security fence along Potters Road. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-1 and a photograph is provided as Photograph 5-23. The GPS coordinates for this feature are latitude 36.8375 and longitude -76.0391.

NASO 20 is characterized by occurrences of streambed scour, gully erosion and embankment scour. The soil type present at this feature is loam. The erosion present at this feature can primarily be attributed to the large volume of drainage that this area receives under peak flow conditions. A deep scour hole located where the roadside ditch enters the outfall area presents a potential safety issue due to its close proximity to the road. Erosion gullies along the culvert embankment, resulting from the shallow concentration of upgradient drainage from the adjacent agricultural field, undermine the perimeter security fence and present potential security concerns. Additionally, erosive scour at the embankment of the culverts passing under the road will begin to undercut the roadway if erosion persists and may pose future problems relating to roadway stability.

The general depth of scouring and gully erosion in the area ranges from approximately three to five feet deep. The total area of the erosion feature is approximately 200 SF.

Photograph 5-23: NASO 20, Ditch Scour and Embankment Erosion at Outfall 005

5.2 NASO DNA

A total of three erosion features, designated as NASO DNA 01 through NASO DNA 03, were identified during field assessment activities at NASO DNA. The surface waters surveyed and the three erosion features identified are shown in Figure 5-2. These erosion features are discussed in detail in the following subsections.

5.2.1 NASO DNA 01

Erosion feature NASO DNA 01 is located at a bend along a small roadside drainage ditch. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-2 and a photograph is provided as Photograph 5-24. The GPS coordinates for this feature are latitude 36.8147 and longitude -75.9707.

NASO DNA 01 is characterized by the occurrence of minor streambank scour along a ninety degree bend in the drainage ditch and undermining of the adjacent security fence. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to the abrupt change in flow direction, which is likely only an issue under peak flow conditions.

Approximately 20 feet of erosive scour is present along the three feet deep streambank. The total eroded area is approximately 60 SF.

Photograph 5-24: NASO DNA 01, Streambank Scour along Roadside Ditch

5.2.2 NASO DNA 02

Erosion feature NASO DNA 02 is located along the southern shoreline of Lake Christine. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-2 and a photograph is provided as Photograph 5-25. The GPS coordinates for this feature are latitude 36.8145 and longitude -75.9769.

NASO DNA 02 is characterized by occurrences of limited embankment scour and failure along a relatively small section of the lake shoreline. The soil type present at this feature is silty loam. The erosion present at this feature can be attributed to wave action from the lake.

Approximately 500 feet of erosion is present along the shoreline, which varies in height from one to four feet above the water. Assuming an average height of 2.5 feet, the total eroded area of shoreline that is visible above the water is 1,250 SF.

Photograph 5-25: NASO DNA 02, Shoreline Erosion at Lake Christine

5.2.3 NASO DNA 03

Erosion feature NASO DNA 03 is located at the outlet of a drainage ditch culvert that passes beneath an unpaved roadway, approximately 0.60 miles upstream of Redwing Lake. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-2 and a photograph is provided as Photograph 5-26. The GPS coordinates for this feature are latitude 36.8035 and longitude -75.9698.

NASO DNA 03 is characterized by failure of the culvert embankment, resulting in potential blockage of the culvert outlet and roadway stability concerns. The soil type present at this feature is silty loam. The embankment failure is likely due to the concentration of upgradient drainage from the overlaying unpaved roadway at the point immediately above the culvert.

A section of the embankment above the culvert approximately 10 feet wide has collapsed. The embankment height is approximately three feet. The total eroded area is approximately 30 SF.

Photograph 5-26: NASO DNA 03, Embankment Failure and Culvert Obstruction along Roadway

5.3 NALFF

A total of three erosion features, designated as NALFF 01 through NALFF 03, were identified during field assessment activities at NALFF. The surface waters surveyed and the three erosion features identified are shown in Figure 5-3. These erosion features are discussed in detail in the following subsections.

5.3.1 NALFF 01

Erosion feature NALFF 01 is located along a roadside drainage ditch that receives drainage from an adjacent agricultural field and is approximately 585 feet upstream of Pocaty Creek. Significant deep erosion is present at this location. Both NALFF 01 and the conjoining downstream erosion feature, NALFF 02, have contributed to the transport of a large volume of sediment that has primarily accumulated in a wooded area located between the end of NALFF 02 and Pocaty Creek. Although the ditches within which NALFF 01 and NALFF 02 are located appear to drain in the general direction toward Pocaty Creek, no direct discharge to Pocaty Creek was observed. The wooded area at the end of NALFF 02, where sediment is deposited, is of generally low relief and drainage appears to dissipate into sheet flow upon exit from the ditch channel. Therefore, sediment transported from these erosion features presently accumulates within the wooded area prior to Pocaty Creek and appears to have no significant impacts to the creek itself. The general location of this erosion feature is presented in Figure 5-3 and photographs are provided as Photographs 5-27 and 5-28. The GPS coordinates for this feature are latitude 36.6758 and longitude -76.1507.

NALFF 01 is characterized by significant drainage ditch scour. The soil type present at this feature is fine sandy loam. The erosion present at this feature can primarily be attributed to the large volume of drainage that the ditch appears to receive under peak flow conditions. The origination of the scour is likely due to flow restrictions at the downstream pipe culvert, which can be attributed to either obstruction of the culvert inlet from the accumulation of debris or the culvert having insufficient capacity to manage the drainage it receives. The scour appears to have originated at the culvert inlet and receded upstream to the present location of the upstream portion of the erosion feature NALFF 0l.

This erosion feature is approximately 100 feet long and 6 feet deep, with an average width of 10 feet resulting in a volume of approximately 225 CY. Immediately upstream of the erosion feature, the typical dimensions of the drainage ditch are approximately three feet wide and two feet deep. An estimated two CY of debris consisting of dead grasses and soil is present at the culvert inlet.

Photograph 5-27: NALFF 01, Scour along Agricultrual Field Ditch

Photograph 5-28: NALFF 01, Scour along Agricultrual Field Ditch

5.3.2 NALFF 02

Erosion feature NALFF 02 is located along an agricultural drainage ditch, approximately 300 feet upstream of Pocaty Creek. Significant erosion is present at this location. Both NALFF 02 and its conjoining upstream erosion feature, NALFF 01, have contributed to the transport of a large volume of sediment that has primarily accumulated in a wooded area located between the end of NALFF 02 and Pocaty Creek. Although the ditches within which NALFF 01 and NALFF 02 are located appear to drain in the general direction toward Pocaty Creek, no direct discharge to Pocaty Creek was observed. The wooded area at the end of NALFF 02, where the sediment is deposited, is of generally low relief and drainage appears to dissipate into sheet flow upon exit from the ditch channel. Therefore, sediment transported from these erosion features presently accumulates within the wooded area prior to Pocaty Creek and appears to have no significant impacts to the creek itself. The general location of this erosion feature is presented in Figure 5-3 and a photograph is provided as Photograph 5-29. The GPS coordinates for this feature are latitude 36.6765 and longitude -76.1501.

NALFF 02 is characterized by occurrences of streambank scour along the southeastern streambank of an agricultural drainage ditch, erosion gullies along the northwestern streambank, and heavy sedimentation along the streambed. The soil type present at this feature is fine sandy loam. The streambank scour, which occurs along the well vegetated southeastern streambank, can be attributed to the large volume of drainage that this ditch receives under peak flow conditions. The erosion gullies, occurring along the northwestern streambank where no vegetative buffer exists, are due to the concentration of upgradient drainage entering the ditch from the adjacent agricultural field.

Approximately 230 feet of erosion is present along this streambank. The depth of the ditch is approximately four feet. Multiple erosion gullies occur along the entire length of the northwestern streambank and range in size from three to five feet long, one to three feet deep, and one to four feet wide.

Photograph 5-29: NALFF 02, Erosion Gullies along Agricultrual Field Ditch

5.3.3 NALFF 03

Erosion feature NALFF 03 consists of multiple erosion features located along an approximate 0.45 mile span of the Chesapeake City drainage channel that discharges directly to Pocaty Creek. These features are designated as NALFF 03(a) through NALFF 03(g) and are addressed as a single unit because of they are located along the same reach of the channel, have similar erosion characteristics, and the repair of these locations involve the same technologies (regarding, filter fabric installation, and riprap). It is very likely that areas 3(a – g) would be repaired by the same contractor. These areas are discussed in further detail below.

5.3.3.1 NALFF 03(a)

Erosion feature NALFF 03(a) consists of erosion present within a large drainage channel known as the City Channel from the channel's intersection with Pocaty Creek to approximately 350 feet upstream of the creek. Significant erosion is present within this section of the channel and heavy sedimentation was observed within Pocaty Creek at the channel's point of discharge. The general location of this erosion feature is presented in Figure 5-3 and a photograph is provided as Photograph 5-30. The GPS coordinates for this feature are latitude 36.6811 and longitude -76.1545.

NALFF 03(a) is primarily characterized by streambed scour along the span of the feature, as well as some minor streambank scour on the southern streambank in an area immediately downstream of the existing riprap armoring. The soil type present at this feature is loam. Both occurrences of erosion can be attributed to the large volume of drainage this channel appears to receive under peak flow conditions.

Approximately 350 feet of significant streambed scour is present. This scour consists of the washout of the main portion of the channel and stabilization matting that was originally placed during channel construction and the channelization of the streambed below the original construction grade of the streambed. The channelization due to scour is approximately 3.5 feet wide and two feet deep.

An estimated 50 to 100 SF of scouring is present along the southern streambank in the area immediately downstream of the existing riprap armoring.

Photograph 5-30: NALFF 03(a), Streambed Scour along Chesapeake City Channel

5.3.3.2 NALFF 03(b) through NALFF 03(g)

Erosion features NALFF 03(b) through NALFF 03(g) consist of similar erosion features located where lateral drainage ditches discharge into the larger City Channel. Each lateral ditch flows to a small diameter pipe culvert located along an approximate 0.32 mile span of the large City channel. These culverts direct drainage from agricultural field ditches which are tributary to the main drainage channel and are located just outside of the main channel. The general locations of these erosion features are presented in Figure 5-3 and a typical photograph is provided as Photograph 5-31. Although Photograph 5-31 is for NALFF 03(b) it is also representative of

features NALFF 03(c through g). The GPS coordinates for NALFF(b) is latitude 36.6814 and longitude -76.1568.

These erosion features are characterized by heavy scour at the culvert inlets. The soil type present at these features is loam. The scour can be attributed to insufficient culvert capacity under peak flow conditions resulting in a restriction of flow and turbulent conditions at the culvert inlet.

Although the extent of erosion varies at each feature, an average of approximately 50 SF of erosion is present at each location. The typical depth of erosion at each location is one foot.

Photograph 5-31: NALFF 03(b), Scour at Agricultrual Field Culvert

5.4 NSA NWA

A total of six erosion features, designated as NSA NWA 01 through NSA NWA 06, were identified during field assessment activities at NSA NWA. The surface waters surveyed and the six erosion features identified are shown in figure 5-4. These erosion features are discussed in detail in the following subsections.

5.4.1 NSA NWA 01

Erosion feature NSA NWA 01 is located at a drainage ditch pipe culvert approximately 325 feet upstream of Mill Stream. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. It was noted that erosion and sediment control measures, including riprap and a rock check dam, were present downstream within the

drainage ditch between the culvert and Mill Stream. The general location of this erosion feature is presented in Figure 5-4 and a photograph is provided as Photograph 5-32. The GPS coordinates for this feature are latitude 36.5725 and longitude -76.2577.

NSA NWA 01 is characterized by the occurrence of gully erosion along one side of the culvert embankment. The soil type present at these features is fine sandy loam. The erosion can be attributed to the concentration of upgradient drainage from the overlaying roadway entering the ditch at the culvert embankment. A minor accumulation of sediment is present within the pipe culvert, although flow through the culvert is not obstructed.

The gully is approximately three feet wide and two feet deep along the four feet tall embankment.

Photograph 5-32: NSA NWA 01, Gully Erosion along Culvert Embankment

5.4.2 NSA NWA 02

Erosion feature NSA NWA 02 is located along Mill Stream. Heavy sedimentation was noted about 200 feet downstream of the feature, although overall downstream impacts to water quality as a result of erosion at NSA NWA 02 appear to be minimal. The occurrences of erosion and sedimentation that are present along this stream section appear to be typical of a channelized natural stream such as Mill Stream. The general location of this erosion feature is presented in Figure 5-4 and a photograph is provided as Photograph 5-33. The GPS coordinates for this feature are latitude 36.5729 and longitude -76.2583.

NSA NWA 02 is characterized by a significant obstruction to normal stream flow and minimal sheet erosion along the shoreline. The obstruction to flow is due to trees that have fallen across the stream and have accumulated debris. The soil type present at this feature is fine sandy loam. The occurrence of erosion at this feature is primarily present along the southern streambank, where scour occurs as a result of the altered flow path from the obstruction present in the stream.

An estimated two to three CY of debris is present within the stream. Approximately 30 linear feet of scour is present along the southern streambank.

Photograph 5-33: NSA NWA 02, Flowpath Obstruction and Sheet Erosion along Mill Stream

5.4.3 NSA NWA 03

Erosion feature NSA NWA 03 is located at a drainage ditch pipe culvert adjacent to a large agricultural field approximately 150 feet upstream of Mill Stream. Significant erosion is present at this feature and sedimentation was observed in Mill Stream at the ditch's point of discharge. The general location of this erosion feature is presented in Figure 5-4 and a photograph is provided as Photograph 5-34. The GPS coordinates for this feature are latitude 36.5755 and longitude -76.2522.

NSA NWA 03 is characterized by a number of erosion issues, including deep gully erosion, streambed and streambank scour, and slope failures. The soil type present at this feature is fine sandy loam. Erosion primarily occurs around the outlet of the culvert and immediately downstream, although erosion is also present at the culvert inlet and atop the culvert embankment. The erosion can be attributed to the large volume of drainage this area receives

under peak flow conditions. The lack of outlet protection, such as riprap, has led to severe streambed scour and has greatly increased the depth of the ditch, particularly under the culvert outlet, and has resulted in significant downstream slope failures. Deep erosion gullies on the southern side of the culvert outlet indicate that substantial shallow concentrated drainage is also received from the upgradient agricultural field. Overall, it appears that this culvert was constructed prior to recent development and is no longer adequately sized to manage the associated increase in drainage volume.

The pipe culvert is approximately 40 feet in length. The streambank height is eight to 10 feet at the culvert inlet and 10 to 12 feet at the outlet. Where eroded, the width of the ditch is approximately 20 feet, which is about double the normal width of the ditch. For the purpose of estimating mitigation costs, an approximate 10,000 SF area would need to be addressed. This includes the erosion area and the surrounding woods and brush that would need to be cleared to facilitate mitigation.

Photograph 5-34: NSA NWA 03, Embankment Scour at Culvert Upstream of Mill Stream

5.4.4 NSA NWA 04

Erosion feature NSA NWA 04 is located at a pipe culvert at the downstream end of an unnamed, natural stream, at its intersection with Mill Stream. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-4 and a photograph is provided as Photograph 5-35. The GPS coordinates for this feature are latitude 36.5687 and longitude -76.2668.

NSA NWA 04 is characterized by obstruction of the culvert inlet resulting in bypass flow along the outside of the culvert pipe and erosion of the culvert embankment. The soil type present at this feature is fine sandy loam. The obstruction is due to the accumulation of debris consisting of fallen branches and leaves.

About half of the culvert inlet is obstructed. An estimated one CY of debris is present outside of the culvert, at its inlet. Approximately 30 feet of erosion occurs along the bottom and sides of the pipe.

Photograph 5-35: NSA NWA 04, Bypass Flow at Mill Stream Culvert

5.4.5 NSA NWA 05

Erosion feature NSA NWA 05 is located at a drainage ditch arch culvert located approximately 0.22 miles upstream of the eastern boundary of the base. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-4 and a photograph is provided as Photograph 5-36. The GPS coordinates for this feature are latitude 36.5658 and longitude -76.2483.

NSA NWA 05 is characterized by the occurrence of gully erosion along the culvert embankment. The soil type present at this feature is loam. The erosion can be attributed to the concentration of upgradient drainage from the overlaying roadway entering the ditch at the culvert embankment. It was apparent upon inspection that soil had been dumped into the gully sometime after the erosion had originally occurred. This soil was washed out of the gully at the time of inspection.

The gully is approximately two feet wide and three feet deep along the four feet tall embankment.

Photograph 5-36: NSA NWA 05, Gully Erosion along Culvert Embankment

5.4.6 NSA NWA 06

Erosion feature NSA NWA 06 is located at a drainage ditch pipe culvert approximately 0.18 miles upstream of the eastern base boundary. No significant downstream impacts, including the transport of sediment, were observed as a result of this feature. The general location of this erosion feature is presented in Figure 5-4 and a photograph is provided as Photograph 5-37. The GPS coordinates for this feature are latitude 36.5656 and longitude -76.2477.

NSA NWA 06 is characterized by the occurrence of sheet erosion along the culvert embankment. The soil type present at this feature is loam. The erosion can be attributed to upgradient sheet flow over the embankment and sparse vegetation in the area. Some of the erosion appears to be due to runoff from the paved parking lot located inside the adjacent fence line as there is evidence of sediment between parking lot and embankment. The gully has some vegetation growing in it so it appears that this erosion feature has been around for a while. Approximately 500 SF of sheet erosion is present at this feature.

Photograph 5-37: NSA NWA 06, Sheet Erosion along Culvert Embankment

Table 5-1: Primary Causes of Erosion for Each Erosion Feature

Area of Erosion	Latitude	Longitude	Poor Agricultural Practices	Recent Land Development or Human Activity	Poor Drainage Structure Design	Severe Storm Event	Little or No Maintenance	Natural Erosion or Steep Slopes
NASO-01	36.7892	-76.0438	X					
NASO-02	36.8125	-76.0384				X		X
NASO-03	36.7911	-76.0382			X			
NASO-04	36.7914	-76.0406					X	X
NASO-05	36.7980	-76.0291			X	X		
NASO-06	36.7967	-76.0277				X		X
NASO-07	36.7996	-76.0294			X		X	
NASO-08	36.8006	-76.0281				X		X
NASO-09	36.7988	-76.0447					X	
NASO-10	36.7933	-76.0408			X		X	
NASO-11	36.8048	-76.0477					X	
NASO-12	36.7986	-76.0573				X	X	
NASO-13	36.8025	-76.0608					X	
NASO-14	36.8259	-75.9861		X				
NASO-15	36.8323	-76.0121						X
NASO-16	36.8304	-76.0113		X	X			
NASO-17	36.8287	-76.0200			X	X		
NASO-18	36.7983	-76.0575				X		X
NASO-19	36.8305	-76.0454				X		X
NASO-20	36.8375	-76.0391			X	X		
NASO DNA-01	36.8147	-75.9707				X		X
NASO DNA-02	36.8145	-75.9769						X
NASO DNA-03	36.8035	-75.9698			X		X	
NALFF-01	36.6758	-76.1507		X	X			
NALFF-02	36.6765	-76.1501	X				X	

Area of Erosion	Latitude	Longitude	Poor Agricultural Practices	Recent Land Development or Human Activity	Poor Drainage Structure Design	Severe Storm Event	Little or No Maintenance	Natural Erosion or Steep Slopes
NALFF-03	36.6811	-76.1545		X	X			
NSA NWA-01	36.5725	-76.2577			X			
NSA NWA-02	36.5729	-76.2583						X
NSA NWA-03	36.5755	-76.2522		X	X			
NSA NWA-04	36.5687	-76.2668			X	X		
NSA NWA-05	36.5658	-76.2483			X			
NSA NWA-06	36.5656	-76.2477			X	X		

FIGURE 5-1
NASO EROSION SURVEY FEATURES

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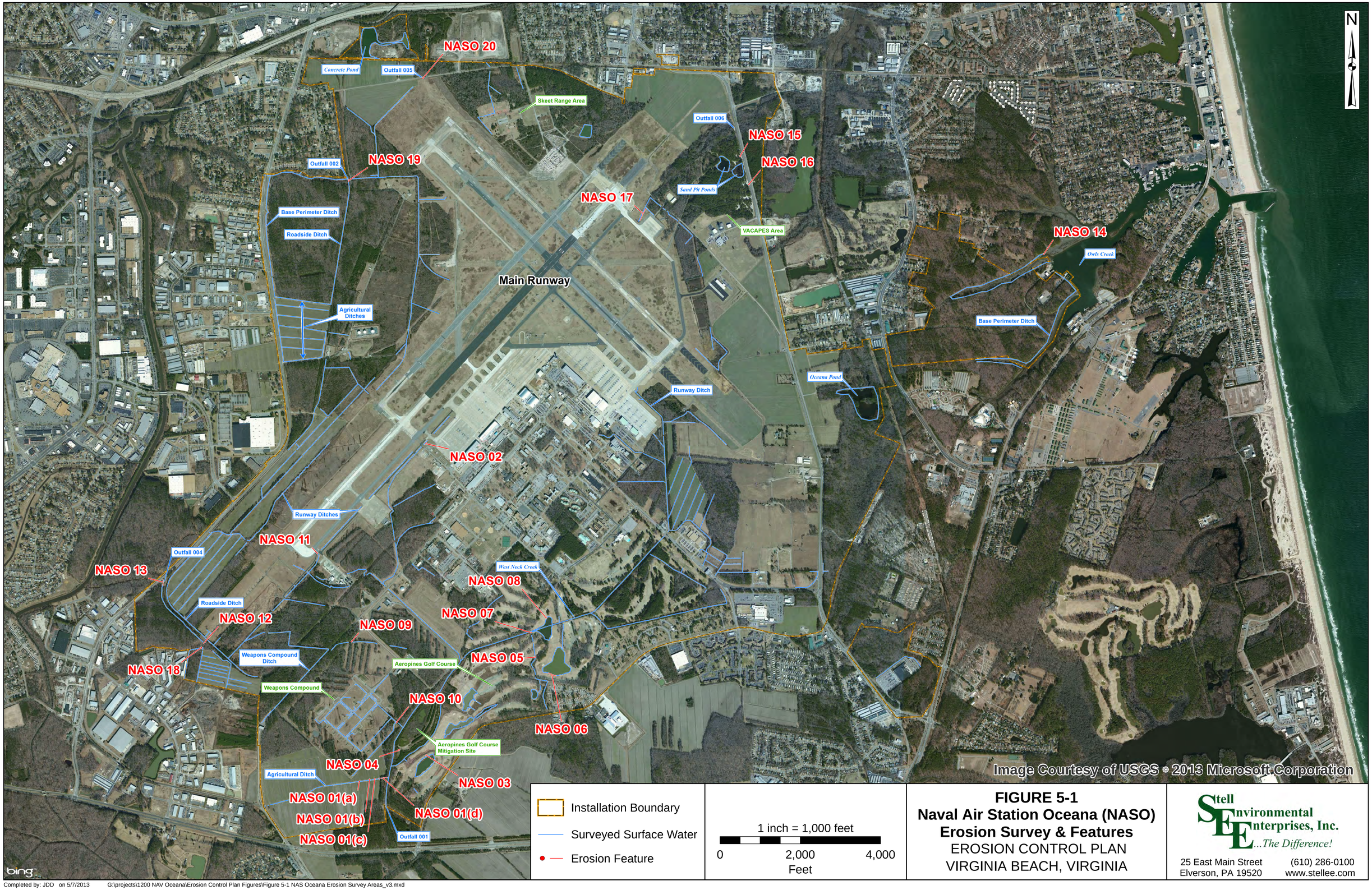

Installation Boundary

Surveyed Surface Water

Erosion Feature

1 inch = 1,000 feet

0 2,000 4,000

Feet

FIGURE 5-1
Naval Air Station Oceana (NASO)
Erosion Survey & Features
EROSION CONTROL PLAN
VIRGINIA BEACH, VIRGINIA

Stellee Environmental Enterprises, Inc.
...The Difference!
25 East Main Street
Elverson, PA 19520
(610) 286-0100
www.stellee.com

Completed by: JDD on 5/7/2013 G:\projects\1200 NAV Oceana\Erosion Control Plan Figures\Figure 5-1 NAS Oceana Erosion Survey Areas_v3.mxd

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FIGURE 5-2
NASO – DAM NECK ANNEX EROSION SURVEY FEATURES

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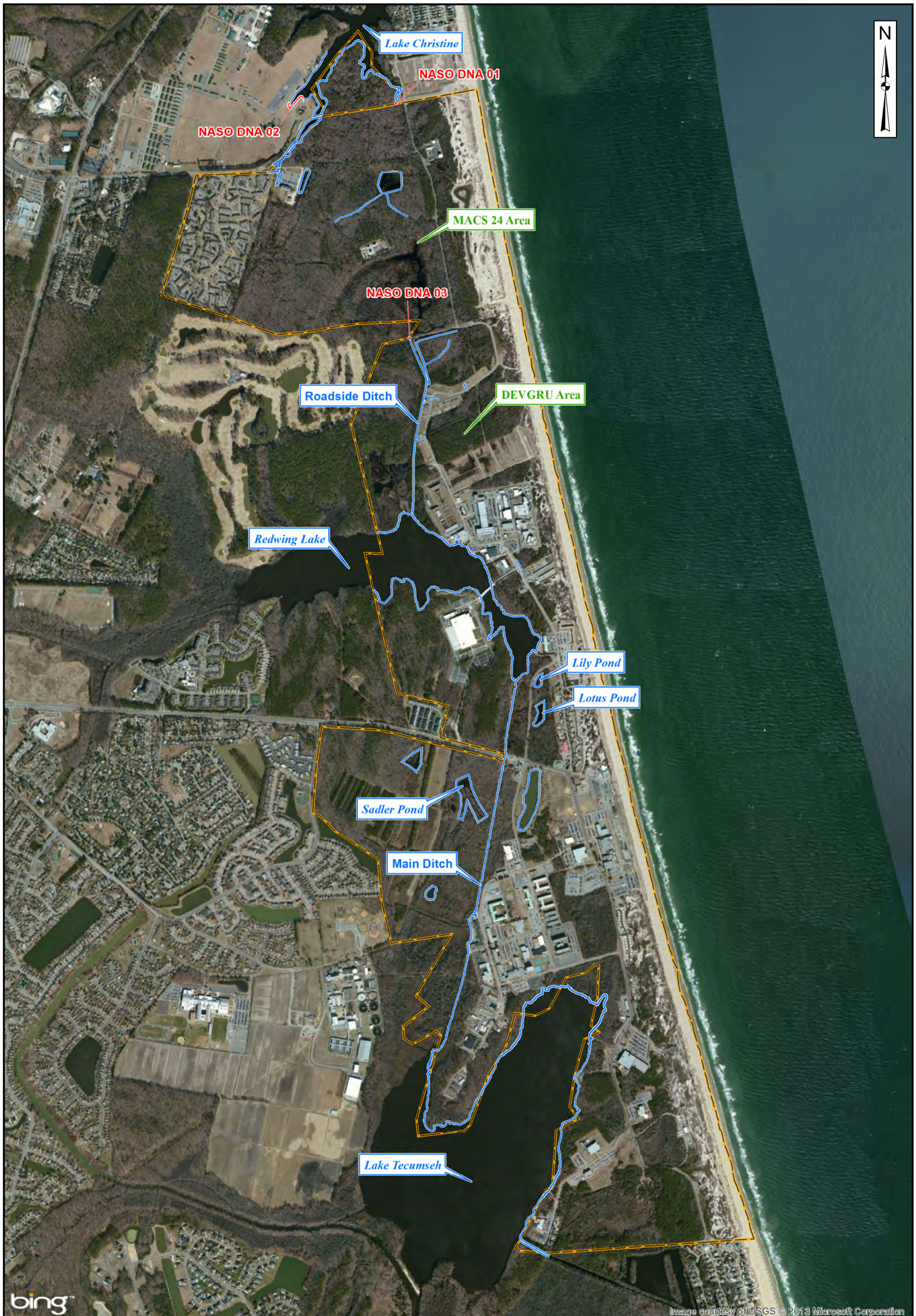

Installation Boundary
Surveyed Surface Water
Erosion Feature

1 inch = 1,500 feet

0 1,500 3,000

Feet

FIGURE 5-2
Naval Air Station Oceana Dam Neck Annex
Erosion Survey & Features
EROSION CONTROL PLAN
VIRGINIA BEACH, VIRGINIA

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FIGURE 5-3
NALFF EROSION SURVEY FEATURES

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N

Agricultural Ditch

Runway Ditches

Pocaty Creek

Chesapeake City Channel

Agricultural Ditch

See Inset

Chesapeake City Channel

NALFF 03(b)

NALFF 03(c)

NALFF 03(a)

NALFF 03(g)

NALFF 03(f)

NALFF 03(e)

NALFF 03(d)

Pocaty Creek

Agricultural Ditch

NALFF 02

NALFF 01

0 500 1,000 2,000 Feet

bing

Data Source: NSAHR-NWA Wetlands and Waters of the USA/Stream Line GIS Layers produced by TetraTech, Inc. 2012

Image courtesy of USGS © 2013 Microsoft Corporation

Installation Boundary

Surveyed Surface Water

Erosion Feature

1 inch = 2,000 feet

0 2,000 4,000

Feet

FIGURE 5-3
Naval Auxiliary Landing Field Fentress
Erosion Survey & Features
EROSION CONTROL PLAN
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Completed by: JDD on 5/9/2013 G:\projects\1200 NAV Oceana\Erosion Control Plan Figures\Figure 5-3 NALFF Erosion Survey Areas_v5.mxd

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FIGURE 5-4
NAVAL SUPPORT ACTIVITY – NORTHWEST AREA
EROSION SURVEY FEATURES

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N

Brig Area

Mill Stream

Lunker Lake

See Inset

Drainage Ditch

Agricultural Ditch

ROTHR Ditch

Agricultural Ditch

Unnamed Stream

Roadside Ditch

NSA NWA 03

NSA NWA 02

Brig Area

Mill Creek

NSA NWA 01

NSA NWA 04

Lunker Lake

NSA NWA 06

NSA NWA 05

Drainage Ditch

0 1,000 2,000 4,000 Feet

Data Source: NSAHR-NWA Wetlands and Waters of the USA/Stream Line GIS Layers produced by TetraTech, Inc. 2012

Image courtesy of USGS © 2013 Microsoft Corporation

Installation Boundary

Surveyed Surface Water

Erosion Feature

1 inch = 2,000 feet

0 2,000 4,000

Feet

FIGURE 5-4
Naval Support Activity Hampton Roads
Northwest Annex
Erosion Survey & Features
EROSION CONTROL PLAN
VIRGINIA BEACH, VIRGINIA

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6 DISCUSSION AND RECOMMENDATIONS

Based on the survey results discussed in Section 5.0 of this report, SEE has provided recommendations to address each erosion feature with an emphasis to stop any current erosion and downstream transport of sediment. The recommendations utilize proven methods and technologies that meet the following primary criteria: effectiveness in controlling erosion, implementability from an engineering standpoint, and cost effectiveness.

6.1 NASO

A total of 20 erosion features, designated as NASO 01 through NASO 20, where identified during field assessment activities at NASO and presented in Section 5.1 of this report. The following subsections discuss SEE's recommendations for addressing these erosion features. Estimated costs are also provided for each recommended approach with supporting documentation provided in Appendix C. Cost estimates are turnkey and include planning, supplies, equipment, and manpower for implementation, in addition to any required maintenance costs.

6.1.1 NASO 01

Erosion feature NASO 01 consists of multiple erosion features located along an approximate 500 foot span of an agricultural field drainage ditch that discharges into West Neck Creek. These features are designated as NASO 01(a) through NASO 01(d). For cost estimate purposes, these features are addressed as a single unit because of their close proximity to each other, similar erosion characteristics, and use of similar methods to address them.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas. Where erosion rills and gullies are present, the recommended mitigation approach is to restore the areas to their original grade and reestablish vegetation to prevent erosion from recurring. Soil fill will be required to bring the areas up to grade. Grading work can be performed using a backhoe loader or similar equipment. Final grades should have a uniform surface with no irregularities to prevent drainage from concentrating and causing erosion to reoccur.

Where slope failure occurs along the streambank, the recommended mitigation approach is to restore the streambank to a stable condition. This can be accomplished by reducing the slope and revegetating the streambank. In the area where slope failure occurs, the streambank should be cut back to reduce the slope and minimize the potential for future failure. Where slope reduction is performed, the final grade of the newly sloped area should gradually taper into the existing undisturbed sections of the streambank to minimize abrupt irregularities that could lead to further erosion. In general, final slopes exceeding three horizontal to one vertical should be avoided when implementing these mitigation approaches.

The eight inch drain pipes associated with these erosion features should be addressed by removing the obstruction present at NASO 1(b) and by repairing or replacing the damaged section present at NASO 1(c). Maintenance of the planted vegetation and good agricultural practices will prevent the erosion from reoccurring.

Vegetation can be reestablished by applying an appropriate seed mixture. Soil amendments, such as topsoil, may need to be incorporated to provide the nutrients necessary to support growth. The Erosion and Sediment Control (ESC) Technical Bulletin No. 4 issued by the Virginia Department of Conservation and Recreation (VDCR), July 2003 specifies native plant species applicable for erosion control in Coastal Plain Areas. An example of an applicable seed mixture consists of tall fescue 62-72%, Bermudagrass 0-15%, Red Top Grass or Creeping Red Fescue 1%, Seasonal Nurse Crop 13%, and/or Sericea Lespedeza 13%. Five foot vegetative buffers should be maintained along the ditch edges to protect against erosion.

Soil stabilization matting should be installed immediately upon completion of seed application. The matting will hold the seed in place, promote its germination, and control erosion until vegetation is firmly established. The application of soil stabilization matting should be in accordance with the specifications of VA ESC Handbook, chapter 3, section 3.36.

Maintenance associated with this approach consists of short-term watering and monitoring requirements. Watering should be performed as necessary for a minimum of two weeks to maintain proper soil moisture levels for initial plant growth.

This mitigation approach will require approximately five days to execute, excluding the planning and preparation prior to field work. The total estimated cost of addressing erosion feature NASO 01 (a-d) is $22,700. This estimate includes planning, construction, and maintenance costs. The documentation for all costs for NASO sites is provided in Appendix C.

6.1.2 NASO 02

The recommended approach to mitigating erosion feature NASO 02 is to restore the eroded streambank slope to a stable condition which will resist the forces that caused this erosion feature. Stabilization can be achieved by reducing the slope of the eroded area and establishing vegetation on the disturbed surface. All work should be performed during low water levels without influence from storm events.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas. Reducing the overall slope of the streambank by cutting back and removing a portion of the bank will minimize the potential for future slope failure. The resulting slope should not exceed three horizontal to one vertical.

Establishing vegetation can be achieved by placing sod as a final cover. Using sod will increase the likelihood of establishing vegetation quickly, provide immediate erosion control, and match the vegetation of the surrounding area. This mitigation approach will require approximately three days to execute, excluding the planning and preparation prior to execution.

Maintenance associated with this approach consists of short-term watering and monitoring requirements. Watering should be performed as necessary for a minimum of two weeks to maintain proper soil moisture levels for plant growth.

The total estimated cost of addressing erosion feature NASO 02 is $7,500. This estimate includes planning, construction, and maintenance costs.

6.1.3 NASO 03

The recommended approach to mitigating erosion feature NASO 03 is to apply riprap outlet protection between the culvert and the pond. The activities associated with placement of the riprap include minor regrading of the channel to provide a uniform surface, installation of a layer of geotextile filter fabric on the graded surface, and placement of riprap to a final grade matching the regraded surface. Regrading and riprap placement can be performed using a backhoe or similar equipment.

The application of riprap should be in accordance with the specifications of VA ESC Handbook, Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap. The length of channel to place rip-rap would be 35 feet.

This mitigation approach will require approximately one day to implement, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NASO 03 is $7,500. This estimate includes planning and construction costs.

6.1.4 NASO 04

The recommended approach to mitigating erosion feature NASO 04 is to overseed (place new seed on an area already seeded) the large bare areas to establish a well vegetated area where the roots will hold the soil in place. This area already has a stable, gentle slope with some established vegetation and regrading is not necessary. In addition, some soil amendments or topsoil should be added prior to seeding to provide more nutrients for growth of vegetation. The existing silt fencing should be removed. This approach provides prompt and effective mitigation with low construction and maintenance costs and can be implemented using conventional construction equipment and manpower.

Establishing vegetation can be achieved by overseeding areas where vegetation is sparse. The *Erosion and Sediment Control Technical Bulletin No. 4, July 2003* recommends using the native plants for erosion control in Coastal Plain Areas: tall fescue 62-72%, Bermudagrass 0-15%, Red Top Grass or Creeping Red Fescue 1%, Seasonal Nurse Crop 13%, and/or Sericea Lespedeza 13%.

Soil stabilization matting should be installed immediately upon completion of overseeding efforts. The matting will hold the seed in place, promote germination, and control erosion until vegetation is established. All materials and installation should meet the specifications of VA ESC Handbook Chapter 3, Section 3.36 pertaining to requirements for soil stabilization matting.

Maintenance associated with this approach consists of short-term watering and monitoring requirements. Watering should be performed as necessary for a minimum of two weeks to maintain proper soil moisture levels for initial plant growth.

This mitigation approach will require approximately three days to execute, excluding the planning and preparation prior to field work. The total estimated cost of addressing erosion feature NASO 04 is $16,500. This estimate includes planning, construction, and maintenance costs.

6.1.5 NASO 05

Although there is no significant downstream impact from erosion, repairing this area could prevent a small area from becoming a larger erosion problem. The recommended approach to addressing NASO 05 is to add riprap along both sides of the existing culvert and over the top of the culvert between the culvert and the golf cart path. The activities associated with adding riprap in this area would be to strip the vegetation on both sides and above the culvert, regrade the area to provide a more uniform sloped surface, place a layer of filter fabric on the graded surface, and add riprap to a final grade matching that of the surrounding ground surface.

The vegetation and topsoil should be stripped using a backhoe or similar equipment and these materials should be either stored at on-site stockpiles for reuse at other on-site areas or disposed of as solid waste in an on-site (preferable) or off-site landfill. The same backhoe could be used to regrade the relatively small area. A layer of filter fabric meeting the specifications in VA ESC Handbook Chapter 3, Section 3.36 should be placed on top of the graded slope and anchored in the upslope and side edges. This filter fabric will help to stabilize the subgrade and minimize plant growth through the riprap. A layer of riprap meeting VA ESC Handbook Chapter 3, Section 3.19 should be placed on the matting to reach a uniform grade matching the surrounding ground surface. This mitigation approach will require approximately two days to execute, excluding the planning and preparation time prior to field work.

There are no maintenance activities associated with this approach.

The total estimated cost of addressing erosion feature NASO 05 is $8,000. This estimate includes planning and construction costs.

6.1.6 NASO 06

The recommended approach to mitigating erosion feature NASO 06 is to install a retaining wall with backfill along the embankment that has separated and sloughed toward the pond. This approach will stabilize the embankment, maximize the usable golf course space, and add an aesthetic quality to the area. A retaining wall composed of H-beams and wooden lagging could be constructed relatively easily. This recommendation only considers repair of the separated area but the Navy may want to consider other steep areas around the pond that could collapse or slough off in the future.

Since there is an existing strip of tall vegetation, the first step would be to strip and remove the vegetation and topsoil landward to the extent that separation has occurred from the water's edge. The retaining wall would then be constructed as follows: drive H-piles vertically into the ground at the water's edge. Treated wooden lagging such as railroad ties or something similar could then be placed horizontally within the U-shaped portion of the H-piles with little or no anchoring

required until they reach the top of the H-piles. The equipment used for driving the H-piles should have rubber tires instead of metal tracks to avoid tearing up the golf course area.

Following completion of the retaining wall, the space behind it should be backfilled with course grained soil near the bottom and against the wall to facilitate drainage and minimize build-up of pore water pressure. A layer of topsoil would then be placed above the backfill. Establishing vegetation can be achieved by placing sod as a final cover on the topsoil and any disturbed surface upon completion of the filling and regrading activities. Using sod will increase the likelihood of establishing vegetation quickly and will conform with the existing vegetation at the golf course. This mitigation approach will require approximately three weeks to execute, excluding the planning and preparation prior to field work.

Maintenance associated with this approach consists of short-term watering and monitoring requirements. Watering should be performed as necessary for a minimum of two weeks to maintain proper soil moisture levels for plant growth.

The total estimated cost of addressing erosion feature NASO 06 would be approximately $73,800. This estimate includes planning, construction, and maintenance costs.

6.1.7 NASO 07

The recommended approach to addressing NASO 07 is to remove the existing loose riprap and topsoil, remove and replace the end section of the existing culvert, encase the end section of culvert in concrete, and re-install riprap on both sides and above the culvert to a final grade matching that of the surrounding ground surface.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas. The loose and strewn about riprap and topsoil should be removed using a backhoe or similar equipment and either stored at on-site stockpiles for reuse or disposed of as solid waste in an on-site (preferable) or off-site landfill. The end section of the existing culvert should be removed and replaced as it may be damaged; other culvert sections are intact and do not need replacement. New riprap should be placed beneath the new culvert to serve as a bedding material to support the new culvert at the same elevation as the old culvert. A minimal concrete collar should be placed around the new culvert to stabilize it and hold it in place.

A layer of soil stabilization matting meeting the specifications in VA ESC Handbook Chapter 3, Section 3.36 should be placed on the regraded area and anchored in the upslope and side edges. This soil matting will help to stabilize the subgrade and minimize plant growth through the riprap. A layer of riprap meeting VA ESC Handbook Chapter 3, Section 3.19 should be placed on the matting to reach a uniform grade matching the surrounding ground surface. The riprap should extend from the water's edge, up the bank on both sides of the culvert, and to the edge of the lawn. This mitigation approach will require approximately two days to execute, excluding the planning and preparation time prior to field work.

There are no maintenance activities associated with this approach.

The total estimated cost of addressing erosion feature NASO 07 is $10,300, which includes planning and construction costs.

6.1.8 NASO 08

The recommended approach to mitigating erosion feature NASO 08 is to install a retaining wall with backfill along the embankment that has separated and sloughed toward the pond. This approach will stabilize the embankment, maximize the usable golf course space, and add an aesthetic quality to the area. A retaining wall composed of H-beams and wooden lagging could be constructed relatively easily. This recommendation only considers repair of the separated area but the Navy may want to consider repairing other steep areas around the pond that could collapse or slough off in the future.

Since there is an existing strip of tall vegetation, the first step would be to strip and remove the vegetation and topsoil landward to the extent that separation has occurred from the water's edge. The retaining wall would then be constructed as follows: drive H-piles vertically into the ground right at the water's edge, treated wooden lagging such as railroad ties or something similar could then be placed horizontally within the U-shaped portion of the piles with little or no anchoring required until they reach the top of the H-piles. The equipment used for driving the H- piles should have rubber tires instead of metal tracks to avoid tearing up the golf course area.

Following completion of the retaining wall, the space behind it should be backfilled with course grained soil near the bottom and against the wall to facilitate drainage and minimize build-up of pore water pressure. A layer of topsoil would then be placed above the backfill. Establishing vegetation can be achieved by placing sod as a final cover on the topsoil and any disturbed surface upon completion of the filling and regrading activities. Using sod will increase the likelihood of establishing vegetation quickly and will conform with the existing vegetation at the golf course. This mitigation approach will require approximately two weeks to execute, excluding the planning and preparation prior to field work.

Maintenance associated with this approach consists of short-term watering and monitoring requirements. Watering should be performed as necessary for a minimum of two weeks to maintain proper soil moisture levels for plant growth.

The total estimated cost of addressing erosion feature NASO 08 is $27,400. This estimate includes planning, construction, and maintenance costs.

6.1.9 NASO 09

No erosion was observed in this area, although the potential for erosion exists due to obstruction of the culvert. The obstruction is a result of an accumulation of debris consisting of approximately one to two feet of leaves and pine needles over a 30 SF area at the culvert inlet. In order to prevent future erosion issues, it is recommended that the obstruction be removed and disposed of on-site, if possible. In addition, this area should be monitored annually by conducting a visual survey for erosion. Annual maintenance will keep the erosion from reoccurring.

The total estimated cost of addressing erosion feature NASO 09 is $3,700. This includes debris removal and monitoring costs.

6.1.10 NASO 10

A heavy accumulation of debris at the culvert inlet has caused stream flows to backup and erode a significant portion of the embankment supporting the overlaying roadway. The recommended approach to addressing NASO 10 is to remove the existing debris from the culvert and strip the vegetation from both sides and above the existing culvert, and excavate a sufficient amount of the overburden from above and laterally of the culvert to enable reconstruction of the embankment. Structural fill would be placed and compacted up to the roadway edge. A concrete headwall would be placed from the culvert up to the roadway to provide stability for the embankment and reduce future erosion.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas. The eroded area is estimated to be 40 feet in width and approximately 18 CY of soil, debris, vegetation is recommended for excavation and removal. These materials should be removed using a backhoe or similar equipment and should be either stored at on-site stockpiles for reuse or disposed of as solid waste in an on-site (preferable) or off-site landfill. Following removal of the soil and debris, the end section of the existing 48-inch metal culvert should be inspected for structural integrity and replaced if there are any concerns.

A steel reinforced concrete headwall should be constructed at the outer edge of the existing culvert and extend vertically approximately six feet and laterally approximately ten feet on each side of the culvert.

A sufficient amount of structural fill containing coarse grained material should be imported and placed behind the headwall, extending up to the bottom of the roadway and laterally to the extent of the eroded areas. Approximately 36 CY of structural fill will be required for this effort. The fill should be placed in eight inch layers and compacted using a vibratory roller or similar equipment.

Due to the steepness of the embankment and the susceptibility of vegetation to erosion, a layer of riprap meeting VA ESC Handbook Chapter 3, Section 3.19 should be placed on top of the newly compacted embankment extending up to the roadway and laterally for the length of the headwall (approximately 40 feet).

This technical approach will require approximately 30 days to execute, excluding the planning and preparation time prior to field work.

The total estimated cost of addressing erosion feature NASO 10 is $63,000, which includes planning and construction.

6.1.11 NASO 11

Although the end section of the culvert has separated from the rest of the culvert, no erosion or downstream impacts were observed in this area. In order to prevent future erosion issues, it is

recommended that this area be monitored annually by conducting a visual survey for erosion to determine if additional erosion control measures are required.

The total estimated cost of addressing erosion feature NASO 11 is $950 per year for the annual monitoring.

6.1.12 NASO 12

Although there is one bare spot on the south embankment, no significant erosion or downstream impacts were observed in this area. It is recommended that this area be monitored annually by conducting a visual survey for erosion to determine if additional erosion control measures are required.

The total estimated cost of addressing erosion feature NASO 12 is $950 per year for the annual monitoring.

6.1.13 NASO 13

Although no erosion was observed at this location (Outfall 004), a significant obstruction has occurred due to accumulation of debris consisting mostly of vegetation. The volume of debris against the fence is estimated to be approximately 4 CY. Removal of this debris is recommended because the flow path of the stream is obstructed, the force of debris against the fence could rip a hole in or otherwise the damage the fence, and the obstruction could cause flooding on the upstream side of the fence. The debris consists of vegetation and should be removed for on-site disposal, if possible. In addition, this area should be monitored annually by conducting a visual survey for future debris accumulation and/or erosion and repairs designed and implemented if larger scale erosion issues are observed.

The total estimated cost of addressing erosion feature NASO 13 is $3,700. This amount includes debris removal and monitoring costs.

6.1.14 NASO 14

Although some minor erosion is occurring on the bank of this area along Owl Creek, no significant erosion or downstream impacts were observed. In addition, there would be limited access to this area by construction equipment to perform any repairs, and it is likely that future recreational use in this area would return this area to the present condition. However, it is recommended that this area be monitored annually by conducting a visual survey for erosion to determine if additional erosion control measures are required.

The total estimated cost of addressing erosion feature NASO 14 is $950 per year for annual monitoring.

6.1.15 NASO 15

This site is located in the Sand Pit Ponds area where there are numerous bare areas due to the sandy soil present. There is no evidence of erosion or downstream impacts in this area. The bottom of the ditch was dry and without any significant flow, and the potential for erosion is

considered low; however, it is recommended that this area be monitored annually by conducting a visual survey for erosion to determine if additional erosion control measures are required.

The total estimated cost of addressing erosion feature NASO 15 is $950 per year for monitoring.

6.1.16 NASO 16

The recommended approach to mitigating erosion feature NASO 16 is to create a riprap lined swale within the existing gully to prevent further erosion from occurring. This approach is preferred over attempting to restore the area to its original condition because drainage naturally concentrates at this point and would continue to erode the area.

The activities associated with adding riprap in this area includes stripping any existing vegetation along the gully, regrading the area to provide a uniform slope, installing a layer of geotextile fabric on the graded surface, and placing riprap to a final grade matching the bottom of the adjacent security fence.

The vegetation and topsoil should be stripped using a backhoe or similar equipment and these materials should be either stored at on-site stockpiles for reuse or disposed of as solid waste in an on-site (preferable) or off-site landfill. The same backhoe can be used to regrade the area. A layer of geotextile filter fabric meeting the specifications of VA ESC Handbook Chapter 3, Section 3.19 should be installed within the graded swale and anchored per the handbook. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap. A layer of riprap meeting the specifications of VA ESC Handbook Chapter 3, Section 3.19 should be placed on the geotextile to reach a final grade matching the bottom of the security fence. This mitigation approach will require approximately two days to execute, excluding the planning and preparation time prior to field work.

There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NASO 16 is $15,600. This estimate includes planning and construction costs.

6.1.17 NASO 17

The recommended approach to mitigating erosion feature NASO 17 is to place riprap along the streambed and side slopes of the embankment where erosion has occurred and revegetate the areas of sparse or no vegetation. The portion of the channel to be riprapped is approximately 350 feet long and up to 12 feet deep. In addition to slowing flow, the riprap will help to stabilize the side slopes within the ditch.

A temporary silt fence should be placed on both sides of the channel to prevent runon from reaching disturbed areas. Implementation of this approach involves stripping vegetation and topsoil from the streambed, constructing rip-rap along the side slopes of the stream beds, overseeding of sparsely vegetated areas along the streambanks, and disposal of the material stripped from the streambed. Debris generated from this effort can be disposed of as solid waste in an on-site (preferable) or off-site landfill.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where the riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against scour. The geotextile will also prevent the migration of soils from the subgrade into the rock and minimize plant growth through the rock.

Revegetation can be accomplished by overseeding the bare areas to establish a well vegetated area where the roots will hold the soil in place. Soil amendments, such as topsoil, should be incorporated to provide nutrients. The VDCRs *Erosion and Sediment Control Technical Bulletin No. 4, July 2003*, specifies native plant species applicable for erosion control in Coastal Plain Areas. An example of an applicable seed mixture consists of: tall fescue 62-72%, Bermudagrass 0-15%, Red Top Grass or Creeping Red Fescue 1%, Seasonal Nurse Crop 13%, and/or Sericea Lespedeza 13%. Five foot vegetative buffers should be maintained along the ditch edges to protect against erosion.

The only maintenance activity associated with this approach is watering of the vegetation for two weeks.

Implementation of this work will take approximately one month and the total estimated cost of mitigating erosion feature NASO 17 is $390,200. This estimate includes planning, construction, and maintenance costs.

6.1.18 NASO 18

Only minor erosion is present at NASO 18 and no significant downstream impacts were observed as a result of this erosion feature. It is recommended that this area be monitored annually by conducting a visual survey for erosion to determine if additional erosion control measures are required.

The total estimated cost of addressing erosion feature NASO 18 is $950, which includes monitoring costs only.

6.1.19 NASO 19

Although notable erosion has occurred at NASO 19, dense vegetation, steep slopes, and security fencing pose equipment access issues in this area and mitigation would be a substantial undertaking. Approximately 70 feet of wooded area would require clearance in order to reach this area. At this time, it is recommended that this area be monitored annually by conducting a visual survey to ensure there are no significant increases in erosion that could present potential downstream impacts. The potential for future downstream impacts exists should erosion persist in this area.

The total estimated cost of addressing erosion feature NASO 19 is $950 per year for monitoring.

6.1.20 NASO 20

The recommended approach to mitigating erosion feature NASO 20 is to apply riprap where erosion is present at the outfall and along the drainage ditches parallel to the roadway, and install a concrete headwall where erosion undercuts the culvert embankment.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas. Riprap should be placed at the convergence of the roadside drainage ditches and the pipe culverts. The riprap should extend up to and slightly beyond where any erosion occurs within the ditches and on the culvert embankment. The riprap should also extend to where erosion occurs beneath the security fence. The activities associated with adding riprap in this area would be to strip existing vegetation where riprap will be placed, regrade the area to the extent necessary to provide uniform slopes, install a layer of geotextile filter fabric on the graded surface, and place riprap to a final grade matching the regraded surface. Final slopes should not exceed three horizontal to one vertical. A backhoe loader or similar equipment can be used to perform the grading and riprap placement.

Where erosion occurs above and between the concrete pipe culvert that extend beneath the road, a cast-in-place concrete headwall reinforced with structural steel should be installed to prevent undercutting of the embankment that supports the overlaying roadway. This will require some additional excavation of the culvert embankment, but should not require any disturbance of the road itself. The headwall can be prepared by constructing a form to encase the top and sides of the existing concrete pipe culvert.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

This mitigation approach will require approximately two weeks to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NASO 20 is $33,700. This estimate includes planning and construction costs.

6.2 NASO DNA

A total of three erosion features, designated as NASO DNA 01 through NASO DNA 03, were identified during field assessment activities at NASO DNA and presented in Section 5.2 of this report. The following subsections discuss SEE's recommendations for addressing these erosion occurrences. Estimated costs are provided for each recommended approach. The documentation for all NASO DNA areas are in Appendix C.

6.2.1 NASO DNA 01

The recommended approach to mitigating erosion feature NASO DNA 01 is to apply riprap where erosion has occurred along the bend in the drainage ditch. The riprap should also extend to where erosion has occurred around the security fencepost.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas. The activities associated with adding riprap in this area include stripping existing vegetation where riprap will be placed, regrading the area to the extent necessary to provide uniform slopes, installing a layer of geotextile filter fabric on the graded surface, and placing riprap to a final grade matching the regraded surface. Final slopes should not exceed three horizontal to one vertical. This work can be performed with a backhoe or similar equipment.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

This mitigation approach will require approximately two days to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NASO DNA 01 is $9,200. This estimate includes planning and construction costs.

6.2.2 NASO DNA 02

Although some minor erosion is occurring along this section of shoreline at Lake Christine, no significant erosion or downstream impacts were observed in this area and there are no signs of collapse or sloughing along the embankment. It is recommended that this area be monitored annually by conducting a visual survey for erosion to determine if additional erosion control measures are required.

The total estimated cost of addressing erosion feature NASO DNA 02 is $950 per year for monitoring.

6.2.3 NASO DNA 03

Difficulty was encountered in assessing the condition of the culvert at NASO DNA 03 due to the collapsed embankment material obscuring direct inspection, but it is assumed that some degree of blockage is present. The size and construction details associated with the existing culvert are unknown. In addition to blockage concerns, the stability and future use of the overlaying unpaved roadway is a concern, as erosion is likely to continue in this area.

The first step would be to clear the area adjacent to and within the culvert and dispose the material in an on-site (preferred) or off-site landfill. This will facilitate inspection of the culvert

so that an accurate assessment can be made. A temporary measure to mitigate erosion until further action can be determined is to place crushed stone along the section of road crossing over the culvert. The crushed stone should be underlain by geotextile filter fabric. The approach would require a backhoe loader or similar equipment.

This mitigation approach will require approximately two days to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of removing overlying debris and installing the temporary measure for the roadway at NASO DNA 03 is $6,900. This estimate includes planning and construction costs. Once debris is removed and the current status of the erosion feature can be evaluated, additional recommendations may be required to mitigate the erosion.

6.3 NALFF

A total of three erosion features, designated as NALFF 01 through NALFF 03, were identified during site assessment activities at NALFF and presented in Section 5.3 of this report. The following subsections discuss SEE's recommendations for addressing these erosion occurrences. Estimated costs are provided for each recommended approach. The documentation for all the NALFF costs is provided in Appendix C.

6.3.1 NALFF 01

Significant erosion exists at erosion feature NALFF 01. Erosion of this scale can be indicative of larger problems, such as inadequate channel or culvert capacity and changes in upstream conditions that affect high flow conditions. For larger scale erosion such as this, it is recommended that peak flow volumes be reevaluated prior to mitigation to ensure that proper design options are evaluated.

The recommended approach to mitigating erosion feature NALFF 01 is to utilize the existing eroded area as a catchment basin by regrading the impacted area and lining it with riprap. Removal of the debris from the culvert inlet will also be required as a part of mitigation. This approach would minimize mitigation costs by eliminating the need to import fill material that would be required to restore the area to its original condition. Also, restoring the area to its original condition with soil would increase the likelihood of the same erosion recurring.

The catchment basin upstream of the culvert will provide additional capacity to retain and temporarily store peak flow volumes, as well as provide energy dissipation that will reduce erosion potential downstream. The catchment basin would have the added benefit of acting as a small sedimentation pond by capturing any sediment or debris prior to entering the culvert and preventing sediment transport downstream.

Prior to initiating and land disturbing activities, a temporary silt fence will be placed around the eroded area and any areas disturbed by excavation. The activities associated with creating the catchment basin include cutting back the steeply sloped southwestern streambank and regrading the area to the extent necessary to provide uniform slopes. The excess material generated from cutting back the slopes could be used to restore the equally steep slopes along the northeastern

streambank, since the existing roadway prevents cutting from being performed. The final grade of the catchment basin should gradually taper into the existing ground surface in the area to minimize abrupt irregularities that could lead to further erosion. Additionally, the catchment basin should be constructed to allow complete drainage once flow has subsided, so as to not create standing water.

A layer of riprap will be installed on the surface of the retention basin. The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

This mitigation approach will require approximately two weeks, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NALFF 01 is $116,200. This estimate includes planning and construction costs.

6.3.2 NALFF 02

The primary erosion requiring mitigation at NALFF 02 is along the northwestern drainage ditch where gully erosion occurs due to the concentration of drainage entering the ditch from the adjacent agricultural field.

The recommended approach to mitigating erosion feature NALFF 02 is to restore the areas to their original grade and reestablish vegetation to prevent erosion from recurring. Soil fill will be required to bring the areas up to grade. Grading work can be performed using a backhoe loader or similar equipment. Final grades should have a uniform surface with no irregularities to prevent drainage from concentrating and causing erosion to reoccur.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas. Where slope reduction is performed, the final grade of the newly sloped area should gradually taper into the existing undisturbed sections of the streambank to minimize abrupt irregularities that could lead to further erosion. In general, final slopes exceeding three horizontal to one vertical should be avoided when implementing these mitigation approaches. This work can be performed using a backhoe loader or similar equipment.

Following grading, vegetation can be reestablished by applying an appropriate seed mixture. Soil amendments, such as topsoil, should be incorporated to provide the nutrients if necessary to support growth. The VDCRs *Erosion and Sediment Control Technical Bulletin No. 4* dated July 2003 specifies native plant species applicable for erosion control in Coastal Plain Areas. An example of an applicable seed mixture consists of tall fescue 62-72%, Bermudagrass 0-15%, Red Top Grass or Creeping Red Fescue 1%, Seasonal Nurse Crop 13%, and/or Sericea Lespedeza 13%. Five foot vegetative buffers should be maintained along the ditch edges to protect against erosion.

Soil stabilization matting should be installed immediately upon completion of seed application. The matting will hold the seed in place, promote its germination, and control erosion until vegetation is firmly established. The application of soil stabilization matting should be in accordance with the specifications of VA ESC Handbook chapter 3, section 3.36.

This mitigation approach will require approximately five days to execute, excluding the planning and preparation time prior to field work.

Maintenance in the form or watering the newly planted vegetation would be required for approximately two weeks.

The total estimated cost of mitigating erosion feature NALFF 02 is $32,700. This estimate includes planning, construction, and maintenance costs.

6.3.3 NALFF 03

Erosion feature NALFF 03 consists of multiple features located along an approximate 0.45 mile reach of the Chesapeake City Channel that discharges directly to Pocaty Creek. These erosion features are designated as NALFF 03(a) through NALFF 03(g). For control mitigation purposes, features NALFF 03(a) through NALFF 03(g) are addressed as a single unit because they are located in close proximity to each other along the same channel reach, have similar erosion characteristics, and require the same recommendations for repair. It is very likely that the same contractor would repair all three areas as one project.

6.3.3.1 NALFF 03(a)

The recommended approach to mitigating erosion feature NALFF 03(a) is to apply a riprap liner where erosion occurs along the streambed, riprap armoring on both side slopes of the streambank up to the top of the channel, and a series of small rock check dams along the streambed to reduce the velocity in the channel. A check dam is a shallow dam constructed of riprap approximately one to two feet in height installed perpendicular to the flow direction.

The riprap channel lining should be applied in sufficient quantity to cover the entire width of the channel and should extend upward from the streambed to the top of the embankment to minimize scour along the slope. An estimated 10,500 SF of riprap will be required for this effort. Due to the volume and velocity of flow anticipated in this channel, a larger diameter, heavier, grade of riprap is recommended, such as that used in the existing riprapped section.

Prior to any construction, a temporary silt fence will be installed upgradient of the side slopes of the channel and around any areas where land disturbing will occur. To prevent the same erosion from occurring in the upstream reach of the channel, riprap check dams should be installed along the streambed to reduce overall flow velocities within the channel. The check dams should be spaced and sized appropriately to manage the anticipated flow rates. For cost estimation purposes, a minimum of 10 check dams is assumed, requiring an estimated 500 SF of riprap.

The activities associated with this approach include stripping existing vegetation where riprap will be placed, regrading the area to the extent necessary to provide a uniform surface, installing

a layer of geotextile filter fabric on the graded surface, and placing riprap to a final grade matching the regraded surface. The stripped vegetation should be staged on-site for future reuse or disposed of as solid waste in an on-site (preferable) or off-site landfill.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

6.3.3.2 NALFF 03(b) through NALFF 03(g)

The recommended approach to mitigating erosion features NALFF 03(b) through NALFF 03(g) use the same control measures as NALFF 03(a) and extend them to provide a liner where erosion occurs at each of the pipe culvert inlets. It is important to note that, due to the extent and nature of erosion present at these features, it is recommended that peak flows be evaluated to determine if adequate culvert capacity is adequate at each feature prior to implementing these mitigation measures. The riprap aprons may be entirely effective in controlling the erosion despite any potential culvert deficiencies, although a significantly undersized culvert will continue to be a source of erosion.

The activities associated with placement of the riprap include minor regrading of the ditches to the extent necessary to provide a uniform surface, installation of a layer of geotextile filter fabric on the graded surface, and placement of riprap to a final grade matching the regraded surface.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

6.3.3.3 NALFF 03 Total Cost Estimate

This mitigation approach will require approximately 30 days, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NALFF 03 is $267,100. This estimate includes planning and construction costs.

6.4 NSA NWA

A total of six erosion features, designated as NSA NWA 01 through NSA NWA 06, were identified during site assessment activities at NSA NWA and presented in Section 5.4 of this report. The following subsections discuss SEE's recommendations for addressing these occurrences of erosion. Estimated costs to implement and maintain the recommendations are also provided for each recommended approach. The documentation for all NSA NWA sites are included in Appendix C.

6.4.1 NSA NWA 01

The recommended approach to mitigating erosion feature NSA NWA 01 is to regrade the culvert embankment and apply a riprap apron. Reducing the slope of the embankment will minimize the potential for future erosion and will provide a suitable subgrade for placement of the riprap apron. The riprap apron will dissipate the energy of water entering the ditch from atop the embankment, as well as water flowing through the ditch. The riprap apron should extend from the culvert inlet and up both sides of the inlet to the top of the embankment.

This approach involves minor regrading of the embankment to the extent necessary to provide a uniform surface, installation of a layer of geotextile filter fabric on the graded surface, and placement of riprap to a final grade matching the regraded surface. A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

This mitigation approach will require approximately two days to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NSA NWA 01 is $7,100. This estimate includes planning and construction costs.

6.4.2 NSA NWA 02

The recommended approach to mitigating erosion feature NSA NWA 02 is removal of the debris that is obstructing flow in the stream and annual monitoring of the area where sheet erosion occurs along the southern shoreline. Removing the debris will restore normal streamflow and minimize potential future occurrences of streambank scour in the area.

It may be necessary to cut a path to the stream by minimal tree clearing between the adjacent road and the stream to provide access to the work area. Removal of the debris can be performed using a backhoe or similar equipment. The debris that is generated from clearing and removal efforts can be disposed of as solid waste in an on-site (preferable) or off-site landfill.

This mitigation approach will require approximately one day to execute, excluding the planning and preparation prior to field work. The total estimated cost of addressing erosion feature NSA NWA 02 is $5,100. This estimate includes planning and construction costs.

6.4.3 NSA NWA 03

The conditions present at erosion feature NSA NWA 03 indicate that the existing pipe culvert has insufficient capacity to manage current peak flow volumes; therefore, the recommended

approach to mitigating this area is to remove the existing pipe culvert and replace it with a riprap lined channel. This approach will provide additional capacity for peak flow volumes by widening the channel.

Prior to any construction activities, a silt fence will be installed on both sides of the culvert and any other areas of land disturbance. The construction activities associated with mitigation of this area include clearing efforts to remove trees and undergrowth present in the work zone, excavation of the existing culvert embankment, removal of the culvert piping, excavation to create the new channel, and application of a riprap liner. During excavation of the culvert and placement of riprap, a bypass channel will be excavated to divert the streamflow away from the work area. Soil and debris generated from this effort can be staged at or near the facility for future reuse or disposed of as solid waste in an on-site (preferable) or off-site landfill. The debris will consist of vegetation that was cleared, potential excess soil, and the concrete pipe. Alternatively, the concrete pipe can be crushed and beneficially reused as riprap material for the new channel lining.

Riprap should be placed to a final grade matching the regraded surface. Final side slopes should not exceed three horizontal to one vertical. The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

This mitigation approach will require approximately 15 days to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NSA NWA 03 is $91,000. This estimate includes planning and construction costs.

6.4.4 NSA NWA 04

The recommended approach to mitigating erosion feature NSA NWA 04 is to restore the functionality of the pipe culvert by removing the debris that obstructs flow at the inlet. Upon removal of the obstruction, water will likely continue to bypass the culvert due to existing erosion along the bottom and sides of the culvert. Some degree of erosion will continue because of this, but its effects are expected to be minor. The intent of mitigation at this feature is to reestablish capacity for high flow volumes when the potential for erosion is at its greatest.

Removal of the debris should be performed by hand in this area to minimize the disturbance that would be associated with equipment access. Access with motorized equipment is limited due to the wooded area surrounding the feature and the stream itself. Only a small quantity of debris is present and this debris can be easily managed and disposed of in the surrounding wooded area in a manner that prevents reentry into the stream.

This mitigation approach will require one day to execute, excluding any planning and preparation time prior to field work. In addition to mitigation, this area should be monitored annually by conducting a visual survey for erosion.

The total estimated cost of addressing erosion feature NSA NWA 04 is $4,100. This estimate includes debris removal and monitoring costs.

6.4.5 NSA NWA 05

The recommended approach to mitigating erosion feature NSA NWA 05 is to regrade the culvert embankment and apply a riprap apron. Reducing the slope and shape of the embankment will minimize the potential for future erosion and will provide a suitable subgrade for placement of the riprap apron. The riprap apron will dissipate the energy of water entering the ditch from atop the embankment, as well as water flowing through the ditch. The riprap apron should extend from the culvert inlet upward along both sides of the inlet to the top of the embankment.

A temporary silt fence should be placed upgradient of any land disturbing activities to prevent runon from reaching disturbed areas. This approach involves minor regrading of the embankment to the extent necessary to provide a uniform surface, installation of a layer of geotextile filter fabric on the graded surface, and placement of riprap to a final grade matching the regraded surface. Grading and riprap placement can be performed using a backhoe or similar equipment.

The application of riprap should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.19. A layer of geotextile filter fabric should be installed and appropriately anchored where riprap is to be placed. The geotextile will help to stabilize the subgrade and protect against future scour. The geotextile will also prevent the migration of soils from the subgrade into the riprap and will minimize plant growth through the riprap.

This mitigation approach will require approximately three days to execute, excluding the planning and preparation time prior to field work. There are no maintenance activities associated with this approach.

The total estimated cost of mitigating erosion feature NSA NWA 05 is $9,200. This estimate includes planning and construction costs.

6.4.6 NSA NWA 06

The recommended approach to mitigating erosion feature NSA NWA 06 is to revegetate the area where sheet erosion occurs along the culvert embankment to prevent the erosion from worsening.

Revegetation can be accomplished by overseeding the bare areas to establish a well vegetated area where the roots will hold the soil in place. Soil amendments, such as topsoil, should be incorporated as necessary to provide nutrients. The VDCRs *Erosion and Sediment Control Technical Bulletin No. 4,* dated July 2003 specifies the use of native plant species applicable for erosion control in Coastal Plain Areas. An example of an applicable seed mixture consists of tall fescue 62-72%, Bermudagrass 0-15%, Red Top Grass or Creeping Red Fescue 1%, Seasonal

Nurse Crop 13%, and/or Sericea Lespedeza 13%. Vegetative buffers should be maintained along the ditch edges to protect against erosion.

Soil stabilization matting should be installed immediately upon completion of seed application. The matting will hold the seed in place, promote its germination, and control erosion until vegetation is firmly established. The application of soil stabilization matting should be in accordance with the specifications of VA ESC Handbook Chapter 3, Section 3.36.

During the site assessment, it was observed that the cause of erosion may be over-topping of the parking lot curb inside the fence. The parking lot inside the fence line should be inspected for signs of overtopping of the curb from runoff from the paved area. All storm inlets should be inspected for debris and sediment, and any such debris and sediment should be removed so the runoff can drain through them and into the culvert.

Maintenance associated with this approach consists of short-term watering and monitoring requirements. Watering should be performed as necessary for a minimum of two weeks to maintain proper soil moisture levels for initial plant growth.

This mitigation approach will require approximately two days to execute, excluding the planning and preparation prior to field work. The total estimated cost of addressing erosion feature NSA NWA 06 is $4,000. This estimate includes planning, construction, and maintenance costs.

7 BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) are devices, systems, and procedures that reduce or eliminate pollutants and sediment from being released into the environment, particularly surface water features. BMPs generally fall into two categories: 1) physical devices or structures that involve construction, landscaping, and agricultural practices; and 2) systems and procedures that include stormwater management, training, regular monitoring, and natural resources management.

7.1 CONSTRUCTION

Uncontrolled stormwater runoff from construction sites can significantly impact rivers, lakes and estuaries. Sediment in water bodies from construction sites can transport pollutants that have a high affinity through adsorption on soil particles, reduce the amount of sunlight reaching aquatic plants, and smother aquatic habitats and fish spawning areas. Stormwater Management Control at construction sites is generally viewed as temporary erosion and sediment (E&S) control measures that provide benefit during the construction phase. Effective stormwater runoff control can be achieved through BMPs that consider future site usage, growth, inspection, and maintenance of the stormwater drainage controls implemented at the site. BMPs at construction sites can be implemented prior to construction activities, during construction activities, after following completion of construction activities as discussed below.

7.1.1 Pre-Construction BMPs

Construction activities that potential release sediment to streams are required to comply with federal National Pollutant Discharge Elimination System (NPDES) construction site stormwater regulations. These regulations include developing SWPPPs and preparing erosion and sediment control plans (ESCPs). The VA ESC Handbook requires an erosion and sediment control plan for all projects where the area of disturbed soil or vegetation exceeds 10,000 SF. In some cases, it may be good practice to prepare an ESCP for areas less than 10,000 SF. Such areas include: sites with steep slopes, areas that will be denuded for extended periods of time, and riparian areas. Due to the of the proposed repairs in this report to surface water, E&S controls are included for areas where land disturbance is proposed. Good construction management is as important as the physical BMPs. The following are management considerations that are recommended prior to construction:

- Include E&S controls as an agenda item during the pre-construction meeting;
- Sequence construction activities so that no area remains exposed for unnecessarily long periods of time;
- Consider the time of year: be prepared for thunderstorms, use straw mulch during poor germination periods;
- Limit land disturbance to only those that need to be disturbed and barricade vegetated areas that are not to be disturbed since construction workers tend to drive on and use more area than is required; and
- Designate one individual to be responsible for implementing E&S measures.

7.1.2 Construction Activities

Two general types of E&S controls that can be implemented during the construction phase of projects: structural and vegetative controls. A complete description of all available E&S controls is beyond the scope of this project but the structural controls recommended for NASO, NALFF, NASO DNA, and NSA NWA include: sediment barriers such as silt fencing; riprap; installing new culverts, retaining walls, excavation and filling; regrading to reduce slope; catchment basins, and in-stream sediment barriers such as check dams. The selection of the most appropriate controls is highly site-specific and needs to be evaluated for each erosion feature. The vegetative controls consist of seeding, over-seeding, sodding, soil stabilization blankets, and landscaping, which also need to be evaluated for each erosion feature. Most erosion control measures utilize a combination of structural and vegetative controls.

7.1.3 Post-Construction Activities:

Adequate BMP performance requires not only proper installation, but also regular maintenance and inspection. Maintenance needs are best determined by a self-inspection program since local agencies require advance notice to schedule an inspection. Stormwater control BMPs require regular inspections to ensure their effectiveness, and many permitting authorities require self-inspection for construction projects. Three types of BMP inspections can be performed: routine inspections, inspections performed before rain events, and inspections performed after rain events.

Routine inspections are an integral part of regular maintenance activities, such as debris removal, repair, and replacement necessary to ensure the integrity and effectiveness of BMPs. Construction site activities can damage BMPs. Earthmoving equipment, for example, can easily dislodge an entrenched silt fence. Routine inspection and maintenance minimizes the work required to prepare a site before a rain event.

After a rain event, prepare the site for the next rain event. Typically within 48 hours after a rain event, inspect, clean, and repair the site's BMPs. To prevent health and safety hazards, remove mud in traffic areas and remove mosquito-breeding standing water. Clean mud and debris from silt fences and other BMPs. Clogged BMP structures will not prevent sediment releases during subsequent rain events, so the contractor needs to clean, repair, or replace them as quickly as possible.

7.2 TRAINING

One of the most important factors in determining whether BMPs are properly installed and maintained is knowledge and experience of the contractor implementing and inspecting them. To ensure a high level of expertise, many naval facilities require formal certification for on-site contractors. These certified private contractors can then be used to lessen the community's inspection burden.

Any contractor who wishes to construct a BMP involving a land-disturbing activity in Virginia must complete the training and pass an exam as part of the *Responsible Land Disturber Certificate of Competence Program* (VDCR n.d.). This program was established through revisions to the VA ESC Law (VA Code of Regulations 1988). The VDCR administers this program which became effective in July 2001. The code states that any person responsible for

implementing the E&S plan must provide the name of an individual holding an RLD Certificate who will be in charge of and responsible for carrying out a regulated "land-disturbing activity."

7.3 LANDSCAPING

Proper landscaping practices help stabilize disturbed areas, minimize sediment transport from stormwater, and improve the overall aesthetics of a stormwater BMP. Landscaped areas can provide significant reductions in sediment transport from developed sites through biological uptake of nutrients, sediment trapping, filtering, and infiltration.

7.3.1 Landscaping Practices

The sites for this project are located primarily in riparian zones that experience both wet and dry soil conditions and periodic inundation. The vegetation in riparian zones serves the following purposes:

- reduce re-suspension of newly deposited sediments;
- prevent erosion; and
- provide habitat and food for wildlife,

The following are recommended landscaping practices at NASO, NALFF, NASO DNA, and NSA NWA to help prevent occurrence of future erosion:

- Do not mow vegetation within 5 feet of the surface water edge. Where there is a definite embankment, the 5 feet buffer starts from the top of the embankment and extends away from the channel.
- Do not mow vegetation too short. This will prevent it from drying or burning out, which can cause bare spots.
- Follow the instructions for adding fertilizer and other soil amendments in the applicable landscaping plan or design document so that the addition of phosphorous, nitrogen and other chemicals to the land surface are minimized.
- If fertilizer is needed, apply 10-20-10 fertilizer at a rate of 500 pounds per acre or 12 pounds per 1,000 SF.

7.3.2 Plants for Erosion Control

Plants selected for a stormwater BMP must tolerate stresses such as pollutants, variable soil types and soil moisture fluctuations, climate, and topography. When selecting plants, native plant species should always be used. Non-native plants require more care to adapt to the hydrology, climate, exposure, soil, or other conditions. Also, some non-native plants can become invasive, especially those used for stabilization, and may ultimately choke out the native plant population.

The placement of trees and larger shrubbery on an embankment is discouraged. The root system of large trees and shrubs can threaten the structural integrity of the embankment and possibly cause its failure. The side slopes of BMPs are usually compacted during the construction process to ensure stability and the density of these compacted soils is often such that plant roots cannot

penetrate to an adequate depth, leading to premature mortality or loss of vigor. In addition, planting trees will take from several years to a decade before any benefits are achieved.

Technical Bulletin No. 4 (VDCR 2003) identifies permanent seeding specifications for new plantings in Coastal Plain areas, such Virginia Beach, VA. For low-maintenance areas with a steep slope, the Bulletin recommends the following:

SPECIES	APPLICATION RATES (lbs/acre)
Tall Fescue	93–108
Bermudagrass	0-15
Red Top Grass or Creeping Red Fescue	2
Seasonal Nurse Crop	20
Sericea Lespedeza	20

The seed mixture recommended in section 6 conforms to the species and rates shown above. Other types of seed mixes may also be appropriate for coastal areas in Virginia. Although the seed mixture is important, it is also important that the plants be naturally occurring in coastal Virginia and that they be low maintenance and durable.

The success of any landscape plan depends on the selection of the proper specifications that are subsequently implemented by the contractor. The specifications should include procedures for installing the plants. They should also provide details for the steps to be taken before and after installation, such as any special instructions for the preparation for planting, fertilization, and watering requirements. Any seasonal requirements for installation should also be specified.

A maintenance schedule should be provided in the project plans and/or specifications. This is particularly important for BMPs that have a vegetative component that is integral to the pollutant removal efficiency. The schedule should include guidance regarding methods, frequency, and time of year for landscape maintenance and fertilization. Specific plant communities may require different levels of maintenance. Upland and floodplain terrace areas require very little maintenance, while aquatic or emergent vegetation may need periodic thinning or reinforcement plantings. After the first growing season it should be obvious if reinforcement plantings are needed. If they are, reinforcement plantings should be installed at the onset of the second growing season after construction (VDCR 2012).

7.4 AGRICULTURAL PRACTICES

The VDCR, U.S. Department of Agriculture, and other water conversation partners spend a large portion of their time and budgets installing, promoting and tracking agricultural BMPs. These include practices to control cropland runoff, animal waste dispersal, streambank erosion, improper use of fertilizers and pesticides, and other non-point source pollutant reduction actions. This is accomplished by constructing control devices such as riparian buffers, diversions, grass buffer strips, and chemical and fertilizer handling facilities. BMPs also include activities such as rotational grazing, planting of cover crops, practicing integrated pest management, nutrient management plan implementation, and other similar proven actions.

SEE recommends the following agricultural BMPs for NASO, NALFF and NSA NWA:

- Maintain a 5 foot buffer vegetation strip between planted crop areas and any stream embankment, ditch, channel, pond, or other surface water features. Do not mow the vegetation strip but allow the vegetation to reach maximum height.
- Construct feeder drainage ditches that are perpendicular to the direction of runoff rather than in the same direction as runoff.
- Maintain access roads in the agricultural fields so ruts do not develop associated with vehicle traffic.
- Follow the instructions for adding chemicals, fertilizer, and other soil amendments in the applicable landscaping plan or design document.

7.5 STORMWATER MANAGEMENT

One of the first considerations in selecting a stormwater BMP is the functional goal of the BMP. In general, stormwater BMPs can be categorized into water quality (sediment and pollution control) and water quantity (stream channel erosion and flooding) BMPs. The use of some BMPS is limited by site or watershed feasibility factors such as environmental impacts, drainage area or watershed size, and topographic constraints. The BMPs designed for water quality control provide varying levels of pollutant removal and are suited for specific development densities.

The decision making process of choosing a stormwater BMP must weigh the goals of the proposed activity against the limiting site feasibility factors of the proposed site or BMP location. The limiting site feasibility factors include:

- Topographic and geologic constraints;
- Contributing drainage area size;
- Environmental impacts; and
- Access for maintenance.

The possible stormwater management requirements that influence BMP selection include:

- Stormwater quality, stream channel erosion, flooding, and environmental mitigation;
- Multiple discharge points;
- Pollutant removal capability; and
- Performance-based versus technology-based water quality criteria.

7.6 NATURAL RESOURCE MANAGEMENT

Successful implementation of a watershed management plan will also depend on the ability to obtain the appropriate permits from state and federal agencies. An inventory of natural resource features in the watershed will promote a BMP development approach that minimizes or avoids impacts on environmental resources to the maximum extent practicable. Natural resource features to be considered prior to implementing BMPs depend on the characteristics of the watershed being studied and could include:

- Wetlands
- Floodplains
- Stream corridors and greenways
- Steep slopes
- Erodible soils
- Rare and endangered species
- Sensitive habitats
- Fish and wildlife resources
- Recreational areas
- Sources of water supply

Although all of the above resources apply to NASO, NALFF, NASO DNA, and NSA-NWA to some extent; the following natural resources should be carefully considered prior to implementing BMPs.

Wetlands. Protecting the natural functions of wetlands is a critical element of the site development process and watershed management planning. Wetlands provide unique habitats for both plants and wildlife, including many threatened and endangered species. Some BMPs, such as check dams, can retain more water in streams and could negatively impact down-stream wetlands by preventing water from reaching the normally saturated areas. For the repair projects recommended by this report, only the erosion areas associated with the Chesapeake City Channel at NALFF have a recommendation for the installation of check dams and there are no wetlands near that channel.

Floodplains and Stream Corridors. Floodplains and stream corridors include waterways and adjacent riparian lands that may be subject to flooding. Natural waterways provide habitat for fish, aquatic plants, and benthic (bottom dwelling) organisms. Vegetated riparian land adjacent to streams stabilize the stream bank; filter pollutants from storms and floods; and provide habitats for a variety of amphibians, aquatic birds, and mammals that depend on the proximity to water for their life functions. A riparian buffer should be preserved or created along the banks of streams, where possible.

Steep Slopes. Steep slopes, such as those on steam embankments, cause instability of the soil on the slopes. High runoff velocities from exposed steep slopes could result in destructive and unsightly erosion, denuded slopes that may be difficult to revegetate, and sediment deposition in sensitive areas both on and off the site. Stabilizing vegetation should be protected to the maximum extent practicable and disturbed areas should be immediately revegetated. Maintenance or revegetated areas, including removal of debris and mowing of non-slope areas is critical to the long-term growth and propagation of the planted vegetation. Some of the recommendations in this report directly address steep slopes by recommending reconstruction to a 3:1 (horizontal to vertical) slope.

Fish and Wildlife Resources. In accordance with Navy Instruction 5090.1C, installations must improve the quantity, function, sustainable productivity, and distribution of aquatic resources for increased recreational fishing opportunities by restoring degraded habitat, fostering conservation, and providing access to and awareness of opportunities for recreational fishing. Although hunting is a significant activity at NASO, hunting does not impact water quality by erosion.

There are no water bodies at NALF Fentress managed for recreational fishing. Oceana Pond at NASO is currently the only water body at NASO managed for recreational fishing. Freshwater fishing is permitted at Lake Tecumseh, Redwing Lake, and Sadler Pond at DNA. Fishing is also allowed in the ditches that drain DNA. Appropriate state licenses and a base permit for freshwater fishing are required for fishing at DNA.

Although three recreational fishing ponds were excavated during the 1960s at NSA NWA, there are no authorized fishing lakes at NSA NWA. Past fisheries assessments of Lunker Lake suggest that the pond is too small, steep-sided, and lacks shallow spawning grounds needed to support a self-sustaining, balanced fish population and that extensive reconstruction would be required to establish a fishing program (USFWS 1987).

Recreational Areas. An inventory of recreational areas and sources of water supply will also facilitate, and in some cases mandate, the goals of the watershed. This information will also be important in the selection of models that would be needed to identify sources of pollution, understand the hydrologic and hydraulic characteristics of the watershed, and evaluate alternatives to meet the watershed goals and manage water quality.

Types of outdoor recreation available at NSA NWA include hunting, fishing, picnicking, bird watching, hiking, jogging, and camping. The MWR at NSA NWA administers a number of these activities, whereas the fishing, hunting, and environmental awareness programs are administered as part of the regional natural resources program under the Regional Environmental Group. Fishing is the recreational activity most impacted by erosion due to sedimentation and should be a criterion in identifying the appropriate BMP for an area.

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8 REFERENCES

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APPENDIX A
PHOTOLOG
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APPENDIX B
FIELD SURVEY FORMS
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APPENDIX C
COST ESTIMATES
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Enclosure 3. Climate Change

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Enclosure 4. Vegetation Community Characterization Mapping

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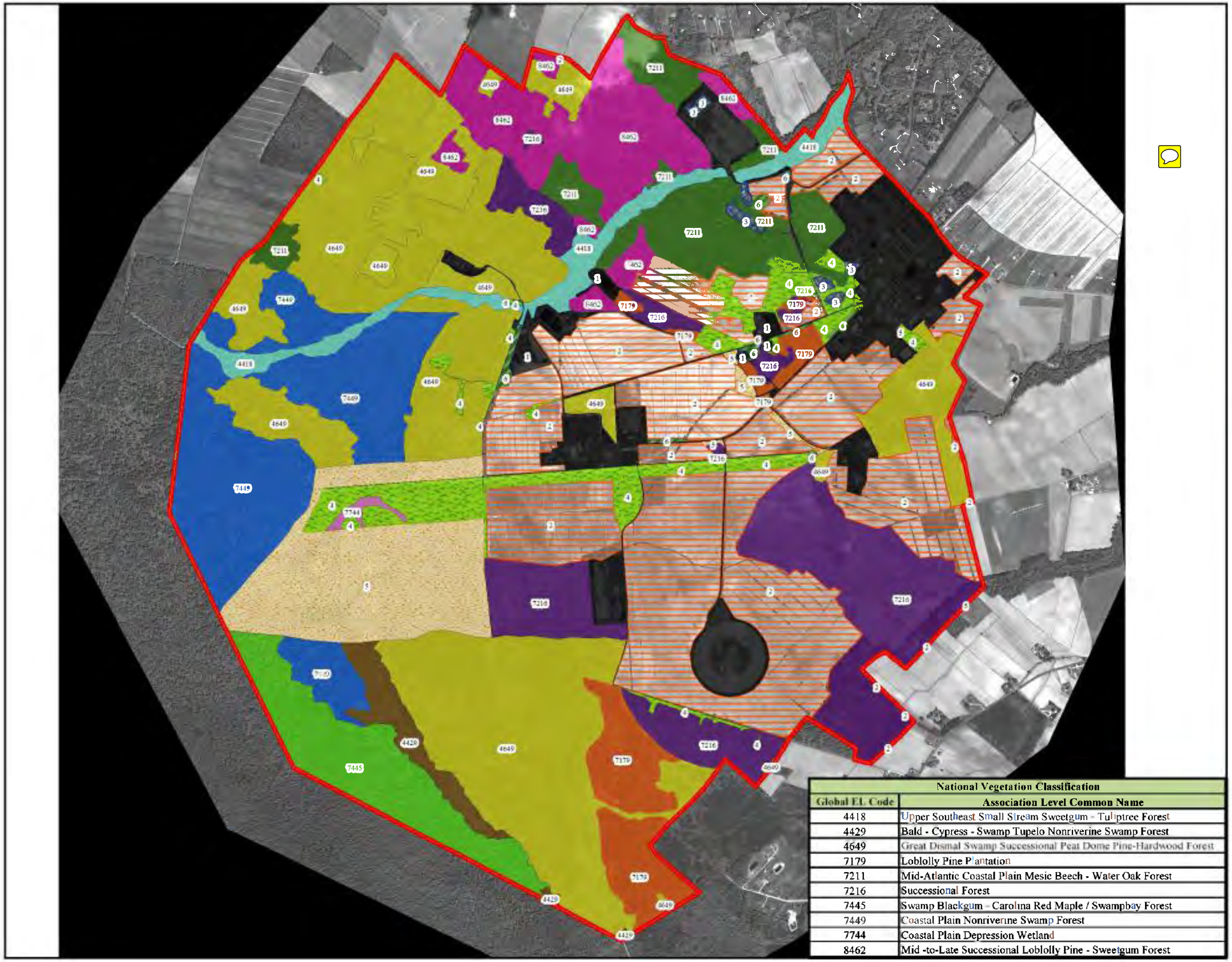

Legend

NSAHR NWA Installation Area

Land Cover

- 1 - Urban
- 2 - Agriculture
- 3 - Recreation
- 4 - Non-NVC Herbaceous
- 5 - Non-NVC Shrub
- 6 - Non-NVC Forest

National Vegetation Classification Global EL Code (Association Level)

- 4418
- 4429
- 4649
- 7179
- 7211
- 7216
- 7445
- 7449
- 7744
- 8462

N

0 500 1,000 2,000 Feet

0 150 300 600 Meters

National Vegetation Classification	
Global EL Code	**Association Level Common Name**
4418	Upper Southeast Small Stream Sweetgum - Tuliptree Forest
4429	Bald - Cypress - Swamp Tupelo Nonriverine Swamp Forest
4649	Great Dismal Swamp Successional Peat Dome Pine-Hardwood Forest
7179	Loblolly Pine Plantation
7211	Mid-Atlantic Coastal Plain Mesic Beech - Water Oak Forest
7216	Successional Forest
7445	Swamp Blackgum - Carolina Red Maple / Swampbay Forest
7449	Coastal Plain Nonriverine Swamp Forest
7744	Coastal Plain Depression Wetland
8462	Mid -to-Late Successional Loblolly Pine - Sweetgum Forest

Vegetation Classification Mapping at NSAHA NWA, Chesapeake, Virginia

Date: 12/2013

Source: Digital Globe Imagery 2010, Navy 2012, and Tetra Tech 2013.

Coordinate System: World Geodetic System 1984
Universal Transverse Mercator, Zone 18, North, Meters

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Enclosure 6. Wildland Fire Management Plan

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Enclosure 6. Wildland Fire Management Plan

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NAVFAC Atlantic Biological Resource Services

Contract: N62470-13-D-8016; Task Order: 0014

Final - September 2017

WILDLAND FIRE MANAGEMENT PLAN

NAVAL SUPPORT ACTIVITY HAMPTON ROADS-NORTHWEST ANNEX

CHESAPEAKE, VIRGINIA,

CURRITUCK, NORTH CAROLINA

Prepared for:
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WILDLAND FIRE MANAGEMENT PLAN

NAVAL SUPPORT ACTIVITY HAMPTON ROADS- NORTHWEST ANNEX

Contract: N62470-13-D-8016; Task Order: 0014

Prepared by:
Tetra Tech, Inc. and
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For:
United States Department of the Navy
Naval Facilities Engineering Command Mid-Atlantic

September 2017

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This Wildland Fire Management Plan for Navy Support Activity Hampton Roads, Northwest Annex (NSAHR NWA) has been prepared in accordance with regulations, standards, and procedures of the Department of Defense and the US Navy. The signatures below indicate approval of the Plan for Implementation.

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Fire and Emergency Services, CNRMA
Security Department, NSAHR NWA
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VDOF Local Forester

Please sign below by respective department listing indicating you have reviewed this plan. Please review within one week of the date annotated by the Natural Resources Specialist line on the cover sheet of this plan.

Distribution:

Executive Officer, NSAHR NWA:

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Local Forester, VDOF:

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ACRONYMS AND ABBREVIATIONS

%	PERCENT
°C	DEGREES CELSIUS
°F	DEGREES FAHRENHEIT
AC	ACRE(S)
BASH	BIRD/ANIMAL AIRCRAFT STRIKE HAZARD
BO	BIOLOGICAL OPINION
CEQ	COUNCIL ON ENVIRONMENTAL QUALITY
CFR	CODE OF FEDERAL REGULATIONS
CLEO	CONSERVATION LAW ENFORCEMENT OFFICER
CM	CENTIMETERS
CNIC	COMMANDER, NAVY INSTALLATIONS COMMAND
CNO	CHIEF OF NAVAL OPERATIONS
CNRMA	COMMANDER, NAVY REGION MID-ATLANTIC
CO	COMMANDING OFFICER
CWA	CLEAN WATER ACT
CZ	CLEAR ZONE(S)
CZMP	CLEAR ZONE MANAGEMENT PLAN
DOD	UNITED STATES DEPARTMENT OF DEFENSE
DODI	DEPARTMENT OF DEFENSE INSTRUCTION
EA	ENVIRONMENTAL ASSESSMENT
EIS	ENVIRONMENTAL IMPACT STATEMENT
EO	EXECUTIVE ORDER
EPA	ENVIRONMENTAL PROTECTION AGENCY
ESA	ENDANGERED SPECIES ACT
FT	FEET
FY	FISCAL YEAR
HA	HECTARES
ICRMP	INTEGRATED CULTURAL RESOURCES MANAGEMENT PLAN
IC	INCIDENT COMMANDER
ICS	INCIDENT COMMAND SYSTEM
IN	INCHES
INRMP	INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
INST	INSTRUCTION
IRPG	INCIDENT RESPONSE POCKET GUIDE
LCC	LANDSCAPE CONSERVATION COOPERATIVE
LB	POUND(S)
LEGACY	LEGACY RESOURCE MANAGEMENT PROGRAM
M	METER(S)
MI	MILE(S)
MI^2	SQUARE MILES
MOU	MEMORANDUM OF UNDERSTANDING
MSL	MEAN SEA LEVEL
MWR	MORALE, WELFARE, AND RECREATION

NALF	NAVAL AUXILIARY LANDING FIELD
NALFF	NAVAL AUXILIARY LANDING FIELD FENTRESS
NAS	NAVAL AIR STATION
NASO	NAVAL AIR STATION OCEANA
NASO DNA	NAVAL AIR STATION OCEANA DAM NECK ANNEX
NAVY	UNITED STATES DEPARTMENT OF THE NAVY
NC	NORTH CAROLINA
NCFS	NORTH CAROLINA FOREST SERVICE
NEPA	NATIONAL ENVIRONMENT POLICY ACT
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NGOS	NON-GOVERNMENTAL ORGANIZATIONS
NHPA	NATIONAL HISTORIC PRESERVATION ACT
NICC	NATIONAL INTERAGENCY COORDINATION CENTER
NIFC	NATIONAL INTERAGENCY FIRE CENTER
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NR	NATURAL RESOURCES
NRCS	NATURAL RESOURCES CONSERVATION SERVICE
NRHP	NATIONAL REGISTER OF HISTORIC PLACES
NRM	NATRUAL RESOURCES MANAGER
NRP	NATURAL RESOURCES PROGRAM
NRS	NATURAL RESOURCES SPECIALIST
NSAHR NWA	NAVY SUPPORT ACTIVITY HAMPTON ROADS NORTHWEST ANNEX
NWCG	NATIONAL WILDFIRE COORDINATING GROUP
NWR	NATIONAL WILDLIFE REFUGE
PFP	PRESCRIBED FIRE PLAN
ROTHR	RELOCATABLE OVER-THE HORIZON RADAR
SAV	SURFACE AREA VOLUME
SHPO	STATE HISTORIC PRESERVATION OFFICE
SIAS	SPECIAL INTEREST AREAS
SOP	STANDARD OPERATING PROCEDURES
T&E	THREATENED AND ENDANGERED SPECIES
US	UNITED STATES
USACE	UNITED STATES ARMY CORPS OF ENGINEERS
USC	UNITED STATES CODE
USDA	UNITED STATES DEPARTMENT OF AGRICULTURE
USFWS	UNITED STATES FISH AND WILDLIFE SERVICE
VA	VIRGINIA
VAC	VIRGINIA ADMINISTRATIVE CODE
VDOF	VIRGINIA DEPARTMENT OF FORESTRY
WFMP	WILDLAND FIRE MANAGEMENT PLAN

GLOSSARY

The hierarchy of terminology will be those defined in law, those defined in policy, those defined in this guidance and then all other agency and interagency documentation. The NWCG (National Wildfire Coordinating Group) Glossary of Wildland Fire Terminology will be maintained as the source of record.

Controlled burn – synonymous with Prescribed Fire.

Escaped Prescribed Fire – a prescribed fire that has exceeded or is expected to exceed prescription parameters or otherwise meets the criteria for conversion to wildfire. Criteria is specified in "Interagency Prescribed Fire – Planning and Implementation Procedures Reference Guide".

Fire Management Plan (FMP) – a plan that identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire and prescribed fire). The plan is supplemented by operational plans, including but not limited to preparedness plans, preplanned dispatch plans, prescribed fire burn plans and prevention plans. Fire Management Plans assure that wildland fire management goals and components are coordinated.

Initial Action – the actions taken by the first resources to arrive at a wildfire.

Land/Resource Management Plan (L/RMP) – a document prepared with public participation and approved by an agency administrator that provides general guidance and direction for land and resource management activities for an administrative area. The L/RMP identifies the need for fire's role in a particular area and for a specific benefit. The objectives in the L/RMP provide the basis for the development of fire management objectives and the fire management program in the designated area.

Planned Ignition –the intentional initiation of a wildland fire by hand-held, mechanical or aerial device where the distance and timing between ignition lines or points and the sequence of igniting them is determined by environmental conditions (weather, fuel, topography), firing technique, and other factors which influence fire behavior and fire effects (see prescribed fire).

Prescribed Fire—is a wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA (National Environmental Policy Act) requirements (where applicable) have been met prior to ignition (see planned ignition).

Protection - the actions taken to limit the adverse environmental, social, political, and economical effects of fire (FEC Briefing Paper, 3/14/2008).

Response to wildland fire - the mobilization of the necessary services and responders to a fire based on ecological, social, and legal consequences; the circumstances under which a fire occurs; and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected.

Suppression - all the work of extinguishing a fire or confining fire spread.

Unplanned Ignition – the initiation of a wildland fire by lightning, volcanoes, unauthorized and accidental human-caused fires (see wildfire).

Use of Wildland Fire - management of either wildfire or prescribed fire to meet resource objectives specified in Land/Resource Management Plans.

Wildfire – unplanned ignition of a wildland fire (such as a fire caused by lightning, volcanoes, unauthorized and accidental human-caused fires) and escaped prescribed fires. (See unplanned ignition and escaped prescribed fire).

Wildland Fire – a general term describing any non-structure fire that occurs in the wildland.

Wildland Urban Interface (WUI) – The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels.

1.0 INTRODUCTION, POLICY AND LAND MANAGEMENT PLANNING

This Wildland Fire Management Plan is designed to complement the Integrated Natural Resource Management Plan (INRMP). It provides specific fire management policy, strategy, and programmatic functions that support the Installation's fire and resource management goals.

1.1 PURPOSE OF THE WILDLAND FIRE MANAGEMENT PLAN

Wildland fires can pose a significant threat to facilities and mission capabilities within Navy Support Activity Hampton Roads, Northwest Annex (NSAHR NWA) areas of responsibility and adjacent lands. This Wildland Fire Management Plan is written to:

- Ensure that the safety of firefighters and the public is the primary objective in all wildland fire operations. Wildland firefighters will work with base fire departments when buildings/infrastructure are threatened or involved by fire. Only trained structural firefighters should attempt to manage structure fires or fires involving infrastructure.
- Describe the wildland fire management program for NSAHR NWA.
- Meet Department of Defense Instruction (DoDI) requirements 6055.6 (2006) that every Installation with burnable vegetation must have an approved WFMP.
- Establish wildland fire management actions that assist in implementing and accomplishing the goals and objectives of the approved INRMP.

1.2 WILDLAND FIRE MANAGEMENT PLAN AREA

NSAHR NWA lies along the southeastern border of Virginia and the northeastern border of North Carolina. The current total Installation acreage, as provided by the Navy Real Estate Office, is 3,726 acres (ac, 1,508 hectares, ha), three-quarters of which is in Chesapeake, Virginia, and one-quarter is in Currituck County, North Carolina (Figure 1). Total acreage is based on Navy geographic information system (GIS) data for the Installation and used throughout this document for natural resources summary purposes is 3,661 (1,482 ha).

The majority of immediate area surrounding NSAHR NWA is undeveloped and is comprised of agricultural land and forested wetlands. In the last several years, however, residential development has expanded along the Ballahack Road corridor to the northeast of the Installation. NSAHR NWA is located within the historic boundaries of the Great Dismal Swamp, which once extended from the James River to the Albemarle Sound. Beginning in the mid-1700s, however, much of the Great Dismal Swamp, including a large percentage of the land currently occupied by NSAHR NWA, was ditched and drained for agriculture and timber production (Navy 2002a). The largest contiguous parcels remaining of swamp are restricted to the Great Dismal Swamp National Wildlife Refuge to the west of the Installation, the Northwest River Preserve to the northeast, and various Virginia and North Carolina state reserves in the area (NWA INRMP 2014).

NSAHR NWA is located within the Outer Coastal Plain physiographic province, which greatly influences the topography, soils, and hydrology of the Installation. The Coastal Plain physiographic province consists of an eastward-thickening wedge of unconsolidated sediments consisting of gravels, sands, clays, and varying amounts of shell material (Roberts and Bailey 2002). This physiographic province is characterized by flat, low relief elevations of 0 to 60 feet

(ft) (0 to 18 meters, m) above mean sea level (msl). Within this province, topography generally slopes eastward toward the Atlantic Ocean. NSAHR NWA, however, is within a region influenced by a geologic feature called the Fentress Rise, which extends from Norfolk, Virginia to the Albemarle Sound, North Carolina. This region consists of a gently inclined, west-facing slope that dips toward the Great Dismal Swamp.

Approximate elevation ranges from 14 to 30 ft (4 to 9 m) above msl (Figure 2-1), and the Installation is depicted on two USGS 7.5 minute series map sheets: the Lake Drummond South East Quadrangle and the Moyock Quadrangle. A majority of the Installation has elevations of about 18 ft (6 m) above msl, with the exception of a small rise located in the center of the Installation that has an elevation of 30 ft (9m) above msl.

NASHR NWA has approximately 2,203.59 acres classified as wetland. Palustrine emergent/palustrine forested (1,624.60 ac or 657.45 ha), palustrine forested (438.11 ac or 117.30 ha), and palustrine forested/palustrine scrub-shrub (122.14 ac or 49.43 ha) are the three largest wetland types. Table 1 provides land use cover classifications.

TABLE 1. LAND USE COVER CLASSIFICATIONS AT NSAHR NWA.

Community Type	Acres
Forest	2,345
Agricultural	750
Maintained open	295
Developed	271
Total	**3,661**

The forests on NSAHR NWA are typically wet with the exception of the pine forests. Some of the hardwood species found in these seasonally flooded swamps are combinations of green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), swamp blackgum (*Nyssa biflora*), water hickory (*Carya aquatica*), willow oak (*Quercus phellos*), and overcup oak (*Q. lyrata*). Well drained levees support swamp chestnut oak (*Quercus michauxii*), cherrybark oak (*Q. pagodifolia*), laurel oak (*Q. laurifolia*), sugarberry (*Celtis laevigata*), and American elm (*Ulmus americana*). In the flatwoods, vegetation is dominated by mixtures of loblolly pine (*Pinus taeda*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), frequently with scattered pond pine (*Pinus serotina*). Small trees and shrubs include sweetbay (*Magnolia virginiana*), swamp blackgum *(Nyssa biflora*), swamp bay (*Gordonia lasianthus*), and coastal dog-hobble (*Leucothoe axillaris*). Giant cane (*Arundinaria gigantea*) typically dominates the shrub layer in patchy to very dense colonies.

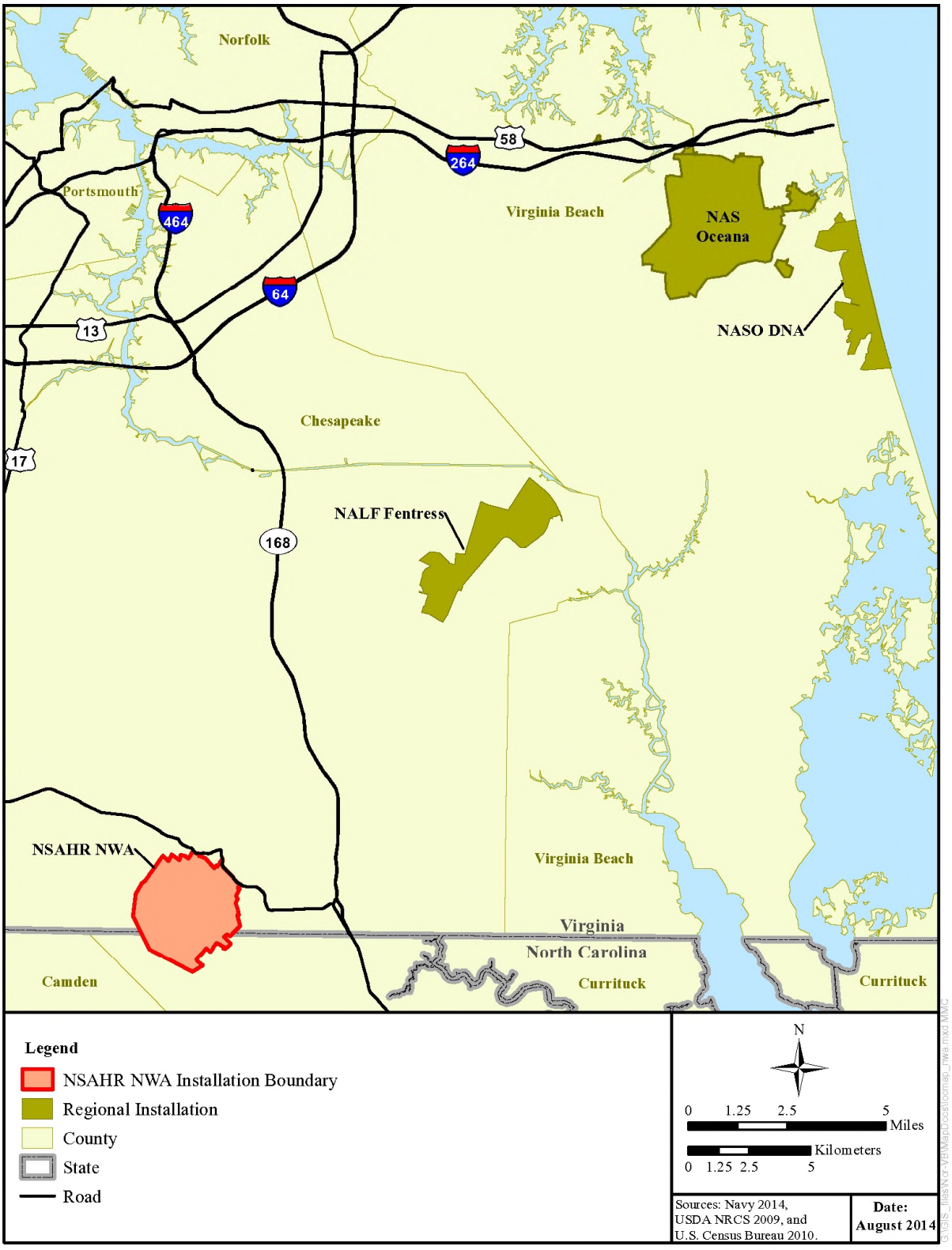

FIGURE 1. NSAHR NORTHWEST ANNEX AND VICINITY.

1.3 WILDLAND FIRE IMPACTS TO THE MILITARY MISSION

The current mission of NSAHR NWA is to coordinate the provision of shore activity support to tenant commands and to operational forces of the U.S. and its allies as required. The Installation provides a wide array of support services for 11 tenant commands, and maintains and operates the largest small-arms range facilities in Commander, Navy Region Mid-Atlantic. Wildland fires have the potential to impact the missions of NSAHR NWA. The primary adverse impact would be the loss of life and/or critical facilities. Additionally, a wildfire could adversely affect the operation of the Relocatable Over-the-Horizon Radar (ROTHR) and other communication sites on the Installation, operations, and access. A wildfire igniting on an Installation could threaten or escape to adjacent lands, which would affect the Navy's public relationship. Installation activities will be disrupted from smoke and particulates. Large wildfires in 2008 and 2011 at Great Dismal Swamp National Wildlife Refuge (NWR) released large volumes of smoke and particulates into the local air shed. These smoke impacts include breathing impairment, visibility impairment, and ash/particulate fallout.

1.4 MILITARY MISSION IMPACTS TO WILDLAND FIRE ACTIVITIES

Military missions have the potential to impact wildland fire activities, which could result in the loss of significant natural and cultural resources, critical facilities, and life. A wildland fire can be either an unplanned ignition (wildfire) or a planned ignition (prescribed fire). The sensitivity of the ROTHR could preclude the use of ground and air assets for fire suppression activities during a wildfire. Current mission requirements could restrict the use of prescribed fire. The absence of prescribed fire would accelerate fuel accumulation and increase the risk of a catastrophic wildfire.

1.5 SIGNIFICANT VALUES TO PROTECT

The most important value is life and property. NSAHR NWA has Installation values that are of national interest. Threatened and endangered (T&E) species of concern, cultural, environmental, and recreational values are discussed later in this section. Additionally, the Great Dismal Swamp Heritage Area runs along the boundary from west to south.

1.6 PUBLIC AND FIREFIGHTER SAFETY

Public and Firefighter Safety is the highest priority for all fire management activities on the Installations. Prevention of injury to the public by fire is the responsibility of all personnel during prescribed burning and wildfire suppression operations. Careful planning of prescribed fires minimizes the risk of escape that may endanger the public. Coordination of fire management activities between the Installation Natural Resources Manager (NRM) and Chief, Fire and Emergency Services along with other Installation departments is essential.

1.7 ENDANGERED SPECIES AND OTHER BIOLOGICAL CONSIDERATIONS

NSAHR NWA has threatened and endangered (T&E) species that can be affected both positively and negatively by fire. Most terrestrial T&E species in the southeastern United States (US) are dependent on fire to maintain their habitat and some have very specific habitat requirements, which require a specific fire regimen.

On-going rare species monitoring at the Installation provides information that is invaluable to fire management planning, prioritization, and implementation. Close collaboration between

Installation and regional staff biologists is therefore critical. Managers can adapt fire practices based on T&E species monitoring recommendations. During most wildfire events, biologists are available to provide input to the fire command staff regarding the effect of suppression plans on endangered species and biological communities.

The 2015 INRMP showed two rare plants and 41 wildlife species have been identified at the Installation that are considered rare, threatened, or endangered under federal or state ESAs, or global or state conservation rankings. The Northern Long Eared Bat has been found at NSAHR NWA during surveys. This bat is currently listed as Threatened (April 2015) under the Federal Endangered Species Act. A complete list of species of concern on this Installation is identified in the INRMP. The INRMP also covers potential impacts of fire to these species. Fire management strategies for T&E species are as follows:

- Prescribed fire will be utilized as appropriate. Using adaptive management, fire managers will adjust prescribed fire parameters according to habitat objectives, current conditions, and specific species requirements.
- Notify every vehicle and equipment operator to avoid adverse impacts to all T&E species. All on-site personnel will be educated to recognize T&E species and where they occur in the burn unit. If any T&E species is encountered, it will be avoided to the extent practicable, and be allowed to leave the immediate area of disturbance before vehicle or equipment use is resumed.
- Use firing patterns to provide escape routes for wildlife (i.e, avoid ring fires and fast-moving head fires).
- If a canebrake rattlesnake (*Crotalus horridus*) is observed in a burn unit during a burn, ignition will cease or the ignition pattern will be adjusted to allow escape routes or additional time for exit.
- Due to the presence of a Federally listed and several State listed bat species occurring on the Installation, no prescribed burning activities will be conducted in forested areas during the months of June and July. This is to reduce the potential negative impacts to these species during their primary pupping season.

1.8 ARCHAEOLOGICAL/CULTURAL RESOURCES CONSIDERATIONS

There are no known Historical Structures at NSAHR NWA that qualify for the registry. Although, suggestions been made regarding the military buildings as potential candidates. Several Phase I surveys were performed on proposed construction sites, and though some artifacts were found, no sites were determined to be eligible for the National Register of Historic Places (NRHP) (Couch and Cottrell 1994, Fesler and Luccketti 1992, and Morehead et al. 1987). Subsequent surveys determined there are seven sites at NSAHR NWA that are eligible for the NRHP and two additional sites that require Phase II surveys (Lowthert et al. 2000, McDonald et al. 1999, and Sheehan et al.1999). Three cemeteries also are part of the resource complement (NSAHR NWA INRMP 2015). Additional information is provided in the Installation INRMP and Integrated Cultural Resources Management Plan (ICRMP). All fire line construction and fuels breaks will be approved by the State Historic Preservation Officer (SHPO) prior to plan work. The exception is when a wildfire has an imminent threat to life or property.

1.9 PUBLIC USE ACTIVITIES

Because of mission constraints, there are limited opportunities for public access to outdoor recreational programs at NSAHR NWA. Recreational opportunities at the Installation include hunting, picnicking, wildlife watching, hiking, jogging, and camping. The Morale, Welfare, and Recreation (MWR) Department administers picnicking and camping activities. The Natural Resources Program (NRP) manages the hunting program. Both MWR and the NRP provide management oversight of facilities/programs that provide wildlife viewing/watching opportunities. These programs are open to active duty and retired military personnel and their dependents, current civilian employees of NSAHR NWA and their dependents, and reservists. These individuals may sponsor other individuals from the public, but they must be present and able to escorts their sponsored guests.

1.10 PRIVATE PROPERTY/URBAN INTERFACE

NSAHR NWA is unique as it straddles two states. Roughly one quarter is in Currituck County, North Carolina (NC) and three quarters in Chesapeake, Virginia (VA). The Installation is located in a fairly rural area. The closest communities are Moyock, NC to the south and Hickory, VA to the north. Adjacent properties are farms, dairy farms and scattered rural homes. Looking out 10 miles from the Installation there are significant farming areas and the City of Chesapeake. The roads, highways, and urban areas contain smoke sensitive areas. These areas are defined in Figure 2, using 2010 Census Block Population Data.

1.11 EFFECTS OF CLIMATE CHANGE ON WILDLAND FIRE MANAGEMENT

NSAHR NWA is located in the humid-subtropical zone which is characterized by long, humid summers and mild winters. The climate is moderated by the proximity of water bodies, including the Atlantic Ocean, Albemarle Sound, and Chesapeake Bay. The average annual temperature is approximately 60F (16C), ranging from monthly averages of 45F (7C) in January to 79F (26C) in July. Extremes have been recorded as high as 105F (41C) and as low as 2F (-17C). Average annual precipitation at Norfolk, Virginia, is 45.74 in (116 cm, National Weather Service, Wakefield, Virginia). Snowfall is a relatively rare event. Southerly winds dominate during the warmer months, while northerly winds dominate the cooler months. Sea breezes from the ocean can cause localized effects and dramatic shifts in wind direction in the spring months, as the land heats up, and ocean temperatures remain cool or cold.

Southeastern Virginia is at the northern edge of a distinctly southern, fire-adapted ecosystem. A long-term change in climate has the potential to push that ecosystem further north, altering vegetative composition and fire regimes. Short-term weather patterns over the past 10 years give indications that drought cycles may be growing longer and becoming more frequent, hydrological conditions are changing, and there may be some shift in seasons. These changes – short or long-term - may lead to longer fire seasons, more intense fires, and more severe fire effects.

Climatic changes in Virginia could amplify current land management challenges and will strongly influence wildland fire operations. Warmer conditions are currently increasing fire seasons length and severity. Vegetative communities may also shift as temperatures increase or as sea water levels rise. This may create vegetation that is more or less flammable. Managing wildland fuels at appropriate levels will help to increase the resiliency of the wildlands to changes that may occur.

N

17

17

Battlefield Blvd S

Chesapeake Expy S

Gallbush Rd

Indian Creek Rd

Battlefield Blvd S

NC-168

Caratoke Hwy

S Mills Rd

Old Swamp Rd

Legend

Hospital

School

2010 Census Block Population Data

2 - 50

51 - 200

201 - 500

501 - 1000

1001 - 2045

Installation

Areas with population data less
than 2 per block group are not shown.

0 0.5 1 2 Miles

Source: ESRI 2011 Bing Aerial.
Boundary Navy 2015.
2010 Census Block Data

TETRA TECH

SMOKE SENSITIVE AREAS
WILDLAND FIRE MANAGEMENT PLAN
NSAHR NORTHWEST
CHESAPEAKE, VIRGINIA

FILE	112G06000.0014	SCALE	AS NOTED
FIGURE NO.	2	REV	DATE 10/20/2016

G:\GIS_files\Nor-VB\MapDocs\UrbanForestry\Northwest\Northwest_census.mxd MC

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2.0 POLICY, LAND MANAGEMENT PLANNING, AND PARTNERSHIPS

2.1 DEPARTMENT OF DEFENSE POLICY

DoD wildland fire suppression policy is found in DoDI 6055.6, Section E3.8. *Wildland Fire Response,* available at http://www.dtic.mil/whs/directives/corres/pdf/605506p.pdf. This section dictates:

> Plan for and respond to wildland fires on Installations using 2001 Federal Wildland Fire Management Policy, established standards, local conditions' risk considerations, and the following:
>
> - The Federal Wildland Fire Management Policy and Program Review of 1995 (as updated), the NWCG *Wildland Fire Qualification Subsystem Guide* (PMS 310-1/NFES 1414), National Fire Protection Association (NFPA) Standard 295 – *Standard for Wildfire Control,* NFPA Standard 1051 – *Standard for Wildland Firefighter Professional Qualifications,* NFPA Standard 1143 – *Standard for Wildland Fire Management,* and NFPA Standard 1144 – *Standard for Protection of Life and Property from Wildfire* establish the accepted professional standards for AF wildland fire management policy. Installations with unimproved lands that present a wildfire hazard, and Installations which utilize prescribed burns as a land management tool, will develop and implement a WFMP. The WFMP will be incorporated into or consistent with the INRMP as a component plan.
> - For Installations with burnable acreage or bordered by burnable acreage, prepare an Installation WFMP that identifies: 1) All wildland fire management strategies including military training availability, ecosystem sustainability, and protection of fire and emergency service personnel and the public and 2) Wildland fire preparedness, preplanned dispatch for both initial and extended attack, and prescribed fire and prevention per NFPA Standard 1710.
> - Train all personnel involved in wildland fire management activities to the appropriate Publication Management System (PMS) 310-1 or NFPA 21 Standard 1051, and all personnel shall be outfitted with protective clothing and equipment per NFPA 1977.

2.2 FEDERAL INTERAGENCY WILDLAND FIRE POLICY

The Review and Update of the 1995 Federal Wildland Fire Management Policy (January 2001) is the primary interagency wildland fire policy document. The Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy (June 20, 2003) was developed and approved under the authority of the Wildland Fire Leadership Council (WFLC) to set forth direction for consistent implementation of the federal fire policy. It has been used since that time.

On May 2, 2008, the WFLC issued a memorandum entitled Modification of Federal Wildland Fire Policy Guidance. This memorandum directed federal agencies to test and implement new guidelines for wildland fire management. The modifications were tested in a number of field units in the 2008 fire season.

In 2009 the National Wildfire Coordinating Group (NWCG) issued a memorandum to the NWCG executive board (NWCG#001-2009, January 7, 2009) that 1) affirms the soundness of the Review and Update of the 1995 Federal Wildland Fire Management Policy (January 2001), 2) reiterates the policy changes stated in the May 2, 2008 WFLC memorandum entitled Modification of Federal Wildland Fire Policy Guidance, 3) states that the Wildland Fire Decision Support System (WFDSS) will replace existing analysis and decision processes, and 4) confirms that the Interagency Strategy for the Implementation of Federal Wildland Fire Management Policy (June 20, 2003) will be replaced in 2009.

The Guidance for Implementation of Federal Wildland Fire Management Policy (February, 2009), is that replacement, https://www.nifc.gov/policies/policies_documents/GIFWFMP.pdf

This WFMP meets the DOD and Federal Wildland Fire Management Policy by implementing and following these guiding principles:

- Firefighter and public safety is the first priority in every fire management activity.
- Support the Naval military mission by managing wildland fire fuels.
- The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the planning process.
- INRMP and pertinent resource management plans set the objectives for the use and desired future condition of the various public lands.
- Wildland fire management plans, programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all wildland fire management activities. Risks and uncertainties relating to wildland fire management activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity.
- Wildland Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives,
- Wildland Fire management plans and activities are based upon the best available science.
- Wildland Fire management plans and activities incorporate public health and environmental quality considerations.
- Federal, State, tribal, local, interagency, and international coordination and cooperation are essential.
- Standardization of policies and procedures for wildland fire management among Navy Installations is an ongoing objective.

2.3 NATIONAL COHESIVE STRATEGY FOR WILDLAND FIRE

This WFMP meets the direction in the National Cohesive Strategy for Wildland Fire through its emphasis on the following primary goals:

- Improving fire prevention and suppression,

- Reducing hazardous fuels,
- Restoring fire-adapted ecosystems, and
- Promoting community assistance.

These can be found at: https://www.doi.gov/wildlandfire/cohesive-strategy

2.4 NAVAL INSTRUCTION

The WFMP incorporates and adheres to Navy policy (OPNAVINST) 11320.23F, http://govdocs.rutgers.edu/mil/navy/11320.23G.pdf, by planning for the use of wildland fire as a natural process and as a tool in the land management planning process and by providing for the following:

- Wildfires, whether on or adjacent to lands administered by the Navy, which threaten life, improvements, or are determined to be a threat to natural and cultural resources or improvements under the Navy's jurisdiction, will be considered emergencies and their suppression given priority over other Navy programs.
- Installations shall cooperate in the development of interagency preparedness plans to ensure timely recognition of approaching critical wildfire situations, to establish processes for analyzing situations and establishing priorities, and for implementing management responses to these situations.
- Installations will enforce rules and regulations concerning the unauthorized ignition of wildfires, and aggressively pursue violations.

This WFMP addresses a full range of potential wildfires and considers a full spectrum of tactical options (from monitoring to intensive management actions) for wildfires in order to meet Fire Management Unit (FMU) objectives. It fully applies and affirms these key elements of policy:

- Firefighter and public safety is the first priority of the wildland fire management program and all associated activities.
- Only trained and qualified individuals will be responsible for, and conduct, wild fire management duties and operations.
- Fire management planning, preparedness, wildfire and prescribed fire operations, other hazardous fuel operations, monitoring, and research will be conducted on an interagency basis with involvement by all partners to the extent practicable.
- The responsible leaders have coordinated, reviewed, and approved this WFMP to ensure consistency with approved INRMP's, values to be protected, and natural and cultural resource management plans, and that it addresses public health issues related to smoke and air quality. Incorporate public health and environmental quality considerations into fire management planning and execution.
- Fire, as an ecological process, has been integrated into INRMP and related resource management plans and activities on a landscape scale, across agency boundaries, based upon the best available science.

- Wildfire is used to meet identified resource management objectives and benefits when appropriate.
- Prescribed fire and other treatment types will be employed whenever they are the appropriate tool to reduce hazardous fuels and the associated risk of wildfire to human life, property, and cultural and natural resources and to manage our lands for habitats as mandated by statute, treaty, and other authorities.
- Management response to wildfire will consider firefighter and public safety, cost effectiveness, values to protect, and natural and cultural resource objectives.
- Staff members will work with local cooperators and the public to prevent unauthorized ignition of wildfires on Navy lands.

2.5 INSTALLATION SPECIFIC FIRE MANAGEMENT POLICY

There are two major components to the wildland fire program at NSAHR NWA. The Installation Fire and Rescue Program is responsible for wildfire suppression and the Installation Natural Resource Program is responsible for fuels management. The corresponding policies are (OPNAVINST) 11320.23F and OPNAV M-5090.1. With the Installation's INRMP containing additional specific guidance. The Installation CO's Environmental Policy (Navy 2011b) is direction for INRMP's.

2.6 LAND/RESOURCE MANAGEMENT PLANNING

This Wildland Fire Management Plan is designed to complement the Integrated Natural Resource Management Plan (INRMP). It provides specific fire management policy, strategy, and programmatic functions that support the Installation's fire and resource management goals.

2.7 ENVIRONMENTAL COMPLIANCE

The Installation covered by this WFMP will follow the Navy Environmental guidance found in OPNAV M-5090.1, to ensure compliance with the:

- National Environmental Policy Act 1970 (NEPA),
- Endangered Species Act of 1973 (ESA),
- National Historic Preservation Act of 1966 (NHPA),
- Archeological Resources Protection Act of 1979 (ARPA),
- Clean Water Act of 1963 (CWA), and the
- Clean Air Act of 1972.

2.8 WILDLAND FIRE MANAGEMENT PARTNERSHIPS

The Installation in this WFMP have developed strong relationships with agencies, groups, and stakeholders in support of their natural resource programs. With-in the natural resource program is a fire management function. The need to have good agreements to support each other in fire management activities is increasing yearly. Table 1 below lists the partners and stakeholders involved in wildland fire management.

TABLE 2. PARTNERS AND STAKEHOLDERS.

Navy	
Naval Facilities Engineering Command, Atlantic	Major Shore Commands of NSAHR NWA, NASO, NASO-DNA, and NALFF
Morale, Welfare, and Recreation Department	Naval Facilities Engineering Command, Mid-Atlantic
NSAHR NWA, NASO, NASO-DNA, and NALFF Commanding Officers	NSAHR NWA, NASO, NASO-DNA, and NALFF Environmental Offices
Navy Personnel	Navy Recycling Program
Other Naval Facilities in the Hampton Roads area	NSA Hampton Roads
Federal, State, and Local Agencies	
City of Chesapeake, Virginia	City of Virginia Beach
National Oceanic and Atmospheric Administration National Marine Fisheries Service	U.S. Department of Agriculture (USDA) Natural Resources Conservation Service
U.S. Army Corps of Engineers	State Historic Preservation Office
Virginia Department of Health	Hampton Roads Sanitation District
USDA Wildlife Services	U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service	U.S. Forest Service
U.S. Geological Survey	Virginia Army National Guard
Virginia Department of Conservation and Recreation – Division of Natural Heritage	Virginia Department of Forestry
Virginia Department of Game and Inland Fisheries	
Partners, Non-Governmental Organizations, Universities, and Individuals	
Center for Conservation Biology	Christopher Newport University
College of William and Mary	Cooperative Ecosystems Studies Unit
Department of Defense (DoD) Partners In Amphibian and Reptile Conservation	Dependents of Navy Personnel
DoD Partners in Flight	Elizabeth City State University
Frog Watch	Institute for Bird Populations
Military Retirees	National Audubon Society
National Military Fish and Wildlife Association	North Carolina Native Plant Society
Old Dominion University	Sportsman Quality Management Board
South Atlantic Landscape Conservation Cooperative	The Nature Conservancy of North Carolina
The Nature Conservancy of Virginia	Virginia Herpetological Society
Virginia Native Plant Society	Virginia Zoological Park
Back Bay Watershed Partnership	Lake Christine Watershed Partnership
Virginia Institute for Marine Science	Partners in Amphibian and Reptile Conservation

2.9 EXTERNAL PARTNERSHIPS

The Installation has a broad array of external partners including, other State / Federal agencies, local clubs, associations and groups. Additional information is provided in the Installation INRMP.

3.0 WILDLAND FIRE MANAGEMENT UNIT CHARACTERISTICS

This Wildland Fire Management Plan covers one fire management unit, NSAHR NWA. As with the other Tidewater Installations, it has many similarities, but also some distinct differences; location to water, vegetation / fuels, fire history, weather, urban development, and military activity.

3.1 AREA WIDE MANAGEMENT CONSIDERATIONS

A Fire Management Unit (FMU) is a land management area definable by objectives, management constraints, topographic features, access, values to protect, political boundaries, fuel types, major fire regime groups, etc. that set it apart from the characteristics of an adjacent FMU. A FMU may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives and can further be divided into Fire Compartments and/or Burn Units. The NSAHR NWA FMU contains a total of 3,661 acres, according to the Installation INRMP.

3.2 WILDLAND FIRE HISTORY

Wildland fires, or wildfires, in coastal Virginia occur periodically as a result of lightning strikes. The following table from the Great Dismal Swamp Wildland Fire Management Plan (2010) details the historical fire return interval in this area.

TABLE 3. HISTORICAL FIRE RETURN INTERVAL BY PRIMARY VEGETATION COMMUNITY TYPE IN THE GREAT DISMAL SWAMP (ADAPTED FROM FROST 1993).

Community Type	Historical Fire Interval
Open Bog Grassland	1-3 years
Canebrake and Pine Savannah	4-6 years
Tall Pocosin Scrub	13-25 years
Pine and Mesic Hardwoods	25-100 years
Atlantic White Cedar, Cypress, Maple Gum	25-100 years

"Frost (1989) hypothesized that for lands south of the James River, which originally were the most fire prone area in Virginia, fire ceased to be a major factor in determining natural vegetation only about 50 years ago. Prior to 1900, fires within the Great Dismal Swamp were uncontrolled and usually occurred during droughts. Lightning ignited most of the fires, but Native American hunting parties and loggers may have ignited some fires. From 1900 to about 1945, railroad and logging activities brought new sources of ignition and changed the fuel dynamics by introducing large areas of slash fuel types to the landscape. Logging increased fire frequency, and created conditions that caused fires to burn for extended periods. Logging activities were typically concentrated during periods of higher fire danger. Logging in the swamp was most easily accomplished during dry periods when men and equipment could maneuver more easily on the organic soils. This is also when the soils are more susceptible to ignition and sustained combustion. Simpson (1990) reported on "The Great Conflagration," a logging slash fire that burned for years during 1923-1926, eventually burning an area of about 150 mi^2 (nearly 100,000 ac).

> *A combination of fire types, including naturally-occurring (lightning-caused) fires (Kirwan and Shugart 2000), and fires associated with the activities of Native Americans and European colonists (Patterson and Sassman 1988) have historically influenced vegetation in the eastern US. Naturally occurring fire is infrequent in the mid-Atlantic, however, human-set fire has historically, dramatically impacted the ecology of the region, including coastal Virginia (Brown 2000).*
>
> *The burning practices of Native Americans ceased as native peoples were decimated and most wildfires were suppressed. Suppression has had profound ecological effects on forests (Abrams 1996) and grasslands (Tyndall 1992, Latham et al. 1996, Askins 1997) in the eastern US. In the absence of periodic fire, eastern landscapes changed rapidly from grasslands to shrublands and dense forests (Brown 2000), and fire intolerant species, such as American beech (Fagus grandifolia) and red maple (Acer rubrum), have increased in distribution and abundance (Brown 2000, Kriwan and Shugart 2000). The absence of fires has allowed dense forest undergrowth.*
>
> *Fire-tolerant natural communities have undergone major changes in vegetation structure, including loss of biological richness and invasion by non-native plants (Ladd 1997).*
>
> *Changes in forest ecology and land use practices also changed the nature of the fires that occur. Heavier fuel loadings, as a result of conversion from grasslands to timber, and a lack of periodic burns to reduce fuel build-up, have largely changed eastern US fires from frequent, low intensity fires, to infrequent, high-intensity fires. In addition, seasonal drought conditions can exacerbate the wildfire potential with the increased fuel load allowing a lightning strike to result in a catastrophic wildfire."* Great Dismal Swamp Wildland Fire Management Plan (2010).

While the Installation does not have a very active wildfire problem, there have been several wildfire occurrences over the years. Wildfires can occur anytime the fuels are dry enough to sustain combustion.

Since DOD acquisition of the lands comprising NSAHR NWA the suppression of wildland fires has been mandated for the protection of personnel and property. The majority of wildland fires were actually caused by inadvertent ignition from rocket/missile launches, launch anomalies, or other human related activities. Regardless, the response to a wildland fire has always been immediate suppression. When a naturally occurring, lightning ignited or human-caused wildfire occurs on this Installation, the response is also to immediately suppress the fire. This response inhibits the natural fire cycle and creates unfavorable forest conditions; however, the protection of NSAHR NWA personnel and mission resources is foremost. One of the goals of this WFMP is to establish a procedure whereby naturally occurring wildland fires may be controlled, instead of immediately extinguished, for the purpose of reducing fuel loads and improving habitat/forest quality.

3.3 WILDLAND FIRE MANAGEMENT GOALS, STRATEGIES, AND GUIDANCE FROM INRMPS OR SIMILAR INSTALLATION PLANS

Goal 1 – Support the missions of NSAHR NWA by minimizing the wildland fire potential and severity.

- Objective 1.1 - Reduce the amount of vegetative fuels on the Installation by conducting prescribed fires on 5-10% of the burnable acres each year.
- Objective 1.2 - Maintain the existing network of firebreaks at the Installation and create new firebreaks as required.
- Objective 1.3 – Create prescribed burn compartment maps that show firebreaks, critical facilities, previously burned compartments (reduced fuel load) and any other wildfire control issues.
- Objective 1.4 – Minimize potential for a catastrophic wildfire by scheduling prescribed burning of compartments known to contain high fuel loads.

Goal 2 – Manage wildfires and prescription fires on NASHR NWA lands in a manner that protects the lives of firefighters, Installation personnel, and the public.

- Objective 2.1 – Provide and ensure adequate training for all firefighters and prescribed burning personnel, maintain certifications and re-certification/refresher training schedule, schedule and complete annual safety training as required.
- Objective 2.2 – Ensure all Fire Chiefs, On-Scene Commanders, prescribed burn bosses, firefighters, and prescribed burn personnel focus on providing the ultimate level of personnel safety protection while engaged in any type of wildfire operation, uncontrolled wildland fire, controlled prescribed fire, etc.
- Objective 2.3 – Establish and maintain a personnel/Installation-wide warning system with procedures to alert and/or inform Installation personnel, tenants, contractors, etc., of a scheduled prescribed burn or wildland fire.
- Objective 2.4 – Provide adequate smoke management during wildland fires to minimize, if not preclude, potential public safety issues (visibility, driving impairment, breathing, etc.) associated with the fire.
- Objective 2.5 Develop formal procedure and conduct safety briefings for all personnel involved in a prescribed burn prior to igniting and/or initiating a prescribed fire.

Goal 3 – Enhance NSAHR NWA capability for utilizing inadvertently ignited wildfires for fulfilling the goals of the fuels management program.

- Objective 3.1 – Establish and implement a procedure for analyzing a wildland fire scenario whereby a wildfire could be allowed to burn without jeopardizing personnel or resources.
- Objective 3.2 – Develop a checklist that can be used in conjunction with facility, infrastructure, and burn compartment maps to quickly determine critical aspects of a wildfire situation in order to provide rapid decisions to extinguish immediately or burn to the established compartment boundary.

- Objective 3.3 – Develop Memorandum of Agreements (MOA) and/or Cooperative Agreement between the USFWS Great Dismal Swamp National Wildlife Refuge (GDRNWR), Virginia Department of Forestry (VDOF), North Carolina Forest Service (NCFS), and the Installation for all types of prescribed fire and wildfire support and/or response as applicable.

Goal 4 – Improve security visibility to enhance protection of NSAHR NWA, and facilities and personnel.

- Objective 4.1 – Use prescribed fire to reduce the height and density of forests/vegetation to minimize areas of concealment by intruders.
- Objective 4.2 – Maintain firebreaks, utility corridors, lines of sight, road shoulders, rights-of-way, etc., used to delineate prescribed burn compartments that are co-utilized as security clear zones.

Goal 5 – Support the Goals of the INRMP to improve wildlife habitat.

- Objective 5.1 – Conduct prescribed fires/controlled burns for the purpose of maintaining the natural, fire dependent ecosystems.
- Objective 5.2 – Analyze and coordinate wildland fire response to determine if a wildfire can be safely controlled and managed as a fire for resource benefit.
- Objective 5.3 – Conduct periodic Controlled Burn Working Group meetings to coordinate and disseminate fire information, facilitate prescribed burn approval, resolve conflicts, and support the other goals of the WFMP.

Goal 6 – Improve forest quality.

- Objective 6.1 – Utilize prescribed fire to mimic the natural lightning ignited fire cycle.
- Objective 6.2 – Use prescribed fire to remove dead and dying vegetation, inhibit the growth and spread of exotic and/or invasive plant species, promote new plant growth (regeneration), create open areas within scrub forests and facilitate species diversification/biodiversity.
- Objective 6.3 – Facilitate the nutrient cycle by reducing the composition of vegetation to ash, thereby enhancing the solubility and uptake of nutrients utilized by regenerating plants and other organisms.

3.4 WILDLAND FIRE MANAGEMENT GUIDANCE AND STANDARDS FROM OTHER SOURCES

1. National Fire Protection Association (NFPA) Standards:
   a. NFPA 1002 Standard on Fire Apparatus Driver/Operator Professional Qualifications
   b. NFPA 1051 Standard for Wildland Firefighter Professional Qualifications
   c. NFPA 1143 Standard for Wildland Fire Management
   d. NFPA 1144 Standard for Protection of Life and Property from Wildfire

e. NFPA 1710 Standard for the Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments

f. NFPA 1977 Standard on Protective Clothing and Equipment for Wildland Firefighting, 2005 Edition

2. Federal Wildland Fire Management Policy of 1995 and January 2001 update.
3. The 10-Year Comprehensive Strategy for A Collaborative Approach to Reducing Wildland Fire Risks to Communities and the Environment and the 2006 Implementation Plan
4. National Fire Plan
5. National Incident Management System: Homeland Security Presidential Directive 5 (HSPD-5), 28 February 2003 and Department of Homeland Security (DHS) National Incident Management System (NIMS), 1 March 2004
6. National Wildland Coordinating Group (NWCG) Publications Management System (PMS) 310-1 Wildland Fire Qualification System Guide

3.5 COMMON CHARACTERISTICS OF FIRE MANAGEMENT UNITS

Fire Management Units are delineated for a variety of purposes, such as vegetation, size, resource management, complexity of associated structures or landscape, and other planning needs. For this WFMP, the NSAHR NWA Installation will be considered a single FMU. Some common attributes of FMU's are fuels, fire breaks, structures, recreational areas, mission requirements, and unexploded ordinance (UXO).

3.5.1 Fuels

The Installation has a mix of vegetation types and thus fuel types. Expansive definitions can be found in the *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model,* http://www.fs.fed.us/rm/pubs/rmrs_gtrl53/pdf. General definitions of the fuel types found at the Installation are described below and identified on the Land Fire Fuels Map in Appendix A. These maps were downloaded from the USGS Landfire Data Distribution Website, available online at: https://landfire.cr.usgs.gov/viewer/viewer.html.

Forest fuel loadings from the NSAHR NWA forest inventory found in the INRMP Appendix are in Table 5 at the end of this section.

3.5.1.1 Grass Fuel Type Models (GR)

The primary carrier of fire in the GR fuel models is grass. Grass fuels can vary from heavily grazed grass stubble or sparse natural grass to dense grass more than 6 feet tall. Fire behavior (FB) varies from moderate spread rate and low flame length in the sparse grass to extreme spread rate and flame length in the tall grass models. While the FB fuel models are static, all of the GR fuel models are dynamic, meaning that their live herbaceous fuel load shifts from live to dead as a function of live herbaceous moisture content. The effect of live herbaceous moisture content on spread rate and intensity is very strong.

Short, sparse grass (GR1)

The primary carrier of fire in GR1 is sparse grass, though small amounts of fine dead fuel may be present. The grass in GR1 is generally short, either naturally or by grazing, and may be sparse or discontinuous. The moisture of extinction of GR1 is indicative of a dry climate fuelbed, but GR1 may also be applied in high-extinction moisture fuelbeds because in both cases predicted spread rate and flame length are low compared to other GR models.

Fine fuel load (t/ac) 0.40
Characteristic SAV (ft-1) 2054
Packing ratio (dimensionless) 0.00143
Extinction moisture content (percent) 15

The **surface area to volume ratio** (SAV) of an object is the relationship between two measurements. It is the **ratio** of **Surface area to volume**. It shows the comparison between the size of the outside of an object and the amount it can hold inside it. Small objects have a large **surface area** compared to the **volume**.

Packing ratio is a measure of fuelbed compactness and is defined as the fraction of the fuel array volume that is occupied by fuel. It is important **factor** in predicting fire behavior. At very high **packing ratios**, lack of oxygen limits fuel combustion.

The fuel moisture content is weighed over all the fuel classes, and defines the moisture content at which the fire will not spread. It is also called **extinction moisture content.**

Low Load, Very Coarse, Humid Climate Grass (GR3)
The primary carrier of fire in GR3 is continuous, coarse, humid-climate grass. Grass and herb fuel load is relatively light; fuelbed depth is about 2 feet. Shrubs are not present in significant quantity to affect fire behavior.

Fine fuel load (t/ac) 1.60
Characteristic SAV (ft-1) 1290
Packing ratio (dimensionless) 0.00143
Extinction moisture content (percent) 30

Moderate Load, Humid Climate Grass (Dynamic) (GR6)
The primary carrier of fire in GR6 is continuous humid-climate grass. Load is greater than GR5 (GR5 is low load humid climate grass with load greater than GR3, but depth lower, about 1-2 feet) but depth is about the same. Grass is less coarse than GR5.

Fine fuel load (t/ac) 3.5
Characteristic SAV (ft-1) 2006
Packing ratio (dimensionless) 0.00335
Extinction moisture content (percent) 40

High and Very High Load, Humid Climate Grass – GR8 / GR9
The primary carrier of fire in GR8 is continuous, very coarse, humid-climate grass. Load and depth are greater than GR3. Spread rate and flame length can be extreme if grass is fully cured. GR9 is dense, tall humid-climate grass. Load and depth are greater than GR8, about 6 feet tall. Mature areas of common reed *(Phragmites australis)* would fit this model.

Fine fuel load (t/ac) 7.8 / 10.0
Characteristic SAV (ft-1) 1302 / 1612
Packing ratio (dimensionless) 0.00316 / 0.00316
Extinction moisture content (percent) 30 / 40

3.5.1.2 Grass-Shrub Fuel Type Models (GS)

The primary carrier of fire in the GS fuel models is grass and shrubs combined; both components are important in determining fire behavior. All GS fuel models are dynamic, meaning that their live herbaceous fuel load shifts from live to dead as a function of live herbaceous moisture content. The effect of live herbaceous moisture content on spread rate and intensity is strong and depends on the relative amount of grass and shrub load in the fuel model.

Moderate Load, Humid Climate Grass-Shrub (GS3)
The primary carrier of fire in GS3 is grass and shrubs combined. Moderate grass/shrub load, average grass/shrub depth less than 2 feet. Spread rate is high; flame length moderate. Moisture of extinction is high.

Fine fuel load (t/ac) 3.0
Characteristic SAV (ft-1) 1614
Packing ratio (dimensionless) 0.00259
Extinction moisture content (percent) 40

Moderate load, Humid Climate Class – Grass (GS6)
The primary carrier of fire in GS6 is continuous humid-climate grass. Fuel load is greater than GS3 but depth is the same, 1 to 2 feet. Grass coarseness is similar to cogon grass *(Imperata cylindrica).*

Fine fuel load (t/ac) 3.5
Characteristic SAV (ft-1) 2006
Packing ratio (dimensionless) 0.00335
Extinction moisture content (percent) 40

3.5.1.3 Shrub Fuel Type Models (SH)

The primary carrier of fire in the SH fuel models is live and dead shrub twigs and foliage in combination with dead and down shrub litter. A small amount of herbaceous fuel may be present in SH9, which are dynamic models (their live herbaceous fuel load shifts from live to dead as a function of live herbaceous moisture content). The effect of live herbaceous moisture content on spread rate and flame length can be strong in those dynamic SH models.

Very High Load, Humid Climate Shrub (SH9)
The primary carrier of fire in SH9 is woody shrubs and shrub litter. Dense, finely branched shrubs with significant fine dead fuel, about 4 to 6 feet tall; some herbaceous fuel may be present. Spread rate is high, flame length very high.

Fine fuel load (t/ac) 13.05
Characteristic SAV (ft-1) 1378
Packing ratio (dimensionless) 0.00505
Extinction moisture content (percent) 40

3.5.1.4 Timber-Understory Fuel Type Models (TU)

The primary carrier of fire in the TU fuel models is forest litter in combination with herbaceous or shrub fuels. TU3 contains live herbaceous load and are dynamic, meaning that their live herbaceous fuel load is allocated between live and dead as a function of live herbaceous moisture

content. The effect of live herbaceous moisture content on spread rate and intensity is strong and depends on the relative amount of grass and shrub load in the fuel model.

Moderate Load, Humid Climate Timber-Grass-Shrub (TU3)
The primary carrier of fire in TU3 is moderate forest litter with grass and shrub components. Extinction moisture is high. Spread rate is high; flame length moderate.

Fine fuel load (t/ac) 2.85
Characteristic SAV (ft-1) 1611
Packing ratio (dimensionless) 0.00359
Extinction moisture content (percent) 30

3.5.1.5 Timber Litter Fuel Type Models (TL)

The primary carrier of fire in the TL fuel models is dead and down woody fuel. Live fuel, if present, has little effect on fire behavior.

Low Load Broadleaf Litter (TL2)
The primary carrier of fire in TL2 is broadleaf (hardwood) litter. Spread rate is very low; flame length very low. Although model TL2 was designed for broadleaf litter, it also applies to the various swamp habitats found at NSAHR NWA.

Fine fuel load (t/ac) 1.4
Characteristic SAV (ft-1) 1806
Packing ratio (dimensionless) 0.04232
Extinction moisture content (percent) 25

Moderate Load, Conifer Litter (TL3)
The primary carrier of fire in TL3 is moderate load conifer litter, light load of coarse fuels. Spread rate is very low; flame length low.

Fine fuel load (t/ac) 0.50
Characteristic SAV (ft-1) 1532
Packing ratio (dimensionless) 0.02630
Extinction moisture content (percent) 20

Moderate load Broadleaf Litter (TL6)
The primary carrier of fire in TL6 is moderate load broadleaf litter, less compact than TL2. Spread rate is moderate, flame length low.

Fine fuel load (t/ac) 2.4
Characteristic SAV (ft-1) 1936
Packing ratio (dimensionless) 0.02296
Extinction moisture content (percent) 25

Long Needle Litter (TL8)
The primary carrier of fire in TL8 is moderate long needle pine litter, may include small amount of herbaceous load. Spread rate is moderate, flame length low.

Fine fuel load (t/ac) 5.8
Characteristic SAV (ft-1) 1770
Packing ratio (dimensionless) 0.03969
Extinction moisture content (percent) 35

Very High Load Broadleaf Litter (TL9)

The primary carrier of fire in TL9 is very high load, fluffy broadleaf litter. TL9 can also be used to represent heavy needle-drape. Spread rate is moderate; flame length moderate.

Fine fuel load (t/ac) 6.65
Characteristic SAV (ft-1) 1733
Packing ratio (dimensionless) 0.03372
Extinction moisture content (percent) 35

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TABLE 4. FOREST FUEL LOADINGS AT NSAHR NWA FROM INRMP APPENDIX.

2014 FOREST INVENTORY REPORT

TABLE 7A
Summary of Fuel Depth, 1-, 10-, and 100-Hour[1] Fuel Loadings with 90 Percent Confidence Interval by Vegetation Type – NWA

Vegetation Type	Number of Transects	Fuel Depth (Inches)	Fuel Depth-90% CI (+/-) (Inches)	1-Hour Fuel Load (Tons Per Acre)	1-Hour Fuel Load-90% CI (+/-) (Tons Per Acre)	10-Hour Fuel Load (Tons Per Acre)	10-Hour Fuel Load-90% CI (+/-) (Tons Per Acre)	100-Hour Fuel Load (Tons Per Acre)	100-Hour Fuel Load-90% CI (+/-) (Tons Per Acre)
Hardwood	16	1.9	0.3	0.06	0.01	0.3	0.2	0.6	0.4
Hardwood-Pine	2	1.4	0.3	0.06	0.05	0.4	0.7	0.0	0.0
Pine	30	2.0	0.2	0.04	0.01	0.4	0.1	0.6	0.3
Pine-Hardwood	16	1.9	0.2	0.04	0.01	0.4	0.2	0.5	0.3
All Vegetation Types	64	1.8	0.1	0.05	0.01	0.4	0.1	0.6	0.2

TABLE 7B
Summary of 1,000-Hour[1] Sound Material, 1,000 Hour Rotten Material, Litter, Duff, and All Fuel Types Combined with 90 Percent Confidence Interval by Vegetation Type – NWA

Vegetation Type	Number of Transects	1,000-Hour Sound Material Fuel Load (Tons Per Acre)	1,000-Hour Sound Material Fuel Load-90% CI (+/-) (Tons Per Acre)	1,000-Hour Rotten Material Fuel Load (Tons Per Acre)	1,000-Hour Rotten Material Fuel Load-90% CI (+/-) (Tons Per Acre)	Litter (Tons Per Acre)	Litter-90% CI (+/-) (Tons Per Acre)	Duff (Tons Per Acre)	Duff-90% CI (+/-) (Tons Per Acre)	All Fuel Types Combined (Tons Per Acre)	All Fuel Types Combined-90% CI (+/-) (Tons Per Acre)
Hardwood	16	0.5	0.7	1.0	0.1	2.2	0.4	1.4	0.6	5.2	1.2
Hardwood-Pine	2	0.0	0.0	0.0	0.0	1.8	0.2	2.9	0.0	5.1	0.5
Pine	30	1.0	0.8	1.8	0.8	2.1	0.2	4.2	0.6	10.1	1.4
Pine-Hardwood	16	2.8	3.9	0.8	0.7	2.1	0.2	3.3	0.5	8.3	2.0
All Vegetation Types	64	1.3	1.0	1.0	0.4	2.1	0.1	3.2	0.4	7.1	1.2

[1]Dead fuel moisture responds to ambient environmental conditions and is critical in determining fire potential. Dead fuel moistures are classed by timelag. A fuel's timelag is proportional to its diameter and is loosely defined as the time it takes a fuel particle to reach 2/3 of its way to equilibrium with its local environment, i.e. lose 66% of its current moisture content. There are four timelag classes:
1-hour: Less than 0.25 inch diameter, fine fuels that respond quickly to weather changes.
10-hour: 0.25-1 inch diameter
100-hour: 1-3 inch diameter
1,000-hour: 3-8 inch diameter.

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3.5.2 Fire Breaks

The Installation has many roads, agricultural fields, and administrative sites which can be a barrier to fire spread. The bottom land hardwood forests will provide a barrier to fire spread as long as water levels are up. Records indicate that fire breaks and fuel breaks were at one time used frequently across the Installation to support the prescribed fire work. There are mowed trails for hunting unit access that can be improved to use as fire breaks. Establishing some permanent fire breaks, in association with the roads will provide further protection from an unwanted fire coming on or leaving the Installation.

3.5.3 Unexploded Ordnance (UXO)

The Installation covered by this plan may contain unexploded ordinance (UXO) materials. Therefore, certain areas have been designated as "no suppression zones." In these areas, suppression activities are limited to using and maintaining existing roads as firebreaks. Personnel will not suppress fire using engines, tractors, or hand tools in any designated "no suppression zone".

It is essential that firefighting operations within or near areas that are known or suspected to contain military munitions (e.g., unexploded ordnance) be planned with consideration of explosives safety. This is equally true where military munitions operating facilities (e.g., current of former production facilities, demilitarization facilities) exist. The local explosives safety specialists, bomb squad, or nearest military explosives ordnance disposal (EOD) unit should be contacted and used as a resource.

Recognizing and taking action to mitigate the potential hazards (explosive and/or chemical agent) associated with military munitions that may be present is paramount to reducing the risk of serious injury or loss of firefighting resources when fighting fires that may potentially involve military munitions.

The ability to recognize military munition is the first and most important step in reducing the potential risks associated with UXO. The below military munitions are likely to be encountered as UXO or DMM on operational ranges or property (e.g., FUDS) formerly used by the DoD for live-fire training or testing or military maneuvers. The potential explosives hazards from munitions vary based on a number of factors. Although the explosives hazards associated with small arms ammunition - defined as ammunition, without projectiles that contain explosives (other than tracers), that is .50 caliber or smaller, or for shotguns - are considered minimal they should not be ignored. Any munitions encountered should be considered UXO and extremely dangerous.

UXO can be found in many different ways (e.g., on the surface, partially buried in soil or partially submerged under water, or buried or fully submerged) and in many different conditions (e.g., rusty and crusted, like new, in parts). The location and condition of the munitions found on a site depends in part on the type munitions used, the weapon systems employed, how the munitions were used (e.g., training or the geology and environmental conditions of the of the area, and activities that may have taken place on the property since DoD last used the site.

UXO may be found fully intact or in parts or fragments. All UXO, whether intact or in parts, presents a potential explosion hazard and should be treated as such. Even UXO that have deteriorated present a significant explosives hazard. In addition, these munitions can also present

an environmental hazard because munitions constituents, like their fillers (e.g., RDX, HMX, TNT), could become exposed.

EXPLOSIVES SAFETY MEASURES: Whether present in an area by design or by accident, UXO poses potential risks of injury or death. Remember the following:

- If you did not drop it, do not pick it up or disturb it!
- Do not enter an area known or suspected to contain munitions. All munitions, whether intact or in fragments, present a potential explosive hazard.
- If you encounter or suspect you may have encountered a munition, stop, and scan the area for additional munitions. Do not move closer.
- Never touch, move, or disturb a munition or suspect munition.
- If time permits, clearly mark the area where munitions were encountered. Do not mark the munition.
- Do not attempt to fight fires in areas known or suspected to contain munitions.
- Report the discovery of munitions to your immediate supervisor or the incident commander as soon as possible!
- Do not use radios or cell phones within 100 feet of areas known to contain munitions, unless specifically authorized or in an emergency.

3.6 FIRE MANAGEMENT UNIT SPECIFIC DESCRIPTIONS

A Fire Management Unit (FMU) is simply an area of similar fuels, weather and topography where fire can be managed in the same manner. Lands within an FMU are geographically proximal to each other. In the case of this WFMP, this Installation is considered its own FMU. Therefore, there is one FMU described in the plan. Fuels maps, firebreak maps, and vegetation maps can be found in Appendix A.

4.0 WILDLAND FIRE OPERATIONAL GUIDANCE

4.1 MANAGEMENT OF WILDFIRES

4.1.1 Preparedness

In order to be prepared for the unexpected, natural resource staff and fire and emergency services personnel should be trained and have wildland fire experiences. Preparedness is defined as activities that lead to a safe, efficient, and cost-effective fire management program in support of land and resource management objectives through appropriate planning and coordination. Some examples of preparedness are: pre-season wildfire planning with state and local coordinators, Wildland Urban Interface (WUI) assessments, such as FIREWISE, review of agreements and MOUs, and initial response planning.

NSAHR NWA contains varying fuel types that react differently under different drought conditions. Drought index, energy release component, and water levels can be used as measurable objective figures to indicate an appropriate preparedness level. Due to the vast area of hardwood swamp and flatwoods, drought will play a role in the establishment of a large fire. These areas can and will burn under unusually dry periods, as the fires of Great Dismal Swamp NWR did in 2008 and 2011. Ignition component, season, national and regional fire activity, and other circumstances are also considered in preparedness decisions.

Ignition sources for wildland fire at this Installation includes but is not limited to, range/training fires, equipment fires, human cause, and lightning. Ignition sources vary by season since temperature, lightning activity, rainfall, relative humidity (RH), fuel moisture content, and curing stage of live fuels vary seasonally. Although lightning is not an important ignition source, lightning fires may occur more frequently during the Atlantic storm season from May through August, and range/training caused fires may occur year-round.

4.1.2 Fire Danger Indices

Fire danger indices correlate weather, fuel moisture, amount of fuel, fuel type, and topography data to potential for a fire to start, spread, and its intensity. Two indices we will look at are Energy Release Component (ERC) and Burning Index (BI). ERC serves as a good characteristic of local seasonal fire danger trends resulting from the area's fuel moisture conditions. BI reflects the changes in fine fuel moisture content and wind speed. This index is highly variable on a daily basis. The Keetch-Byram Drought Index (KBDI) is included in the report to provide a view of local and regional drought. The KBDI is a daily value representing the water balance where yesterday's drought index is balanced with today's drought factor. The KBDI index ranges from 0-800, which represents a soil moisture level in the first 8 inches of soil. Zero being saturated and 800 extremely dry. These indices provide a range from extreme to low fire potential. As an example; the local ERC is reaching the 95 percentile and the BI is forecast to reach 40. This indicates a fire that ignites will burn intensely and with the high BI spread quickly. When reviewed together they form trends that can define fire seasons. These trends can also help define the Installation's wild land fire readiness and/or determine levels when military missions may cause a fire. These charts are in Appendix D.

4.1.3 Training & Safety

1. All civilian, contractor, and emergency services personnel involved in wildland fire management must be trained for their expected level of involvement in the wildland fire organization. Training shall meet the applicable NFPA or NWCG Standards for wildland fire activities. State training by the state in which the Installation is located is also acceptable if appropriate for the employee's expected level of involvement in wildland fire activities.
2. Personnel in the natural resources job series (GS-401 thru GS-499), cultural resources (GS0193), and natural/cultural resources contractors with jobs requiring certifications as per references NFPA 1051 and NFPA 1002, or the equivalent NWCG Wildland Fire Qualification System Guide (PMS 310-1/NFES 1414) certifications.
3. Personnel are mobilized to participate in wildland fire management activities on Federal properties not under DoD jurisdiction, through their local dispatch, then the state Geographic Coordination Center (GACC) and then through NICC.
4. Military personnel can be mobilized through the DOI, USDA, and DOD Interagency Agreement. NICC will place all Requests for Assistance (RFAs) for DoD assets to the US Northern Command (USNORTHCOM) in Colorado Springs, CO. The RFA will include a fiscal code for DoD use. The purpose of the Interagency Agreement for the Provision of Temporary Support During Wildland Firefighting Operations among the United States Department of the Interior, the United States Department of Agriculture, and the United States Department of Defense is:

   • To establish the general guidelines, terms and conditions under which the National Interagency Fire Center (NIFC) will request, and DOD will provide, temporary support to NIFC in wildfire emergencies occurring within all 50 States, the District of Columbia, and all U.S. Territories and Possessions, including fires on State and private lands. It is also intended to provide the basis for reimbursement of DOD under the Economy Act.

This agreement and others can be found at: https://www.nifc.gov/nicc/logistics/references.htm.

Several national requirements, including the National Wildfire Coordinating Group (NWCG) Qualifications Guidelines (310-1), are in place to aid the conduct of safe operations. All firefighters must have the training and experience for their positions and equipment they operate. All personnel will be issued fire-resistant clothing, a hard hat with chinstrap, fire shelter, leather gloves, eye protection, and hearing protection. Personnel must use the appropriate Personal Protective Equipment (PPE) in conjunction with their assigned task.

Leather boots which are a minimum of 8 inches tall and have lug soles are also required for wildland firefighters but are not issued as standard equipment.

4.1.4 Wildland Fire Incident Management

The Chief, Fire and Emergency Services or their designee will be the initial attack incident commander for every fire on the base. This initial attack incident commander will then be responsible for managing the fire and ordering additional resources as needed. All incident functions will follow the Incident Command System (ICS). Additional resources may be provided from cooperating agencies through a Memorandum of Understanding (MOU) or Memorandum of

Agreement (MOA). These MOU or MOA are the tool for ordering and paying outside resources. If a fire were to get established in the swamp or flatwoods, heavy equipment would be needed to contain the spread. This would be another use of the agreements. It is important to review these annually. See Appendix B.

To facilitate the use of naturally occurring wildfires to meet fuels management objectives the Incident Commander may utilize barriers such as roads, waterways, and previously burned areas to contain fires. Utilizing this strategy will allow firefighters to more safely manage wildfires.

4.1.5 Wildland Fire Aviation Management

Any fire-related aviation operations will follow applicable guidelines of the Navy and Federal/State interagency operations and guidelines.

4.1.6 Wildfire Detection

Wildfires are typically reported via detection from Installation personnel, aircraft or the control towers. Private Citizens may call in a wild fire through the 911 system.

4.1.7 Initial Report of Wildfire and Initial Attack (Response) Dispatching

Fire reporting is accomplished by calling 911. The Installation dispatcher will then dispatch a response for the wildfire.

4.1.8 Incident Commander Responsibilities (for all incident types)

All wildfires will be supervised by a qualified incident commander (IC). The IC is a single individual responsible for all incident activities, including the development of incident management strategies and tactics, and the ordering, deployment, and release of resources. The IC is responsible to:

- Provide a fire size-up to dispatch as soon as possible upon arrival on scene. A size-up consists of: location, size, status (growth and direction), weather conditions on-site, best access route, special hazards or concerns, additional resource needs (law enforcement, medical, etc.). (2016 Incident Response Pocket Guide)
- All Incident Commanders will file an incident report.
- Assess potential management by suppression and/or by wildfire for resource benefits as incident objective(s).
- Use guidance in this WFMP. Secure a Delegation of Authority, for non-Navy Incident Commanders (2016 Redbook), to implement the selected suppression response and manage an organization to implement effective strategies and tactics. Minimize suppression impacts where possible without reducing the effectiveness of the actions being undertaken.
- Determine resource needs and order as needed through a local dispatch.
- Ensure all resources assigned and those incoming receive a briefing. Document these briefings. Refer to the Briefing Checklist in the IRPG.

- Continually re-assess incident complexity using the checklist in the IRPG. When a more qualified IC is needed, inform dispatch and Fire Chief and place the order for a higher level IC.
- Depending on incident complexity, additional responsibilities for the IC may apply. Utilize the National Wildfire Coordination Group (NWCG) Fireline Handbook for a more detailed description of IC responsibilities.
- All resources, including mutual aid resources, will report to the IC (in person or by radio) to receive an incident briefing prior to tactical assignment deployment.
- All wildfires must be investigated to determine fire cause. Use of Navy or cooperator investigators is recommended. Document findings, determine if negligence or criminal intent were factors.

4.2 MANAGEMENT OF PLANNED FUELS TREATMENTS

4.2.1 Fuels Management

Fuels Management is the use of prescribed fire and non-fire techniques to manipulate fuel hazards to a lower burning intensity for manageability and ecological diversity.

In the arena of fire protection, prescribed fire is the major tool to be used to manage wildland fuels for the Installation. Due to the robust vegetation types combined with a 6-month growing season and high rainfall amounts, fuels management is an ongoing fire program concern.

The *Interagency Prescribed Fire Planning and Implementation Procedures Guide* is the guiding document for writing prescribed fire plans. The Interagency Prescribed Fire Plan Template will be used for all prescribed fire plans on this Installation. The template can be found in the Interagency Prescribed Fire Plan Guide. A Prescribed Fire Plan for the Installation is provided as Appendix C of this document.

4.2.2 Processes used to identify fuels treatments

Fuels treatments on the Installation will be identified by the Installation NRM. Factors used to make these determinations include: site inspections, input from NSAHR NWA staff, fuel loads, fuel mapping, clear zone management needs, time since last burned, species habitat management guidelines and other pertinent information that is needed to make determinations.

4.2.3 Prescribed Fire Program

NSAHR NWA currently does not have an active prescribed fire program. There are records indicating prescribed burns were planned in the 80's, as forest management practices, and also as recently as 2007-2009. It is the intent of the natural resource program to re-initiate this program with an average of 5-10 percent of the burnable fuels treated yearly. It is recommended that initial prescribed burning be accomplished in the dormant or winter time due to heavy fuel loading. Once an area has received a cool season burn it can be setup for a growing season burn.

Fire is considered an important element of several native ecosystems in the southeastern U.S. and although there is a low level of risk for wildland fire at NSAHR NWA, controlled burning is used

as a natural resources management tool. Conducting controlled burns is a cost-effective, practical method of controlling or manipulating vegetation.

At NSAHR NWA it is used to:

- reduce hazardous fuel accumulation,
- prepare sites for seeding and planting,
- control hardwood competition in pine stands,
- maintain vegetation height restrictions in the ROTHR and Helicopter Landing Pad,
- maintain grasslands and other early successional habitat,
- improve wildlife habitat, and
- Aid in the control of select invasive species.

All prescribed burns on the Installations will be conducted under the supervision of a Virginia or North Carolina State Certified Burn Manager.

Prescribed burns are commonly used to reduce slash and expose mineral soils in preparation for seeding or planting in pine plantations. In pine stands in particular, high levels of forest fuels pose a serious threat of wildfire and may accumulate in only a few years. There is no set time interval for reducing hazardous fuels; however, a burning rotation of 3 to 5 years is generally utilized throughout the southeast. Tolerance to heat intensity, smoke management, risks, and desired understory composition should serve as guides for determining burning intervals. As the primary objective in prescribed burning is to reduce hazardous fuels, it is only necessary to break up the fuel continuity, and not to achieve 100% coverage of the area. The resulting patchwork of unburned areas also is beneficial to wildlife. However, the fuel buildup in unburned areas can cause hot spots in future burns and must be closely observed.

Encroachment of understory hardwoods in pine stands may crowd out or suppress pine seedlings. The resulting competition for water and nutrients may significantly lower growth rates of the overstory and result in an undesirable species composition. Burning is most effective at controlling hardwoods that are less than 3 in (8 cm) in diameter at ground level. To best control woody growth, burns should be conducted in the growing season after hardwood species have put their reserved energy into leaf growth. It has been found that, although in some cases, one or two summer burns can completely eliminate hardwood competition, winter burns often do little to affect hardwood growth and early spring burns result in dense, hardwood undergrowth. Summer burns also have a greater potential to damage the residual pines and must be used with caution. There has been a great deal of research on fire's influence on the development of oak forests, and it is seen as a potential tool for eliminating less desirable understory hardwoods. Frequent burning to eliminate or damage mast-producing species and burning bottomland hardwoods should be avoided. Frequent fires (intervals of less than five years) can be used to improve habitat conditions for a number of wildlife species. The production of herbaceous growth sharply increases during the first growing season following a prescribed burn and gradually decreases over the next 2 to 4 years. Understory structure and composition also can be permanently altered by frequent prescribed fires and should be monitored.

Frequent fires tend to favor annual species by eliminating competing perennial vegetation and can increase the occurrence of invasive exotic species. Bermuda grass *(Cynodon dactylon)*, sericea lespedeza *(Lespedeza cuneata)*, and spotted knapweed *(Centaurea maculosa)* are non-native invasive species that invade burned sites and should be watched for. The US Forest Service, Fire Effects Information System describes the effects of fire on a number of plant and wildlife species and habitat types across the US.

A portion of the Installation(s) lands support fire dependent ecosystems. The application of fire is essential to their continued existence of these fire dependent ecosystems. The following fire management strategies will be used as prescribed fire management on Installation lands.

- Hazardous fuel reduction treatments will be used where the fuel loading and environmental conditions present a hazard to life, resources, property, the Navy mission, or threatened and endangered species and their habitats.
- Where possible and desirable, prescribed fires will simulate the natural fire season. Historically, most of the lightning-ignited fires occurred during the late spring and throughout the summer season. Ultimately, some portion of the annual prescribed fire program accomplishment will be during these months.
- Prescribed fire will be used in conjunction with other resource management activities to restore vegetation in fire dependent ecosystems. Where possible and desirable, prescribed fires will simulate the natural fire frequency and severity and in some cases, will involve mechanical or herbicide treatment of vegetation prior to burning.

4.2.4 Project Planning

All prescribed fire activities from planning through implementation will be done following guidance from Virginia Department of Forestry or North Carolina Forest Service or both and the Interagency *Prescribed Fire Planning and Implementation Procedures Guide.* The first step in planning a prescribed fire is defining the objectives of the prescribed fire.

Once objectives are identified, areas or units that fit the identified objectives are listed. The final identification of areas to burn the next year or two should be an interdisciplinary process. The development of the PFP should include field visits, burn unit map preparation, pre-burn preparation required, the size and makeup of the burning crew, smoke management screening, and monitoring of the effects of prescribed fire, review of the unit's fire history, fuel loading and type will be recorded, fire behavior, and coordination with other internal and external partners.

The approval process involves a technical review by the Installation NRM and approval by the CO.

Prescribed fire plans and their implementation will generally be based on established areas. These maybe hunting units, military mission areas, air field clearance zones, or other clearly delineated area.

Maintenance of firebreaks around each burn unit to protect adjacent land is an important part of controlled burning. Firebreak maintenance or construction must be conducted prior to ignition. Cool season, and if necessary growing season, prescribed burns will be conducted on NSAHR NWA on a 1 to 5-year rotation to maintain grasses and low shrubs in a state of compliance for ROTHR and other Communication Systems, and Helicopter Landing Pad safety clearance

requirements. Prescribed burns would only be conducted by trained and experienced personnel. Proper evaluation of fire conditions and detailed planning will be conducted each time a burn is set. The Natural Resources Specialist is the proponent for all aspects of prescribed burning on the station.

In Virginia there is a 4pm law that limits burning after 4pm from February 15, to April 30. The 4:00 p.m. Law § 10.1-1142 B shall not apply if:

1. The fire is set for "prescribed burning" that is conducted in accordance with a "prescription" and managed by a "certified prescribed burn manager" as those terms are defined in § 10.1-1150.1;
2. The burn is conducted in accordance with § 10.1-1150.4;
3. The State Forester has approved the application for the prescribed burn; and
4. The burn is being conducted for one of the following purposes:
    i. control of exotic and invasive plant species that cannot be accomplished at other times of the year;
    ii. wildlife habitat establishment and maintenance that cannot be accomplished at other times of the year; or
    iii. management necessary for natural heritage resources. The State Forester may on the day of any burn planned to be conducted pursuant to this subsection revoke his approval of the prescription for the burn if hazardous fire conditions exist. The State Forester may revoke the certification of any certified prescribed burn manager who violates any provision of this subsection.

North Carolina has similar prescribed burning legislation in regard to certified burner, burn permit, smoke management, developing a burn plan and other considerations. These requirements can be found here:

http://www.ncga.state.nc.us/EnactedLegislation/Statutes/HTML/ByArticle/Chapter_106/Article_80.html

All burn units designated for growing season fires will receive at least one dormant season prescribed fire prior to a growing season prescribed fire. It is recognized that maintaining fire frequency is a higher priority to seasonality, if conditions do not warrant growing season burns.

4.3 AIR QUALITY AND SMOKE MANAGEMENT

4.3.1 Prescribed Fire Smoke Management

The Installations must comply with National and State regulations concerning air pollution. To do this, the Base must take action to manage human exposure to smoke from both prescribed burns and wildfires by minimizing impacts and maintaining air quality.

4.3.2 Federal Regulations Smoke Management

The most important Federal Regulation concerning smoke management on Installations is the Clean Air Act (42 USC (USO) 7401). The specific areas of concern to fire managers are Class 1

Air sheds and Non-Attainment areas. There are no Class 1 air sheds or Non-Attainment areas within the area managed under this plan.

4.3.3 State Regulations Smoke Management

The appropriate Fire Departments and Department of Environmental Quality officials will be notified on the day of the prescribed burn. There are no Virginia state requirements for particulate emissions at this time, nor any permitting process for federal land management agencies. Unless conditions are unusual, burning authorizations are granted between 0900 and one hour after sunset for State Certified Burn Managers. The state requires that visibility remain above 500 ft on highways. It does not have any regulations at the present time that limit the total number of prescribed burns in an area, nor the total amount of particulates that are in the air at one time.

4.3.4 Smoke Management Goals

In general terms, the goals of smoke management on the Installations are to manage both prescribed fires and wildfires in such a manner as to cause minimum smoke impact to the surrounding areas. Specifically, these goals would be:

- Each Burn Area will specify required conditions upon which burning may take place to minimize impacts to identified downwind sensitive smoke receptors (Table 2). These sensitive targets include hospitals, nursing homes; interstate or other major highways, schools, and heavily populated areas.
- Target areas around NSAHR NWA include, antennas, roadways, buildings, the IAMS range, and neighborhoods north of the Installation on Ballahack Road.
- Endeavor to keep smoke episodes less than twenty-four hours in duration.

4.3.5 Smoke Planning

The *Smoke Management Guide for Prescribed and Wildland Fire* (NWCG, NFES 1279, PMS 420-1, 2001) and Virginia Smoke Management guidelines are used to guide the NSAHR NWA smoke management activities.

To assist in the smoke management planning process, the major smoke sensitive areas will be identified prior to each prescribed fire. Smoke plume directions are plotted on burn maps and the direction that causes the least impact is chosen. This map is normally printed the morning before the Pre-Burn briefing to assist in making the GO/NO GO decision. Dispersion indices, ventilation rates and dispersion categories are listed below.

Dispersion Index Value	Interpretation
≥101	Very Good
61 to 100	Good
41 to 60	Fair to Good
21 to 40	Fair
13 to 20	Fair to Poor
7 to 12	Poor
1 to 6	Very Poor

Ventilation Rate (ft mph)	Associated Burn Category
0 to 33,499	1
33,500 to 44,999	2
44,500 to 59,999	3
60,000 to 111,999	4
≥112,000	5

Surface Wind (mph)	Associated Dispersion Category
Near Calm	Stagnant
2 to 4	Very Poor
6 to 8	Poor
9 to 12	Fair
≥13	Good

4.3.6 Prescribed Fire Operations Related to Smoke

A test fire will be ignited at the beginning of each prescribed fire to determine if objectives, including smoke management can be met. The fuels for the test fire should be representative of the burn unit, and the area ignited should be of sufficient size to give a good indication of smoke plume direction and dispersal.

The smoke generated by the fire will be monitored throughout the prescribed fire. If the prescription parameters for smoke management are exceeded, steps to mitigate impacts are taken. Depending on the situation, these measures could include varying the firing technique, initiating traffic control or shutting down the burn.

4.4 PROJECT IMPLEMENTATION

Implementation will follow least risk, due to weather, fuels, and available resources logic. While some areas will be a higher priority, at no time will we take undue risk to accomplish any prescribed burns.

During the time between the approval of the Prescribed Fire Plan and the actual burn day, preparation activities such as maintaining the necessary control lines or preparing the vegetation powerlines, around facilities will be completed.

The environmental staff can monitor the fire weather and National Fire Danger Rating System (NFDRS), through the VDOF website. Remote Automated Weather Station (RAWS) may be ordered and used year around. On burn day, general zone weather forecasts and a spot weather forecast for the burn area will be obtained from the Virginia National Weather Service Office. Weather conditions can also be obtained from the Great Dismal Swamp National Wildlife Refuge, or NAS Oceana Air Operations Tower.

4.4.1 Prescribed Fire Notifications

Prior to the ignition of any prescribed fire, the appropriate organizations will be notified. The security forces office is also notified. A complete list of notifications is included within each prescribed fire plan.

4.4.2 Procedures for Escaped Prescribed Burn

- Begin the suppression response as soon as the prescribed fire has left the determined prescribed fire area or beyond the contingency parameters.
- Leave personnel to manage the prescribed fire, while the qualified and delegated personnel are suppressing the escaped prescribed fire.
- Notify the Installation Fire Chief, and Dispatch office
- Take photos if possible.

4.4.3 Conversion of a Prescribed Fire to a Wild Fire

When a prescribed fire burns outside the planned burn unit boundary and cannot be mitigated by implementing the contingency plan in the prescribed fire burn plan, it may be converted to a wildfire. Similarly, a prescribed fire that is still within a burn unit boundary, but outside prescription parameters and not meeting objectives, may be converted to a wildfire.

A wildfire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in military mission, fuels, weather, topography, varying social understanding and tolerance, and involvement of other governmental jurisdictions having different missions and objectives.

Managers will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for these decisions.

Site-specific treatment objectives are developed to guide project operations. Prescribed fire objectives describe what a treatment must accomplish in order to meet a resource management objective.

The converted wildfire will be transferred from a Prescribed Fire Burn Boss to a qualified Incident Commander.

4.5 PREVENTION

During times of elevated fire danger the Installation Fire Chief, in coordination with other programs may issue temporary restrictions on outdoor fires. Along with providing fire prevention messages and materials to Installation users.

Prevention education should be stressed to all users of the Installations during periods of high fire danger. Virginia fire prevention materials can be found at:
http://www.dof.virginia.gov/fire/firewiseva/index.htm.

5.0 MONITORING AND EVALUATION

The intent of this section is to document processes for determining whether the WFMP is being implemented as planned and fire–related goals and objectives are being achieved. Information obtained from monitoring and evaluation is used to update the FMP and land management plans.

WFMPs will be reviewed annually and updated as outlined in the national WFMP review process. The Installation Commander and the Installation NRM or representative is responsible for reviewing the WFMP and determining required updates needed annually. Revisions of WFMPs will be required during the completion of a new (or significantly revised) INRMP.

6.0 REFERENCES

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National Weather Service, 2015 State of Virginia Fire Weather Services Plan and AOP

Scott, Joe H., and Robert E. Burgan. 2005 *Standard Fire Behavior Fuel Models: A Comprehensive Set for Usewith Rothermel's Surface Fire Spread Model.* General Technical Report RMRS-GTR-153. Rocky Mountain Research Station

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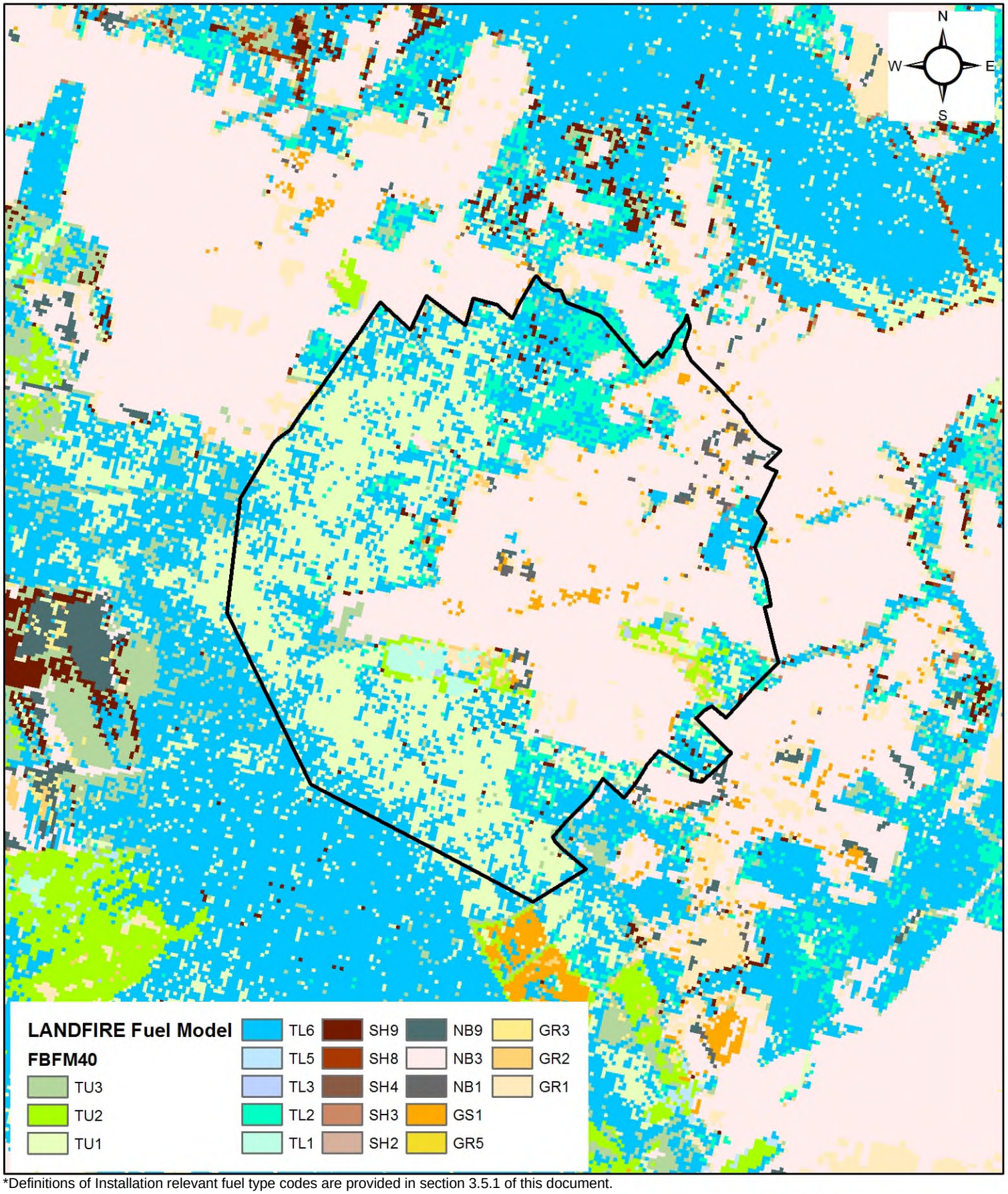
APPENDIX A. ADDITIONAL INSTALLATION MAPS

1. NSAHR NWA Fuels Map
2. NSAHR NWA Roads Map
3. NSAHR NWA Vegetation Map

Northwest LANDFIRE Scott & Burgan Fuel Models

Source: USGS Landfire Data Distribution Website: https://landfire.cr.usgs.gov/viewer/viewer.html. Accessed: October 2016



*Definitions of Installation relevant fuel type codes are provided in section 3.5.1 of this document.

0 0.5 1 2 3 4 Miles

Legend

- Road Centerline
- Stream
- Common Reed
- Pinus Taeda
- Water Body
- Installation

N

BALLAHACK RD
CARDINAL LN
NORTHWEST BLVD
OLYMPIC RD
WILDERNESS RD
LUNKER LN
LAGOON LN
CASTEEN ROAD
DOUGLAS A MUNRO ROAD
RELAY RD
FARMHOUSE RD
MAINTENANCE RD
DUSTY ROAD
RANGE RD
SHOTGUN RD
CAROLINA ROAD

ESRI 2011 Bing Aerial

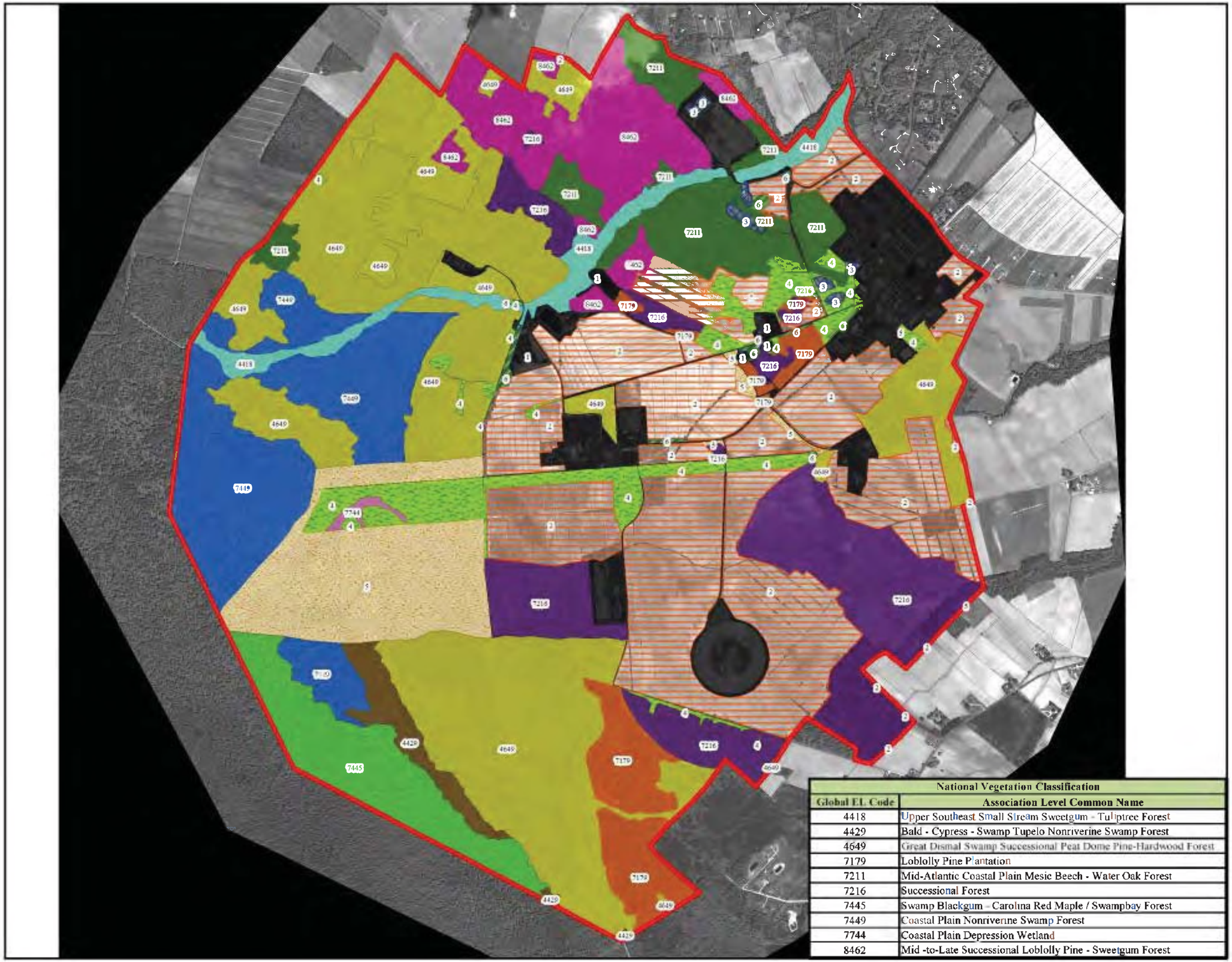
0 1,000 2,000 4,000 Feet

TETRA TECH

URBAN FORESTRY
NSAHR NORTHWEST ANNEX
CHESAPEAKE, VIRGINIA
CURRITUCK, NORTH CAROLINA

FILE	112G06000.0014	SCALE	AS NOTED
FIGURE NO.		REV	DATE 1/27/2016

G:\GIS_files\Nor-VB\MapDocs\UrbanForestry\NorthwestNorthwest_veg.mxd MC



National Vegetation Classification	
Global EL Code	Association Level Common Name
4418	Upper Southeast Small Stream Sweetgum - Tuliptree Forest
4429	Bald - Cypress - Swamp Tupelo Nonriverine Swamp Forest
4649	Great Dismal Swamp Successional Peat Dome Pine-Hardwood Forest
7179	Loblolly Pine Plantation
7211	Mid-Atlantic Coastal Plain Mesic Beech - Water Oak Forest
7216	Successional Forest
7445	Swamp Blackgum - Carolina Red Maple / Swampbay Forest
7449	Coastal Plain Nonriverine Swamp Forest
7744	Coastal Plain Depression Wetland
8462	Mid -to-Late Successional Loblolly Pine - Sweetgum Forest

Legend

NSAHR NWA Installation Area

Land Cover

- 1 - Urban
- 2 - Agriculture
- 3 - Recreation
- 4 - Non-NVC Herbaceous
- 5 - Non-NVC Shrub
- 6 - Non-NVC Forest

National Vegetation Classification

Global EL Code (Association Level)

- 4418
- 4429
- 4649
- 7179
- 7211
- 7216
- 7445
- 7449
- 7744
- 8462

*For higher resolution image, please refer to NSAHR Northwest Annex INRMP, Appendix E.

N

0 500 1,000 2,000 Feet

0 150 300 600 Meters

Vegetation Classification Mapping at NSAHA NWA, Chesapeake, Virginia

Date: 12/2013

Source: Digital Globe Imagery 2010, Navy 2012, and Tetra Tech 2013.

Coordinate System: World Geodetic System 1984
Universal Transverse Mercator, Zone 18, North, Meters

APPENDIX B. MEMORANDUM OF UNDERSTANDING/MUTUAL AID AGREEMENTS

1. Currituck County (2010)
2. City of Chesapeake (2012)

MUTUAL AID AGREEMENT
BETWEEN
PROGRAM DIRECTOR, REGIONAL PUBLIC SAFETY
NAVY REGION MID-ATLANTIC
1510 GILBERT STREET, NORFOLK VA 23511
AND
CURRITUCK COUNTY, NORTH CAROLINA
153 COURTHOUSE ROAD, CURRITUCK, NC 27929
FOR THE PROVISION OF FIRE FIGHTING & EMS ASSISTANCE

THIS MUTUAL AID AGREEMENT (hereinafter, the "Agreement") is made and entered into this 21st day of December, 2009 by and between Program Director, Regional Public Safety, Navy Region Mid-Atlantic (hereinafter, "Navy"), Currituck County Department of Fire-EMS by the authority of the County Manager, Currituck County North Carolina for fire fighting and emergency medical services (EMS) assistance (hereinafter, "Currituck County").

WITNESSETH:

WHEREAS, each of the Parties hereto maintains equipment and personnel for the suppression of fires, emergency medical services calls, hazardous materials incidents and any other related emergency incidents occurring within areas under their respective jurisdictions, and

WHEREAS, as set forth in 42 U.S.C. 1856 the term 'fire protection' includes personal services and equipment required for fire prevention, the protection of life and property from fire, fire fighting, and emergency medical services, including basic medical support, basic and advanced life support, hazardous material containment and confinement, and special rescue events involving vehicular and water mishaps, and trench, building, and confined space extractions.

WHEREAS, the Parties hereto desire to augment the fire protection, and hazardous material response capabilities available in their respective jurisdictions by entering into this Agreement, and

WHEREAS, the lands or districts comprising the respective jurisdictions of the Parties are adjacent or contiguous to one another such that the rendering of mutual assistance between the Parties in response to a fire, emergency medical event or hazardous material incident is feasible, and

WHEREAS, it is the policy of the Department of the Navy and the Program Director, Regional Public Safety, Navy Region Mid Atlantic, to enter into Mutual Aid Agreements with non-Federal Fire Departments located in the vicinity of a Naval installation, whenever practicable, and

WHEREAS, the Parties have mutually concluded that it is desirable, practicable, and beneficial for the Parties to enter into this Agreement to memorialize their willingness and ability to render assistance to one another, in order to enhance the safety and security of the civilian community and Navy Region Mid-Atlantic installations and facilities.

NOW, THEREFORE, BE IT AGREED THAT:

1. The authority to enter into this Agreement is set forth in 42 U.S.C. 1856a, and 15 U.S.C. 2210, and the regulations implementing same at 44 Code of Federal Regulations Part 151.

2. The rendering of assistance from one Party to the other under the terms of this Agreement shall be accomplished in accordance with detailed operational plans and procedures, which shall be developed by each of the Parties. The technical heads of each Party's Fire-EMS Departments shall work together to implement such plans and procedures in a manner compatible with the operational authorities of each.

3. The senior officer of a Fire-EMS Department belonging to a Party to this Agreement, or the senior officer of such Fire-EMS Department actually present at a fire, EMS or hazardous material incident, may request assistance under the terms of this Agreement from the other Party's Fire-EMS Department, whenever he/she deems it necessary to make such a request. The senior officer on duty of the Fire-EMS Department receiving a request for assistance shall forthwith take the following action:
    a. Immediately determine if the requested apparatus and personnel are available to respond to the call for assistance.
    b. In accordance with the terms of this Agreement, forthwith dispatch such apparatus and personnel, along with instructions as to their mission, use and deployment, in quantities and amounts as in the judgment of the senior officer receiving the call can be provided to the requesting Fire Department without

jeopardizing the mission of the Fire-EMS Department providing such resources.

4. The rendering of assistance under the terms of this Agreement shall not be mandatory; however, the Party receiving a request for assistance shall endeavor to immediately inform the requesting Party if the requested assistance cannot be provided and, if assistance can be provided, the quantity of such resources as may be dispatched in response to such request. Neither Party shall hold the other Party liable or at fault for failing to respond to any request for assistance or for failing to respond to such a request in a timely manner or with less than optimum equipment and/or personnel, it being the understanding of the Parties that each is primarily and ultimately responsible for the provision of fire suppression and hazardous material incident response needed within their own jurisdictions.

5. As required by Federal law as a condition precedent to entering into this Agreement, the Parties hereby waive all claims against the other Party for compensation of any loss, damage, personal injury, or death occurring in consequence of the performance of this Agreement.

6. Each Party hereby agrees that its intent with respect to the rendering of assistance to the other Party under this Agreement is not to seek reimbursement from the Party requesting such assistance. The Parties hereby recognize that pursuant to the Section 11 of the Federal Fire Prevention and Control Act of 1974 (15 U.S.C. 2210) and Federal regulations issued there under (Title 44 of the Code of Federal Regulations 151), Currituck County is permitted to seek reimbursement for all or any part of its direct expenses and losses (defined as additional fire fighting costs over normal hazard materials, emergency management and emergency medical services operational costs) incurred in fighting fires on property under the jurisdiction of the United States. Furthermore, under the authority of 42 U.S.C. 1856a, each Party hereby reserves the right to seek reimbursement from the other for the costs incurred by it in providing services to the other Party in response to a request for assistance.

7. The senior officer of the Fire-EMS Department requesting assistance shall normally assume full charge of the operations at the scene of the fire or other emergency. However, under procedures agreed to by the technical heads of the Fire-EMS Departments involved, a senior officer of the Fire-EMS

Department furnishing the assistance may assume responsibility for the coordination of the overall operations at the scene of the fire or other emergency.

8. The officers and personnel of the Fire-EMS Departments of the Parties to this Agreement are invited and encouraged, on a reciprocal basis, to frequently visit each other's activities for guided familiarization tours (consistent with local security requirements) and, as feasible, to jointly conduct pre-fire planning inspections, drills and training.

TRAINING:

9. Whenever either Party hosts fire protection training for its own Department ("Host Department") it may, to the maximum extent practicable and subject to its sole discretion, offer to provide the same training to members of the other Party ("Guest Department").

10. The Host Department will not charge the Guest Department for any training provided under the terms of this Agreement, unless it is a cost that cannot be covered by the Host Department such as, cost per student or cost of a certificate. Further, any such training will be provided on a space available basis only.

11. The Guest Department and/or its members will be solely responsible for the payment of any and all costs necessary for the Guest Department personnel to attend any training provided by the Host Department including, but not limited to, lodging, meals and travel.

12. This Agreement is entered into voluntarily by both Parties with no obligation on the part of either to provide such training to the other or, if such training is offered to the other Party, to participate in such training.

13. The Guest Department is responsible for ensuring that its members observe all rules, regulations, and guidelines established by the Host Department for training provided by the Host Department, as such rules, regulations and guidelines are made known to the Guest Department.

14. The Host Department reserves the right to deny training to any member of the Guest Department who does not meet the prerequisites necessary to attend the training which is

offered by the Host Department under the terms of this Agreement.

Execution of this Agreement:

15. This Agreement shall become effective upon the date annotated above, and shall remain in full force and effect until cancelled by mutual agreement of the Parties, or upon the provision of at least sixty (60) days advance written notice from the Party desiring to terminate this Agreement to the other Party. Upon becoming effective, this Agreement shall supersede all previous agreements between the Parties concerning the rendering of assistance from one to the other for the purposes stated in this Agreement.

County Manager
Currituck County, NC

JOHN C. P. FRISTACHI
Captain, U. S. Navy
Program Director, Operations (N3)
By Direction

MUTUAL AID AGREEMENT
BETWEEN
PROGRAM DIRECTOR, REGIONAL PUBLIC SAFETY,
NAVY REGION MID ATLANTIC
1510 GILBERT STREET, NORFOLK, VA 23511
AND
CITY MANAGER, CITY OF CHESAPEAKE, VA
304 ALBERMARLE DRIVE, CHESAPEAKE, VA
FOR THE PROVISION of FIRE FIGHTING ASSISTANCE

THIS MUTUAL AID AGREEMENT (hereinafter, the "Agreement") is made and entered into this 13th day of June 2012 by and between Program Director, Regional Public Safety, Navy Region Mid Atlantic, Norfolk, VA (hereinafter, "Navy"), and the City of Chesapeake, VA, for firefighting and emergency medical services (EMS) assistance (hereinafter, "City of Chesapeake").

WITNESSETH:

WHEREAS, each of the Parties hereto maintains equipment and personnel for the suppression of fires and response to hazardous materials incidents occurring within areas under their respective jurisdictions, and

WHEREAS, each of the Parties hereto maintains equipment and personnel for the protection of life and property from fire to include basic medical support, basic and advanced life support, special rescue events involving vehicular and water mishaps; and trench, building, and confined space extractions and,

WHEREAS, the Parties hereto desire to augment the fire protection and hazardous material response capabilities available in their respective jurisdictions by entering into this Agreement, and

WHEREAS, the lands or districts comprising the respective jurisdictions of the Parties are adjacent or contiguous to one another such that the rendering of mutual assistance between the Parties in response to a fire or hazardous material incident is feasible, and

WHEREAS, it is the policy of the Department of the Navy and the Program Director, Regional Public Safety, Navy Region Mid Atlantic, Norfolk, VA, to enter into Mutual Aid Agreements (MAA) with non-Federal Fire Departments located in the vicinity of a Naval installation, whenever practicable, and

WHEREAS, the Parties have mutually concluded that it is desirable, practicable, and beneficial for the Parties to enter into this Agreement to memorialize their willingness and ability to render assistance to one another, in order to enhance the safety and security of the civilian community and of the Regional Public Safety, Navy Region Mid Atlantic, and outlying installations and facilities.

NOW, THEREFORE, BE IT AGREED THAT:

1. Pursuant to 42 U.S.C. §1856a, DODI 6055.06, and OPNAVINST 11320.23F, the Parties enter into a Mutual Assistant Agreement (MAA) to provide personnel and equipment required for fire

prevention; the protection of life and property from fire; fire fighting and suppression to include emergency services, including basic medical support, basic and advanced life support; hazardous material containment and confinement; and special rescue events involving vehicular and water mishaps; and trench, building, and confined space extractions.

2. The senior officer of a Fire Department belonging to a Party to this Agreement, or the senior officer of such Fire Department actually present at a fire, EMS or hazardous material incident, may request fire fighting assistance under the terms of this Agreement from the other Party's Fire Department, whenever he/she deems it necessary to make such a request.

3. The requesting and rendering of assistance from one Party to the other under the terms of this Agreement shall be accomplished in accordance with detailed operational plans and procedures, which shall be developed by each of the Parties. The technical heads of each Party's Fire Departments shall work together to implement such plans and procedures in a manner compatible with the operational authorities of each. In the absence of more specific procedures, the Parties will generally proceed as follows:

    a. The senior officer on duty of the Fire Department receiving a request for assistance shall take the following actions:

        i. Immediately determine if the requested apparatus and personnel are available to respond to the call for assistance.

        ii. In accordance with the terms of this Agreement, forthwith dispatch such apparatus and personnel, along with instructions as to their mission, use and deployment, in quantities and amounts as in the judgment of the senior officer receiving the call can be provided to the requesting Fire Department without jeopardizing the mission of the Fire Department providing such resources.

    b. The senior officer of the Fire Department requesting assistance shall normally assume full charge of the operations at the scene of the fire or other emergency. However, under procedures agreed to by the technical heads of the Fire Departments involved, a senior officer of the Fire Department furnishing the assistance may assume responsibility for the coordination of the overall operations at the scene of the fire or other emergency.

4. The rendering of assistance under the terms of this Agreement shall not be mandatory.

    a. The Party receiving a request for assistance shall endeavor to immediately inform the requesting Party if the requested assistance cannot be provided and, if assistance can be provided, the quantity of such resources as may be dispatched in response to such request.

    b. Neither Party shall hold the other Party liable or at fault for failing to respond to any request for assistance or for failing to respond to such a request in a timely manner or with less than optimum equipment and or personnel, it being the understanding of the Parties that each is primarily and ultimately responsible for the provision of fire suppression and hazardous material incident response needed within their own

jurisdictions.

5. The officers and personnel of the Fire Departments of the Parties to this Agreement are invited and encouraged, on a reciprocal basis, to frequently visit each other's activities for guided familiarization tours (consistent with local security requirements) and, as feasible, to jointly conduct pre-fire planning inspections, drills and training.

6. Each Party hereby agrees that neither Party will seek reimbursement from the Party requesting such assistance, except insofar as costs incurred significantly exceed normal operating costs as demonstrated by documentary proof of un-programmed/unbudgeted/un-forecasted outlays and expenditures that were directly related to support provided under this MAA.

    a. Notwithstanding the preceding language, it is understood that, pursuant to 15 U.S.C. § 2210 and 44 C.F.R § 151, City of Chesapeake may file a claim with the Administrator of the Federal Emergency Management Agency for direct expenses and losses (which are additional firefighting costs over and above normal operating costs) incurred as a result of fighting fires on property under the jurisdiction of the United States.

7. As required by Federal law as a condition precedent to entering into this Agreement, the Parties hereby waive all claims against the other Party for compensation of any loss, damage, personal injury, or death occurring in consequence of the performance of this Agreement.

8. Independent of, and in addition to, any provisions of this Agreement, Program Director, Regional Public Safety, Navy Region Mid Atlantic, Norfolk, VA is authorized and has the discretion to render disaster relief or emergency assistance to preserve life and property in the vicinity of a DOD installation, when in the opinion of the installation commander, the assistance is in the best interest of the United States. 42 U.S.C. §§ 5121-5206; DOD 3025.1-M.

TRAINING:

1. Whenever either Party hosts fire protection training for its own Fire Department ("Host Department") it may, to the maximum extent practicable and subject to its sole discretion, offer to provide the same training to members of the other Party ("Guest Department").

2. The Host Department will not charge the Guest Department for any training provided under the terms of this Agreement, unless it is a cost that cannot be covered by the Host Department such as, cost per student or cost of a certificate. Further, any such training will be provided on a space available basis only.

3. The Guest Department and/or its members will be solely responsible for the payment of any and all costs necessary for the Guest Department personnel to attend any training provided by the Host Department including, but not limited to, lodging, meals and travel.

4. This Agreement is entered into voluntarily by both Parties with no obligation on the part of either to provide such training to the other or, if such training is offered to the other Party, to participate in such training.

5. The Guest Department is responsible for ensuring that its members observe all rules, regulations, and guidelines established by the Host Department for training provided by the Host Department, as such rules, regulations and guidelines are made known to the Guest Department. Neither Party shall hold the other Party liable or at fault for failing to respond to any request for assistance or for failing to respond to such a request in a timely manner or with less than optimum equipment and or personnel, it being the understanding of the Parties that each is primarily and ultimately responsible for the provision of fire suppression and hazardous material incident response needed within their own jurisdiction.

6. The Host Department reserves the right to deny training to any member of the Guest Department who does not meet the prerequisites necessary to attend the training which is offered by the Host Department under the terms of this Agreement.

Execution of this Agreement:

This Agreement shall become effective upon the date annotated above, and shall remain in full force and effect until cancelled by mutual agreement of the Parties, or upon the provision of at least sixty (60) days advance written notice from the Party desiring to terminate this Agreement to the other Party. Upon becoming effective, this Agreement shall supersede all previous agreements between the Parties concerning the rendering of assistance from one to the other for the purposes stated in this Agreement.

IN WITNESS WHEREOF, the parties hereto have made and executed this to the agreement on the respective dates under each signature. City of Chesapeake, VA through its City Council signing by and through its City Manager authorized to execute same by City Council action on the 13 day of June, 2012, and the Department of Navy signing by and through the Commanding Officer, Program Director, Regional Public Safety, Navy Region Mid Atlantic duly authorized to execute same on the 13 day of June, 2012.

nterim City Manager, Amar Dwarkanath
City of Chesapeake

MARK PATTERSON
Captain, U.S. Navy
Program Director
Regional Public Safety
Navy Region Mid-Atlantic

APPENDIX C. NSAHR NWA PRESCRIBED FIRE PLAN

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NAVFAC Atlantic Biological Resource Services

Contract: N62470-13-D-8016; Task Order: 0014

Final - September 2017

PRESCRIBED FIRE PLAN

NAVAL SUPPORT ACTIVITY HAMPTON ROADS-NORTHWEST ANNEX

CHESAPEAKE, VIRGINIA

CURRITUCK, NORTH CAROLINA

Prepared for:
NAVFAC Mid-Atlantic
Hampton Roads IPT 9742
Maryland Ave., Norfolk, VA 23511

Prepared by:
Tetra Tech, Inc.
2200 Wilson Blvd., Suite 400
Arlington, VA 22201

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ELEMENT 1[1]

This Prescribed Fire Plan (also referred to as burn plan throughout this document) for Naval Support Activity Hampton Roads- Northwest Annex (NSAHR NWA) has been prepared in accordance with regulations, standards, and procedures of the Department of Defense and the US Navy. The signatures below indicate approval of the Plan for Implementation.

PREPARED BY:

Natural Resources Specialist/Manager, NAVFAC MidLant PWD Hampton Roads, Environmental
(757) 433-3461 — **DATE**

REVIEWED BY:

Regional Natural Resources Specialist
NAVFAC MidLant PWD Hampton Roads, Environmental
(757) 341-0495 — **DATE**

REVIEWED BY:

Environmental Division Director, NAVFAC MidLant PWD Hampton Roads, Environmental
(757) 433-3437 — **DATE**

REVIEWED BY:

Public Works Officer, NAVSUPPACT NW
(757) 421-8801 — **DATE**

REVIEWED BY:

NAVSUPPACT NW Security Officer
(757) 421-8181 — **DATE**

REVIEWED BY:

Navy Region Mid-Atlantic Fire and Emergency Services
(757) 433-3258 — **DATE**

APPROVED BY:

Officer-in-charge, NAVSUPPACT Hampton Roads
(757) 421-8201 — **DATE**

APPROVED BY:

Commanding Officer, NAVSUPPACT Hampton Roads
(757) 836-1488 — **DATE**

DISTRIBUTION:

Executive Officer, NSAHR NWA
OIC, NSAHR NWA
Fire and Emergency Services, NSAHR NWA
Security Department, NSAHR NWA
Safety Department, NSAHR NWA
VDOF Local Forester

[1] *A burn plan "element" is a section of the prescribed fire plan consistent with interagency prescribed fire planning, with Element 1 being the signature page. Each element applies to all of the prescribed burn areas (or burn units) discussed in this document.*

Please sign below by respective department listing indicating you have reviewed this plan. Please review within one week of the date annotated by the Natural Resources Specialist line on the cover sheet of this plan.

Distribution:

Executive Officer, NSAHR NWA:

_____

OIC, NSAHR NWA:

_____

Fire and Emergency Services, NSAHR NWA:

_____

Security Department, NSAHR NWA:

_____

Safety Department, NSAHR NWA:

_____

Base Operations, NSAHR NWA

_____

Local Forester, VDOF:

_____

Project Area Description

NSAHR NWA is located on the Virginia / North Carolina State line. The majority of the installation resides in Virginia. The Installation covers approximately 3,661 acres, which are classified as 2,345 forest, 750 agriculture, 295 maintained open, and 271 as developed. In 2012 USACE inventoried NSAHR NWA for wetlands and identified 2,203.98 acres of which 127.82 acres are in North Carolina. Approximately 2,184 acres of these wetlands are forested with the dominant forest type is Loblolly Pine (927 ac), with Non-Riverine Swamp Forest (476 ac), and Non-Riverine Flatwoods and Swamp (423 ac) (INRMP 2015). The loblolly pine stands are a mix of planted and natural regeneration, ranging in age 10-70 years. The Non-Riverine Flatwoods and Swamp are a mix of loblolly pine *(Pinus taeda)*, red maple *(Acer rubrum)*, and sweetgum (*Liquidambar styraciflua*), scattered pond pine (*Pinus serotina*). Small trees and shrubs include sweetbay (*Magnolia virginiana*), blackgum *(Nyssa biflora)*, swamp bay *(Gordonia lasianthus)*, and coastal dog-hobble (*Leucothoe axillaris*). The Non-Riverine Swamp Forest is now dominated by red maple because of extensive past logging, catastrophic fires, and ditching. (INRMP 2015).

The specific units planned for burning under this plan are;

Unit- Skeet is 1.92 acres. The primary carrier of fire is grass and some timber litter. The adjacent fuel is pine and pine hardwood.

Unit Lunker Lake is 4.53 acres. The majority of this unit is grass, with some timber litter along edges and on north end. This unit will have a disked line around perimeter tying into Mill Stream.

Unit ROTHR 1 is 88.21 acres. The primary carrier of fire is grass and cane. There are pockets of common reed in this unit. This unit will have a disked line around it tying into Dusty Road on the east boundary.

Units ROTHR 2, 3, 4 are 44.70, 21.47, and 71.91 acres, respectively. The primary carrier of fire will be grass with pine and hardwood litter. This is early successional vegetation with grass scattered throughout unit. Unit ROTHR 4 has more hardwood with pine pockets. The primary carrier of fire will be hardwood/pine litter and grass.

All ROTHR units will have a mowed disked, or dozer line as perimeters.

Units IAMS Range 1/2 are 20.70 acres and 36.97 acres, respectively. These units consist of early successional vegetation with loblolly pine dominating. The primary carrier of fire is litter with grass in the open areas.

These units have roads, mowed, disked and/ or dozer bladed lines as perimeters.

Units Supplywoods 1 and 2 are 29.36 acres and 122.32 acres, respectively. The primary carrier of fire in unit 1 is grass and timber litter along the east boundary. In unit 2 it will be a mix of pine / hardwood litter and grass. Both units will have mowed, disked, or dozer line along perimeter.

This burn plan is valid for three years following the final date of approval. If any changes are made to this plan after approval, a technical review must be done by a Virginia Certified Prescribed Fire Manager.

ELEMENT 2A

GO/NO-GO PRE-IGNITION APPROVAL CHECKLIST

Instructions: The Agency Administrator Ignition Authorization must be completed before a prescribed fire can be implemented. If ignition of the prescribed fire is not initiated prior to expiration date determined by the agency administrator, a new authorization will be required.

Prior to signature the agency administrator should discuss the following key items with the fire management officer (FMO) or burn boss. Attach any additional instructions or discussion documentation (optional) to this document.

Key Discussion Items

A. Has anything changed since the Prescribed Fire Plan was approved or revalidated? *Such as drought or other climate indicators of increased risk, insect activity, new subdivisions/structures, smoke requirements, Complexity Analysis Rating.*
B. Have compliance requirements and pre-burn considerations been completed? *Such as preparation work, NEPA mitigation requirements, cultural, threatened and endangered species, smoke permits, state burn permits/authorizations.*
C. Can all of the elements and conditions specified in Prescribed Fire Plan be met? *Such as weather, scheduling, smoke management conditions, suitable prescription window, correct season, staffing and organization, safety considerations, etc.*
D. Are processes in place to ensure all internal and external notifications and media releases will be completed?
E. Have key agency staffs been fully briefed about the implementation of this prescribed fire?
F. Are there circumstances that could affect the successful implementation of the plan? *Such as preparedness level restrictions, resource availability, other prescribed fire or wildfire activity*
G. Have you communicated your expectations to the Burn Boss and FMO regarding if and when you are to be notified that contingency actions are being taken?
H. Have you communicated your expectations to the Burn Boss and FMO regarding decisions to declare the prescribed fire a wildfire?

Implementation Recommended by:
Chief Environmental or Prescribed Fire Burn Boss Signature: _____ Date: _____

I am authorizing ignition of this prescribed fire between the dates of_____ and_____ . It is my expectation that the project will be implemented within this time frame and as discussed and documented and attached to this plan. If the conditions we discussed change during this time frame, it is my expectation you will brief me on the circumstances and an updated authorization will be negotiated if necessary.

Additional Instructions or Discussion Documentation attached (Optional): Yes ☐ No☐
Ignition Authorized by:

Agency Administrator Signature and Title: _____ Date: _____

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ELEMENT 2B

PRESCRIBED FIRE GO/NO-GO CHECKLIST

Preliminary Questions	**Circle YES or NO**
A. Have conditions in or adjacent to the ignition unit changed, (for example: drought conditions or fuel loadings), which were not considered in the prescription development? If **NO** proceed with the Go/NO-GO Checklist below, if **YES** go to item B.	YES NO
B. Has the prescribed fire plan been reviewed and an amendment been approved; or has it been determined that no amendment is necessary? If **YES**, proceed with checklist below. If **NO, STOP: Implementation is not allowed. An amendment is needed.**	YES NO

Southeast Regional Smoke/Fog Management Questions	**Circle YES or NO**
C. Is there a chance of fog formation Post burn forecasted in the morning spot weather forecast**? If NO proceed with checklist, If YES go to item D.**	YES NO
D. If YES have appropriate mitigation elements been identified to limit potential fog/smoke impacts to smoke sensitive targets and are they explained in the pre-burn briefing? **If YES proceed with checklist below, if NO STOP.**	YES NO

GO/NO-GO Checklist	**Circle YES or NO**
Have ALL permits and clearances been obtained?	YES NO
Have ALL the required notifications been made?	YES NO
Have ALL the pre-burn considerations and preparation work identified in the prescribed fire plan been completed or addressed and checked?	YES NO
Have ALL required current and projected fire weather forecast been obtained and are they favorable?	YES NO
Are ALL prescription parameters met?	YES NO
Are ALL smoke management specifications met?	YES NO
Are ALL planned operations personnel and equipment on-site, available and operational?	YES NO
Has the availability of contingency resources applicable to today's implementation been checked and are they available?	YES NO
Have ALL personnel been briefed on the project objectives, their assignment, safety hazards, escape routes, and safety zones?	YES NO
If all the questions were answered "**YES**" proceed with a test fire. Document the current conditions, location and results. If any questions were answered "**NO**", DO NOT proceed with the test fire: Implementation is not allowed.	
After evaluating the test fire, in your judgment can the prescribed fire be carried out according to the prescribed fire plan and will it meet the planned objective? **Circle: YES or NO**	

Burn Boss Signature: _____Date:_____

PMS 486 (11/13)

ELEMENT 3 **COMPLEXITY ANALYSIS SUMMARY[2]**			
ELEMENT	**RISK**	**POTENTIAL CONSEQUENCE**	**TECHNICAL DIFFICULTY**
1. Potential for escape	Low	Low	Low
2. The number and dependence of activities	Low	Low	Low
3. Off-site Values	Low	Low	Low
4 On-Site Values	Low	Low	Low
5. Fire Behavior	Low	Low	Low
6. Management organization	Low	Low	Low
7. Public and political interest	Low	Low	Low
8. Fire Treatment objectives	Low	Low	Low
9 Constraints	Moderate	Low	Low
10 Safety	Low	Low	Low
11. Ignition procedures/methods	Low	Low	Low
12. Interagency coordination	Low	Low	Low
13. Project logistics	Low	Low	Low
14 Smoke management	Low	Low	Low

COMPLEXITY RATING SUMMARY	
	OVERALL RATING
RISK	Low
CONSEQUENCES	Low
TECHNICAL DIFFICULTY	Low
SUMMARY COMPLEXITY DETERMINATION	Low

RATIONALE:
All units will be burned by hand which requires good coordination and communication. It has been several years since burning has been conducted on the Installation which adds some complexity. Smoke will be mitigated by using prescribed weather but drainage and smoke dispersion still has to potential to affect the public. Broken continuity of fuels, sparse population surrounding NSAHR NWA allows for several wind directions and small burn units make this a low complexity project.

[2]*Source: Interagency Prescribed Fire Planning and Implementation Guide 7/2017*

ELEMENT 4 **DESCRIPTION OF PRESCRIBED FIRE AREA**	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

PHYSICAL DESCRIPTION

County: Chesapeake, Virginia and Currituck County, North Carolina
Topography: Flat with elevations ranging from 14-30 feet above mean sea level.
See table on next pages for a break out of the unit location and acreage.

Vegetation Types:

- ***Pine:*** Loblolly Pine is the dominant species with some Pond Pine in the Non-Riverine Flatwoods. Some of the pine stands are heavily stocked with planted and natural pine regeneration.
- ***Non-Riverine Flatwoods and Swamp:*** The Non-Riverine Flatwoods and Swamp are a mix of loblolly pine, red maple, and sweetgum (Liquidambar styraciflua), scattered pond pine (Pinus serotina). They can have a shrub mid-story.
- ***Non-Riverine Swamp:*** The Non-Riverine Swamp Forest dominant trees are bald cypress, swamp tupelo (Nyssa biflora), and red maple. These areas are located on the west side of the installation as the terrain transitions to the Great Dismal Swamp.

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PROJECT OR BURN UNIT BOUNDARY DESCRIPTION

All units will have disked, mowed, roads, or dozer line as there containment / perimeter boundary. There are roads, ditches, and agricultural fields as secondary containment lines. [See attached map (s) Appendix A].

FUELS DESCRIPTION

ON-SITE FUELS DATA	**ADJACENT FUELS DATA**
See table on next page for a break out of fuel and habitat types for all burn compartments within this project area.	Fuels adjacent to these burn units are older pine stands (TL8), hardwood stands (TL6) and agricultural fields. As long as the fields are farmed they should be non-burnable. If fields have crop stubble or grass then use GR3.

DESCRIPTION OF UNIQUE FEATURES (hazards, regulations, issues, constraints, etc. Examples may include: fences to protect, power poles, historical/cultural sites, threatened and endangered species or habitat, etc.)

• Due to the proximity of these burn units smoke should not be an issue. Burn permit (s) should be coordinated with Virginia and North Carolina Forestry.
• Habitat: Try to do disking, mowing, or putting in dozer line during drier periods to prevent rutting.
• Species of concern: The Rafinesque's bat has been captured while foraging at NSAHR NWA. It is unknown if a hibernaculum exists there. Be aware of canebrake rattlesnake dens. Also, some canebrake have tracking devices which need to be coordinated with natural resource specialist.
• Areas of Concern/Structures: Antennae poles around ROTHR. Shooting structures in skeet unit. Military structures adjacent to IAMS Range units. Hunting stands and monitoring wells.

ON-SITE FUELS	PROJECT NAME:	NSAHR NWA 2018/2019
	BURN UNIT NAME:	Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, Lunker Lake.

FUELS DATA

UNIT	Habitat	Fuel Model	Acres	% Unit	UNIT	Habitat	Fuel Model	Acres	% Unit
ROTHR 1	Grass	GR6	58	66	IAMS 1	Pine / Hardwood	TL6	20.70	100.0
ROTHR 1	Grass / Scrub	GS3	30.21	33					
					IAMS 2	Pine / Hardwood	TL6	36.97	
									100.0
	TOTAL			100.0					
ROTHR 2	Pine/Hardwood	TL6	44.70	100.0	Supplywoods 1	Grass/ scrub	GS3	29.36	100.0
ROTHR 3	Pine/Hardwood	TL6	21.47	100.0					
	TOTAL			100.0					
ROTHR 4	Pine/Hardwood	TL6	71.91	100.0	Supplywoods 2	Grass / Scrub	GS3	89	73
					Supplywoods 2	Pine/Hardwood	TL8	33.32	27
	TOTAL			100.0					
						TOTAL			100.0
Skeet	Grass	GR6	1.92	100.0	Lunker Lake	Grass	GR6	4.53	100.0
	TOTAL			100.0					
						TOTAL			100.0

- Burn units are composed of varied habitat types which have a varied influence on fire behavior. The main carrier of fire in these units is the herbaceous and litter. The Pineland and Non-Riverine Flatwoods and Swamp habitats are the most susceptible to fire and should be maintained with fire.
- The fuel models used represent the closest approximation to expected fire behavior under current conditions.

PHYSICAL LOCATION (Latitude, Longitude, Section Township Range and general location description.)

Unit	Acres	Long	Lat	STR	General Location
ROTHR 1	88.21	76°16'39.20"W	36°33'19.15"N	Chesapeake, VA	West end of installation
ROTHR 2	44.70	76°16'29.40"W	36°33'8.58"N	Crosses VA/NC state line	West end of installation
ROTHR 3	21.47	76°16'42.57"W	36°33'6.07"N	Crosses VA/NC state line	West end of installation
ROTHR 4	71.91	76°17'1.28"W	36°33'6.76"N	Crosses VA/NC state line	West end of installation
Skeet	1.92	76°16'32.75"W	36°33'50.06"N	Chesapeake, VA	West end of installation
IAMS Range1	20.70	76°16'3.26"W	36°33'7.23"N	Chesapeake, VA	Southwest of ROTHR antennae
IAMS Range 2	36.97	76°16'15.06"W	36°33'8.20"N	Chesapeake, VA	Southwest of ROTHR antennae
Supplywoods 1	29.36	76°15'13.60"W	36°33'23.44"N	Chesapeake, VA	Just south of Farmhouse Road
Supplywoods 2	122.32	76°14'53.44"W	36°33'11.59"N	Crosses VA/NC state line	Just south of Farmhouse Road
Lunker Lake	4.53	76°15'58.98"W	36°34'3.86"N	Chesapeake, VA	North of Monroe Road

ELEMENT 5	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
GOALS AND OBJECTIVES	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

PURPOSE AND RESOURCE MANAGEMENT GOALS:

Restore / maintain ecological integrity of landscape by improving native grasses and forbs, and improving general forest stand health.

Reduce the potential for large wildfire by removing some of the hazardous fuel load, primarily 90 % of the surface fuels.

Open and maintain ROTHR clear zones by reducing height of vegetation.

RESOURCE AND PRESCRIBED FIRE OBJECTIVES

RESOURCE OBJECTIVES:	**PRESCRIBED FIRE OBJECTIVES:**
1. Reduce hazardous fuels to protect adjacent military structures and Wildland/Urban Interface from unplanned wildfire. **2.** Enhance plant habitat by utilizing fire to increase native species viability.	**1.** Consume 50-80% of understory vegetation within wet prairie and pine habitat during each treatment **2.** Consume up to 90% of 1 hour fuels during each treatment.
OBJECTIVES ARE S.M.A.R.T.	**Specific** **Measurable** **Attainable** **Reasonable** **Time Related**

CONSTRAINTS:

These burn units are at least 5 miles from high density urban areas though moderate density urban Lincoln Housing Community is adjacent to the main gate of the Installation. There are small rural sub-divisions and dairy farms along Ballahack Road. Smoke impact to highways and military facilities should be minimal. There should be no problem meeting objectives using prescribed weather and resources.

The hunting program will be active during the early season of burning planned for these units. Coordination with the Natural Resource Specialist to mitigate any conflicts will be important. All burn units have hunting in them or immediately adjacent.
Burning the IAMS Range units might need to facilitate closure for a day or a couple of hours until smoke has cleared.

ELEMENT 6 **FUNDING[3]**	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**	
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**	
PRESCRIBED FIRE PHASE:		**COST:**	**FUNDING SOURCE:**
Planning			Military Project
Preparation			Military Project
Execution			Military Project
Evaluation			Project and Resource
TOTAL OF ALL ESTIMATED COSTS:			

[3]*Costs will be determined by contracts or cooperator use (in house). Typical cost is 30-250$ per acre*

ELEMENT 7 **PRESCRIPTION: ENVIRONMENTAL PARAMETERS[4]**	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**
	PRESCRIPTION NARRATIVE	GR6 and TL6, and GS3

DESCRIPTION OF ENVIRONMENTAL PARAMETERS NEEDED TO PRODUCE THE DESIRED FIRE BEHAVIOR:	**Prescription Compliant Values**	
Temperature (F)	35	90
Relative Humidity**	65	25
Wind Speed, MPH (20')	≥5	≤11
Wind Speed, MPH (mid-flame)	≥1	≤7
Wind Direction	See Wind Matrix Below	
Mixing Height	1680' AGL (state minimum)	
Transport Wind Speed & Direction	>9 MPH	
10 hr. Fuel Moisture (%)	>15	≥8
Nightime Low Visibility Occurrence Risk Index (LVORI)	Less than 6	
Dispersion Index	≥25	≤75
ERC (%) -7G	0	≤28
Live Woody Fuel Moisture	≥75	

Fire Behavior outputs may be derived from BEHAVE models, nomograms, or historical/empirical evidence.
Include modeling and/or empirical evidence documentation as an appendix or in the fire behavior narrative.

COMMENTS:
**** Visibility forecast should be completed using the spot forecast which includes nighttime fog formation probability (not to be confused with existing prescription parameters)**

- Wind direction parameters are located on the following page.
- Dispersion will be considered on day of burn in conjunction with the state permitting process. Smoke impacts are mitigated through planned wind direction, ignition patterns, timing of ignition, and mop up parameters.
- When burning near the upper limits of the prescription, precautions need to be discussed with the authorizing official during the go/no-go process. More than one forecasted environmental parameter near the high end of the prescription may increase the potential for escape and prolonged fire duration. All decisions involving the environmental parameters should be discussed with holding boss and Natural Resource Specialist prior to the test fire, and concerns should be documented and mitigated.

[4]*Separate prescriptions pages should be added for multiple prescriptions and result in multiple complexity ratings and burn organizations.*

Wind Parameters:

0' Wind Direction Matrix

Burn Unit	SE	S	SW	W	NW	N	NE	E
ROTHR 1								
ROTHR 2								
ROTHR 3								
ROTHR 4								
IAMS Range 1								
IAMS Range 2								
Skeet								
Lunker Lake								
Supplywoods 1								
Supplywoods 2								

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	OK	Favorable and acceptable wind direction for Rx burning.
	Limited Smoke Dispersion Area	Smoke may disperse into this area for short periods of time as winds shift

- Wind direction is the direction from which the wind is coming from, expected fire spread and smoke trajectory will be 180º of wind direction.
- Smoke sensitive areas – Ballahack Road 1-2 miles north of burn units, Highway 168 3 miles east, highway 17- 5 miles west. Core military residential area just north and northeast of burn units. IAMS Range.

ELEMENT 7 **PRESCRIPTION: FIRE BEHAVIOR PARAMETERS OUTPUTS**[4]	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**
	PRESCRIPTION NARRATIVE FOR UNIT:	GR6,GS3,TL6, and TL8

DESCRIPTION OF PRESCRIBED FIRE BEHAVIOR CHARACTERISTICS NEEDED TO MEET THE RESOURCE MANAGEMENT OBJECTIVES STATED IN THE OBJECTIVES SECTION:	**GR 6** **Prescription Compliant Values**	**GS3 / TL 6 / TL8** **Prescription Compliant Values**
Rate of Spread (Chains/hr)	6 – 79	4-48 / 1-10 / 1-10
Average Flame Length (ft)	4-13	3-9 / 1-4 / 1-4

The level of fire behavior modeling and the tools used should be commensurate with the scale and complexity of the fuel beds within the ignition units and landscape. **Include modeling and/or empirical evidence documentation as an appendix or in the fire behavior narrative.**

Fire Behavior Narrative or description of empirical evidence:

- Due to the proximity of the burn units, smoke sensitive areas should not be impacted. Some of the timbered units may have some smoldering duff if burned on high end of prescription. No chance of fog is needed to be forecasted for the day of and night of the burn to limit the chance of smoke impacting any of the smoke sensitive areas. The open areas on and adjacent to NSAHR NWA may have smoke funneled into them. They should be patrolled prior to leaving the burn for the night.
- The fire behavior values were derived from looking at the highest possible outputs from the BEHAVE runs under the environmental parameters identified in the prescription. Spread rates of 10-30 chains per hour could be possible for short runs. But, with small burn units, fire breaks, adjacent agricultural fields, and natural barriers, high spread rates are not expected.

SEE BELOW FOR BEHAVE RUN DOCUMENTATION

[4]*Separate prescriptions pages should be added for multiple prescriptions and result in multiple complexity ratings and burn organizations.*

ELEMENT 7 **PRESCRIPTION: FIRE BEHAVIOR PARAMETERS OUTPUTS**[5]	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**
	PRESCRIPTION NARRATIVE OUTSIDE of UNIT:	TU3 Worst Case OUTSIDE of UNIT

DESCRIPTION OF PRESCRIBED FIRE BEHAVIOR CHARACTERISTICS NEEDED TO MEET THE RESOURCE MANAGEMENT OBJECTIVES STATED IN THE OBJECTIVES SECTION:	**TU3 & GR6** **Prescription Compliant Values**
Rate of Spread (Chains/hr)	4-42 / 6-79
Average Flame Length (ft)	3-9 / 4-13

The level of fire behavior modeling and the tools used should be commensurate with the scale and complexity of the fuel beds within the ignition units and landscape.

BehavePlus 5.0.5 (307)

Inputs: SURFACE

Input Variables	Inputs	
Fuel/Vegetation, Surface/Understory		
	Fuel Model	GR6, GS3, TL6, TL8
Fuel Moisture		
	1-h Moisture	6
	10-h Moisture	8
	100-h Moisture	16
	Live Herbaceous Moisture	75
	Live Woody Moisture	75
Wind	Midflame Wind Speed	1,2,3,4,5,6,7
Terrain	Slope Steepness	0

RATE of SPREAD	Mid-Flame Wind Speed						
Fuel Model	1	2	3	4	5	6	7
GR6	6.4	13.7	23.4	34.9	48.1	62.8	78.8
TL6	1.1	2.0	3.1	4.4	6.0	7.7	9.5
TL8	1.3	2.2	3.3	4.6	6.1	7.7	9.4
GS3	4.7	9.8	15.9	22.9	30.5	38.8	47.5

Results for: Flame Length (ft)	Mid-Flame Wind Speed						
Fuel Model	1	2	3	4	5	6	7
GR6	4.1	5.9	7.5	9.0	10.4	11.8	13.1
TL6	1.2	1.6	2.0	2.3	2.7	3.0	3.3
TL8	1.6	2.1	2.5	3.0	3.4	3.7	4.1
GS3	3.1	4.4	5.5	6.4	7.4	8.2	9.0

[5]*Red= high fire intensity (difficult to control), yellow= moderate intensity, green= low or favorable intensity*

ELEMENT 8 **SCHEDULING**	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

IGNITION TIMEFRAMES/SEASONALITY:

These burns are planned for dormant season, typically October – March. Water levels, and weather will play a role in the scheduling of burns. At the beginning of every fiscal year the Natural Resource Division will hold a prescribed fire planning meeting to determine the burn schedule and set priorities.

There is the potential to burn more than one unit during one burn period. If it is determined that there are enough resources to fully staff both units, Span of control is not exceeded for the burn boss(s), and the complexity analysis has not changed, then more than one unit can be burned on the same day. A minimum of one (1) single resource boss is required for each burn unit. If the distance between units or the span of control is too great for one (1) burn boss then an additional burn boss is necessary. The decision to burn more than one unit in a burn period will be well documented and covered in the Agency Administrator's Go-No-Go briefing.

Fire Management Unit acreage/burn history:

Unit	Acres	Last Burned	Scheduled	Unit	Acres	Last Burned	Scheduled
ROTHR 1	**88.21**		**2018/2019**	**Skeet**	**1.92**		**2018 / 2019**
ROTHR 2	**44.70**		**2018/2019**	**Lunker Lake**	**4.53**		**2018 / 2019**
ROTHR 3	**21.47**		**2018/2019**	**Supplywoods 1**	**29.36**		**2018 / 2019**
ROTHR 4	**71.91**		**2018 / 2019**	**Supplywoods 2**	**122.32**		**2018 / 2019**
IAMS 1	**20.70**		**2018 / 2019**				
IAMS 2	**36.97**		**2018 / 2019**				

PROJECT DURATION:

The duration of the burn will depend on the current fuels and weather conditions. These units should be completed in just a few hours, due to the small size of these units and light fuels, Overnight relative humidity recovery usually ranges near 90 – 100% which extinguishes fine and small woody fuels.

Base Commander approval allows this burn plan to be valid for three years to the date of which it was signed.

CONSTRAINTS:

Getting plan communicated and coordinated with all internal and external stake holders.
Any Navy Mission scheduling priorities.
Hunting areas are located in and adjacent to burn units. Coordination with Natural Resource Specialist is necessary.

ELEMENT 9 **PRE-BURN CONSIDERATIONS**	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

ON AND OFF-SITE CONSIDERATIONS

ON SITE:

- Fire lines will be mowed and/or disked (depending on soil moisture and soil type). All fire lines will be completed 24 hours prior to ignition. Signs should be posted indicating burn unit.
- Snags that could threaten the fire line will be felled before the burn.
- Natural Resource section will coordinate all activities, since burn unit prep and burn implementation may be conducted by contractors, cooperators, base personnel or any combination.
- Hunting stands, monitoring wells, research projects

OFF SITE:
Smoke signs will be available for deployment.
Highway 168 3 miles east, highway 17- 5 miles west are heavily traveled roads, Ballahack Rd. just north of installation; Sherriff and Highway Patrol will be notified before the burn. The community of Myock, NC, is 5.7 miles southeast and Hickory, Virginia is 5.8 mile northeast.

METHOD AND FREQUENCY FOR OBTAINING WEATHER FORECAST(S):

A spot forecast will be acquired from local (Wakefield) NWS office the day of the burn. On site weather will be taken on an hourly basis or at intervals determined by the Burn Boss during the operational period. NAS Oceana can provide local weather briefs.
Local NWS: http://www.srh.noaa.gov/ (phone) (fax)

INTERNAL AND EXTERNAL INVOLVEMENT:

Identify and list people who are notified and involved in the fuels management process for this plan. Include a list for public contact information (news releases, radio spots, outreach pamphlets). Document internal and external coordination for development of plan.

Internal: The list of contacts on page two will be notified 48 hours out of a potential prescribed burn.

External: Plan will be reviewed by a qualified cooperator.
USFWS, TNC, or Virginia Department of Forestry
Public Outreach: List internet address for cooperators or news stations.

NOTIFICATIONS:

Who	When*	Phone Number and/or e-mail	Contact	Date	Method
CO NAVSUPPACT Norfolk	day of	(757) 836-1488			
OIC NAVSUPPACT NW	day of	(757) 421-8201			
Navy Regional Fire Department:	day of	(757) 433-3258 (757) 433-2043			
Base Security –	day of	(757) 421-8181			
Base Safety –	day of	(757) 322-2884			
PWO, NAVSUPPACT NW	day of	(757) 836-1836 (757) 421-8801			
Director, FSSC –	day of	(757) 421-8400			
ROTHR POC –	day of	(757) 675-3303			

ROTHR Watch Officer	day of	(757) 421-8742			
CO MCSFTCO –	day of	(757) 421-8559			
CO USCG CAMSLANT –	day of	(757) 421-6256			
CO USCG SRT-1 –	day of	(757) 421-1801			
OIC NSU SGT F-3 -	day of	757) 421- 3838			
OIC NSG Det Chesapeake –	day of	(757) 421-8130			
OIC CENATNSF –	day of	(757) 421-8797			
Tech Dir NAVSATCOMMFAC –	day of	(757) 421-8611			
SPAWAR 751 –	day of	(757) 421-8369			
SPECOMMDIV –	day of	(757) 836-1069			
NAVSUPPACT PAO –	day of	(757) 836-1862			
NAVSUPPACT NW Quarterdeck	day of	(757) 421-8000			
North Carolina Forestry Service	day of	(252) 453-6770			
Virginia Department of Forestry	day of	(757) 465-6840			
Virginia Air Pollution Control Board (PReP)	day of	(757) 518-2077			
Dismal Swamp National Wildlife Refuge	day of	(757) 986-3705			

ELEMENT 10

PRESCRIBED FIRE BRIEFING CHECKLIST	

- Burn organization and assignments
- Prescribed Fire objectives and prescription
- Description of prescribed fire project area
- Special considerations and sensitive features
- Expected weather and fire behavior
- Communications
- Ignition plan
- Holding plan
- Contingency plan and assignments
- Wildfire declaration
- Safety and medical plan

A briefing package or IAP (Incident Action Plan), should be given to each participant prior to briefing. This package should include (minimum); map of burn unit, weather, communications, burn organization and assignments, safety and medical plan, and objectives.

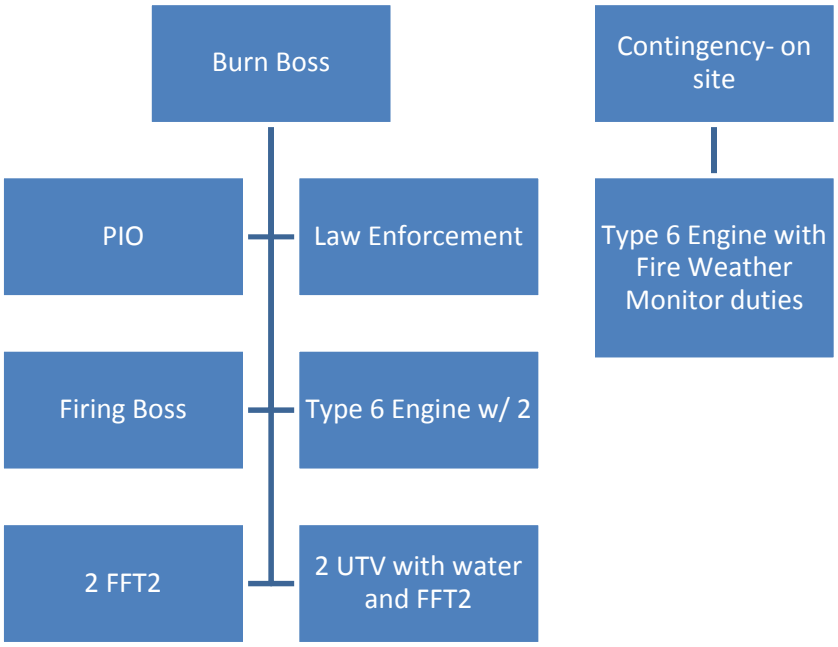
The Prescribed Fire Burn Boss, or designee, will ensure that any new personnel arriving to the prescribed fire receives a briefing prior to assignment.

ELEMENT 11 **ORGANIZATION AND EQUIPMENT**	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

See implementation reference guide for specifics. Minimum requirements to perform this prescribed burn.

Hand Ignition: Prescribed fires require a minimum of 6 people for smaller units (less than 15 acres) and 8 people for larger or more complex units.
The following positions / equipment must be filled:**

- Burn Boss* – 1
- Firing Boss (FIRB)* –1
- Holding
- Firefighter Type 2 (FFT2) with utility vehicle (UTV)* - 2
- FFT2 – 2
- Type 6 Engine* -2
- Public Information Officer (PIOF)- 1
- Law Enforcement Officer (LEO)- 1



- *One person may fill more than one position but not more than two. (i.e. Burn Boss/FIRB)
- THE ACTUAL ORGANIZATION WILL BE SPECIFIED BY THE BURN BOSS ON DAY OF BURN.
- The burn can be delegated back to the Installation, following the day after the burn.

ELEMENT 12 **COMMUNICATIONS[6]**	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

Identify and assign command, tactical and air operations frequencies as needed.

SYSTEM	RX FREQ.	RX TONE / NAC(Hex)	TX FREQ.	TX TONE / NAC(Hex)	ASSIGNMENT	REMARKS
Digital(n)					Command	Repeater
Digital(n)					Tactical	Tac. 1
Digital(n)					Tactical	Tac. 2
Analog(n)					Tactical	Tac -7

PROJECT PHONE NUMBERS	
PERSONNEL NAME & TITLE:	**PHONE NUMBER:**
Michael Wright—Natural Resource Specialist	
--Chief NSAHR NWA Fire	
Air Operations	
NSAHR NWA Public Works Officer	
Virginia DOF	
NC Forest Service	

[6] *At a minimum this information should be updated annually and verified within 24 hours prior to burn ignition. After 24 hour verification, updates should be mad as needed throughout the burn (ignition, holding, and mop-up phases).*

ELEMENT 13	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
PUBLIC, PERSONNEL SAFETY	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

SAFETY HAZARDS:

- Fire
- Aircraft/Training Operations
- Driving
- Uneven terrain
- Venomous snakes
- Dehydration
- Extended smoke exposure
- Working on/near Urban Interface, roads
- Undocumented UXO or other Hazardous Material
- Equipment operations

MEASURES TAKEN TO REDUCE THE HAZARDS:

The Burn Boss will ensure the following:

- All personnel wear **required PPE** (Nomex clothing, boots, fire shelter, gloves, hard hat, and eye protection) at all times.
- All fire management activities will be conducted in accordance with policies.
- Locations of Escape Routes and Safety Zones will be discussed with all fire line personnel. Safety Zones may include the fire lines, ponds, creeks, roads, other natural barriers and burned areas.
- Personnel are warned of the venomous snakes and are directed to avoid the snakes.
- All personnel are briefed on dehydration signs and symptoms and ensure that there are adequate liquids available to all personnel.
- In reference to UXO concerns, all personnel are to take RRR training.
- Non-essential fire personnel working near the road ways will wear high visibility vests, and stay clear of the road whenever possible. Flashing lights on all vehicles involved with the project will be used during the operation.
- Holding personnel will be rotated out of high smoke areas to clear air.

Operators will brief personnel who are unfamiliar with the equipment, being utilized for the burn, on the particular hazards and standard operating procedures.

ELEMENT 13 **EMERGENCY MEDICAL PLAN**	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

EMERGENCY MEDICAL PROCEDURES:

If a medical emergency arises all operations will be evaluated and stopped if they can be done safely until the medical condition can be determined. If necessary the injured person can be evacuated to receive proper medical treatment. All radio traffic will be kept at a minimum so emergency procedures can proceed uninhibited. The burn boss or designee will initiate the 911 emergency system if needed.

NOTE: The decision to stop all firing operations is up to the burn boss, it may be necessary to continue firing operations to maintain the safety of all forces and the security of the burn operation.

EMERGENCY EVACUATION METHODS:

- Initiation of the emergency dispatch system will help determine the need for an ambulance or aerial transport. If transport is determined to be best by ground it will be necessary to meet the ambulance at a location that is easily accessible.
- If a Med-flight is needed the law enforcement on-site will coordinate landing area via the 911 emergency dispatch system.

EMERGENCY FACILITIES:

Chesapeake Regional Medical Center, Chesapeake, Virginia, at 736 N Battlefield Blvd. (757) 312-8121

The closest burn center is Sentara Norfolk General Hospital (800-763-8272).

The on base Emergency Fire and Rescue Team is located on the Installation, off of Relay Rd., near the main gate.

DIRECTIONS FROM NEAREST MEDICAL FACILITY TO PROJECT VIA GROUND: TRANSPORTATION

To Chesapeake Regional Medical Center- Take Ballahack Road east to Chesapeake Expressway (Hwy 168). Go north on Chesapeake Expressway to Great Bridge Bypass into Chesapeake. Proceed until you reach the intersection of Medical Parkway and Hwy 168. The Medical Center is in the NW quadrant of this intersection. Driving distance is approximately 16.5 miles.

ELEMENT 14	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
TEST FIRE	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

PLANNED LOCATION & SPECIFIC INSTRUCTIONS:

The test fire will be conducted in representative fuels in a downwind location in close proximity to the perimeter of the unit with sufficient precautions in place to quickly extinguish the test fire if needed. The Burn/ firing boss will determine the location and be on scene during the test fire.

BURN DAY DOCUMENTATION

WEATHER CONDITIONS ONSITE:	**TEST FIRE RESULTS:**

Does the test fire meet prescription parameters?	**YES**		**NO**		

COMMENTS:

ELEMENT 15	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
IGNITION PLAN	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

NARRATIVE FOR IGNITION PLAN:

FIRING METHOD(S)*: Hand

DEVICES: Driptorch, flares, and fuse.

TECHNIQUES: Flanking/backing/strip head, or spot firing depending on location, weather, and time of day.

SEQUENCES: Ignition sequence will be determined by the burn boss and firing boss so that the burn objectives can be met safely. Burn pattern and technique will be determined by the burn boss and the firing boss on the day of the burn and adjusted as necessary if parameters significantly change.

ANTICIPATED PATTERNS: Flanking fire patterns will be used on the interior of the unit and backing fire will be used to establish control lines before interior ignition. There is potential for use of strip head fires in areas which have sufficient lines or blackline down wind, this method will be used if it is determined to be the best way to safely meet burn objectives.

MINIMUM IGNITION STAFFING: The burn boss will determine the staffing on the day of burn.

*Multiple prescriptions may require identifying and developing multiple ignition organizations and implementation instructions.

ELEMENT 16	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
HOLDING PLAN	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

GENERAL PROCEDURES NARRATIVE FOR PRESCRIBED FIRE HOLDING:

The Burn / Holding Boss will determine the holding organization on the day of the burn. Assignments will be announced at briefing. During the operation the holding boss will be in contact with the Firing Boss and/or Burn Boss to ensure that firing operations are not overextending the holding forces. Spot fire activity will be communicated to the Burn Boss and locations will be identified.

Holding forces may allow the backfire to burn to the edge of the control lines before extinguishing the flaming front if it threatens to cross fire lines. Holding forces will notify holding boss of any spot fires. Holding forces can take different suppression tactics to reduce spotting potential (pre-treating heavy fuel concentrations with water). The firing boss will periodically check with holding boss to ensure that ignition forces are not overextending holding forces.

CRITICAL HOLDING POINTS AND MITIGATION ACTIONS:

There could be critical holding points on these burn units based on current weather, fuel conditions, firing sequence. These points will be discussed during the briefing and communicated to all resources during the burn.

Critical holding points and safety zones will be identified during the briefing.

PRESCRIBED FIRE MOP-UP & PATROL	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

GENERAL PROCEDURES NARRATIVE FOR PRESCRIBED FIRE MOP-UP AND PATROL:

Specific mop-up standards will be determined by the burn boss on the day of the burn. The burn boss will take into consideration the proximity of any critical smoke receptors and the potential for escape.

Due to the proximity of the burn units to highways and urban centers, resources should start mop up operations as soon as possible. Concentrating on fuels that could cause containment issues, then concentrating on fuels that will continue to smolder past the first burn period along the boundary. The goal will be 100% mop-up of the entire unit.

If requested, by the Regional Natural Resources Specialist or designated Burn Boss, the Navy Regional Fire and Emergency Services and/or NSAHR NWA fire crews will make hourly site inspections for three consecutive hours after the burn crew has secured the unit.

PRESCRIBED FIRE DECLARED OUT BY:

The prescribed burn will be declared out by the Burn Boss or designee, when there has been no smoke or evidence of active fire for 3 consecutive days.

ELEMENT 17	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
CONTINGENCY PLAN	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

Management Action Documentation Element	**Management Action Narrative**
Designator and Description:	Fire objectives are not being met during the burning operation
Condition:	Resource management/hazardous fuel reduction objectives are not being met during the burn operation
Management Intent:	- Maintain fire within the burn unit and project boundary - Adjust fire behavior to keep fire effects within objectives
Recommended Action(s) to Consider:	- Weather observations will be taken at 30 minute to 1 hour intervals to watch the weather parameter trend. - May cease firing or adjust firing techniques and patterns based on the weather parameters and desired fire effects. If changing firing methods does not adequately influence the desired fire behavior, termination of the ignition operations will take place at a time and location that will be conducive to holding current active fire with resources on scene. Operations will be concentrated on mop-up and holding until conditions better suit the objectives.
Recommended Resources:	-If contingency resources are needed to ensure the prescribed fire meets objectives and/or doesn't exceed the unit boundary; offsite contingency resources may be ordered.
Time Frame:	Variable based on weather parameter
Describe the consequences of not taking the recommended action(s) (Optional):	- Possibility of high numbers and/or long range spotting into neighboring private lands and/or refuge burn units within the project boundary
Responsibility:	Burn Boss and FIRB
Date Each Action is Initiated (Optional):	
Management Action Documentation Element	**Management Action Narrative**
Designator and Description:	Prescription elements exceeded during the operation
Condition:	Parameters are exceeded during the burning operation
Management Intent:	- Maintain fire within the burn unit and project boundary - Reduce fire behavior to keep fire effects within objectives
Recommended Action(s) to Consider:	- Weather observations will be closely monitored by assigned weather observer/ - Significant negative changes in behavior or weather will be documented and require the burn boss and holding boss to discuss the holding forces' ability to maintain control. - If unexpected weather drastically changes the fire behavior of the prescribed fire the Burn Boss will determine the appropriate actions to take; whether full suppression is needed or a change in firing tactics are needed.
Recommended Resources:	-If contingency resources are needed to ensure the prescribed fire meets objectives and/or doesn't exceed the unit boundary; offsite contingency resources may be ordered.
Time Frame:	Variable based on weather parameter

Describe the consequences of not taking the recommended action(s) (Optional):	Possibility of high numbers and/or long range spotting into neighboring private lands and/or other burn units within the project boundary
Responsibility:	Burn Boss
Date Each Action is Initiated (Optional):	
Management Action Documentation Element	**Management Action Narrative**
Designator and Description:	**Smoke management objectives not being met.**
Condition:	Smoke management objectives being not being met.
Management Intent:	- Maintain fire within the burn unit and project boundary - Reduce fire behavior to keep fire effects within objectives - Reduce impact of smoke on smoke sensitive areas
Recommended Action(s) to Consider:	- Have the roads and sensitive points checked often - Put up smoke signs
Recommended Resources:	- If contingency resources are needed to suppress the prescribed fire and mop-up any heavy fuels they will be ordered. The contingency resources and minimum response times are listed in the next section.
Time Frame:	Variable based on weather parameter
Describe the consequences of not taking the recommended action(s) (Optional):	- Smoke lays down along busy roads and sensitive areas causing low visibility on roads - problems with breathing for sensitive persons
Responsibility:	Burn Boss, FIRB,
Date Each Action is Initiated (Optional):	
Management Action Point - Documentation Element	**Management Action Point Narrative**
Designator and Description:	**Fire leaves unit boundary**
Condition:	Fire leaves unit boundary
Management Intent:	- Maintain fire within the project boundary -
Recommended Action(s) to Consider:	- Position holding forces for quick response to spot fires - Fire outside of the unit boundary may be controlled with direct attack, if fire behavior allows, or by indirect attack (burning out entire unit where spot is established) if flame lengths do not allow direct attack, or if firefighter or public safety is threatened. - If possible resource advisors will be in the decision loop when a burn out operation is planned
Recommended Resources:	- Initial size-up will determine the appropriate suppression action - Available holding forces will perform initial attack on spot fires or slop-overs. - If contingency resources are needed to ensure the prescribed fire meets objectives and/or doesn't exceed the unit boundary; onsite and offsite contingency resources may be ordered
Time Frame:	Variable based on weather parameter
Responsibility:	Burn Boss, FIRB
Date Each Action is Initiated (Optional):	

MINIMUM CONTINGENCY RESOURCES AND MAXIMUM RESPONSE TIME(S):
The minimum number and type of contingency resources may vary depending on the location, implementation phase and applicable management actions.

- One (1) Type 6 Engine on site.
- NSAHR NWA Fire –on Installation, ~5-20 minutes away
- There is an agreement with the City of Chesapeake for support if Installation personnel cannot get to the scene in time.

ELEMENT 18	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/201**
WILDFIRE CONVERSION	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

A prescribed fire will be declared a wildfire when the assigned Burn Boss determines that one or more of the following conditions or events has occurred or is likely to occur, and if these conditions cannot be mitigated within the next burning period by implementing the contingency actions in the prescribed fire plan by on-site holding forces and listed contingency resources staged during this operational period:

- The prescribed fire leaves the planned unit boundary.
- The fire behavior exceeds limits described in the prescribed fire plan and/or the fire is threatening to leave the planned unit boundary.
- The fire effects are unacceptable.
- Smoke production must be reduced because of adverse air quality impacts.
- Local and/or geographic area fire activity escalates and resources committed as contingency or holding forces are needed for re-assignment to other incidents.

After wildfire declaration, a prescribed fire project is over.

Actions

- When a prescribed fire is declared a wildland fire, managers still have the full range of suppression options available under the concept of the "Wildland Fire Response."

WILFIRE DECLARED BY:

Burn boss

IC ASSIGNMENT:

The burn boss or other qualified personnel (depending on complexity of incident and span of control).

NOTIFICATIONS:

The burn boss or designee will contact the VDOF or NCFS and Base management when the prescribed burn is declared a wildfire. The Base Fire Chief or designee will contact the VDOF OR NCFS for assistance if needed. .

EXTENDED ATTACK ACTIONS AND OPPORTUNITIES TO AID IN SUPPRESSION EFFORTS:

Once a burn is declared a wildfire, initial attack suppression tactics will follow the Base Wildland Fire Management Plan. Pre-established roads will be used to burn out from and contain the wildfire with minimal mechanical impact as long as the escaped fire can be contained on base land.

ELEMENT 19	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
SMOKE MANAGEMENT AND AIR QUALITY	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

COMPLIANCE AND PERMITS TO BE OBTAINED:

Describe how the project will comply with local community, County, State, Tribal, and Federal air quality regulations.

Smoke emissions will be managed in accordance with the Virginia Administrative Code, which regulates rural open burning. These rules require that an open burning authorization be obtained from VDOF and that burning be confined to the hours between 0900 and one hour before sunset of the same day, two hours after sunset for Certified Burns.

SMOKE-SENSITIVE FEATURES AND RECPTORS:

Some compartments border these roads while others are interior (see map). No other sensitive features or receptors are expected to be affected by the project. All of the compartments in this project are identified as areas that would impact smoke sensitive areas.

POTENTIAL IMPACTED AREAS:

Identify Class I air sheds, restricted areas, non-attainment areas (designated areas), and population centers that may be impacted.

No Class I air sheds, restricted areas, or non-attainment areas will be impacted by smoke from this burn. The closest population centers are Hickory which is southwest and Myock NC, to the southeast of the burn unit and should not be impacted with the prescription parameters required in the plan.

Night time drainage winds will pool smoke in low lying areas, possible potential fog formation areas are;

MITIGATION STRATIGIES AND TECHNIQUES TO REDUCE IMPACTS:

Smoke signs will be placed on Interstate and State Rd on the morning of the burn by fire staff if the forecasted winds will impact these roads. The burn boss or designee will notify the Highway Patrol or County Sheriff of the location of any signs and the potential for any smoke impact. *See day of burn contact list for phone numbers for these agencies.*

Residual Smoke Problems;

No prescribed burn will occur within 1 mile of Interstate or State Road if the weather forecast mentions the possibility of FOG in the spot forecast.

- Obtain a spot weather forecast for the day of the prescribed burn, prior to ignition from the National Weather Service. An updated spot forecast should also be considered mid-afternoon to assist Burn Boss with night shift staffing decisions.
- The Burn Boss or Base LE will notify the Highway Patrol or the County Sheriff's Office that a burn will be conducted adjacent to smoke sensitive areas. A location will be given to the dispatcher. Phone numbers of the person's in charge will be given to the dispatcher. The dispatcher's name, date and time will be recorded on the burn plan.

Smoke monitoring will take place along smoke sensitive areas that may be impacted. The attached "Smoke sensitive areas" and burn unit map correspond to the areas that will require smoke monitoring following a burn. The monitoring will be accomplished throughout the night utilizing road patrols, these patrols will continue until daylight. The road patrols will utilize fire personnel and non-fire personnel for this purpose. Patrols will be concentrated one mile on either side of the burn site. If fog develops and drifts towards the smoke signs, the signs will be moved to stay beyond the heaviest density of the fog. Log sheets (Appendix E) containing the note data will be signed by the shift monitor and passed on to the next shift monitor. This documentation will then be attached to the respective prescribed burn plan.

If heavy fog is determined to impede normal traffic by burn personnel, local law enforcement will be notified. The law enforcement agency notified will make the determination as to what action is to be taken.

ELEMENT 20	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
MONITORING	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

MONITORING:

Describe the monitoring that will be required for the prescribed fire. At a minimum specify the weather, fire behavior and fuels information (forecast and observed) and smoke dispersal monitoring required during all phases of the project and the procedures for acquiring it, including who and when.

A. Fuels Information (forecast and observed) Required and Procedures:

B. Weather Monitoring Required and Procedures:

A person assigned to monitor will take hourly weather observations throughout the operational period during active fire spread. Weather observations will be broadcast over the radio so all personnel on the fire will be informed on conditions. A copy of on-site weather will be placed in the burn compartment history folder after the completion of the burn.

C. Fire Behavior Monitoring Required and Procedures:

If possible, the person assigned to monitor weather will observe and record flame lengths, rate of spread, and probability of ignition during the burn period; otherwise another person will be assigned. Photos will be taken during the burn of representative flaming fronts for archival data.

D. Monitoring Required To Ensure That Prescribed Fire Plan Objectives Are Met:

Point location (lat. & long.)	Point type (veg, photo, well, etc.)	Pre-burn requirements	Monitoring completed (initials/date)

E. Smoke Dispersal Monitoring Required and Procedures:

Resources nearest to potentially impacted roads will monitor smoke characteristics and visibility and will document any visibility concerns either in writing or with digital photos. If available a helicopter will monitor smoke impacts on the major road ways and will document smoke plume characteristics. If possible photos will be taken from the air of plume height and dispersion of the plume.

ELEMENT 21	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
POST-BURN ACTIVITIES	**BURN UNIT NAME:**	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**

POST-BURN REPORT:

Prescribed fire reporting will include: burn day conditions, fire behavior, smoke dispersal, and first order fire effects.

- The Burn Boss and Natural Resources Specialist are responsible for reports which will be completed no later than 7 days after completion of the burn.
- Weather observations from the closest RAWS site and on-site weather will be added to the burn plan folder by the Burn Boss.
- Post burn photos will be taken shortly after the burn, and then six months after the burn in pre-established photo points.

OTHER:

Describe other post-burn activities that must be completed. This may include: safety mitigation measures, and rehabilitation needs including those as a result of pre-burn activities undertaken.

The burn boss will conduct an after action review at the end of the shift. All actions and any significant incidents or events will be recorded and placed in the burn compartment fire history folder.

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APPENDICES

A. Maps: Vicinity, Project or Ignition Units (or both).
B. Technical Reviewer Checklist
C. Complexity Analysis
D. Fire Behavior Modeling Documentation or Empirical Documentation
E. Post Burn Patrol Log

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Appendix A: Vicinity Map and Burn Unit Maps

Insert your vicinity maps here. Refer to Element 4D in the *Interagency Prescribed Fire Planning and Implementation Procedures Guide*, PMS 484, to fill out this appendix.

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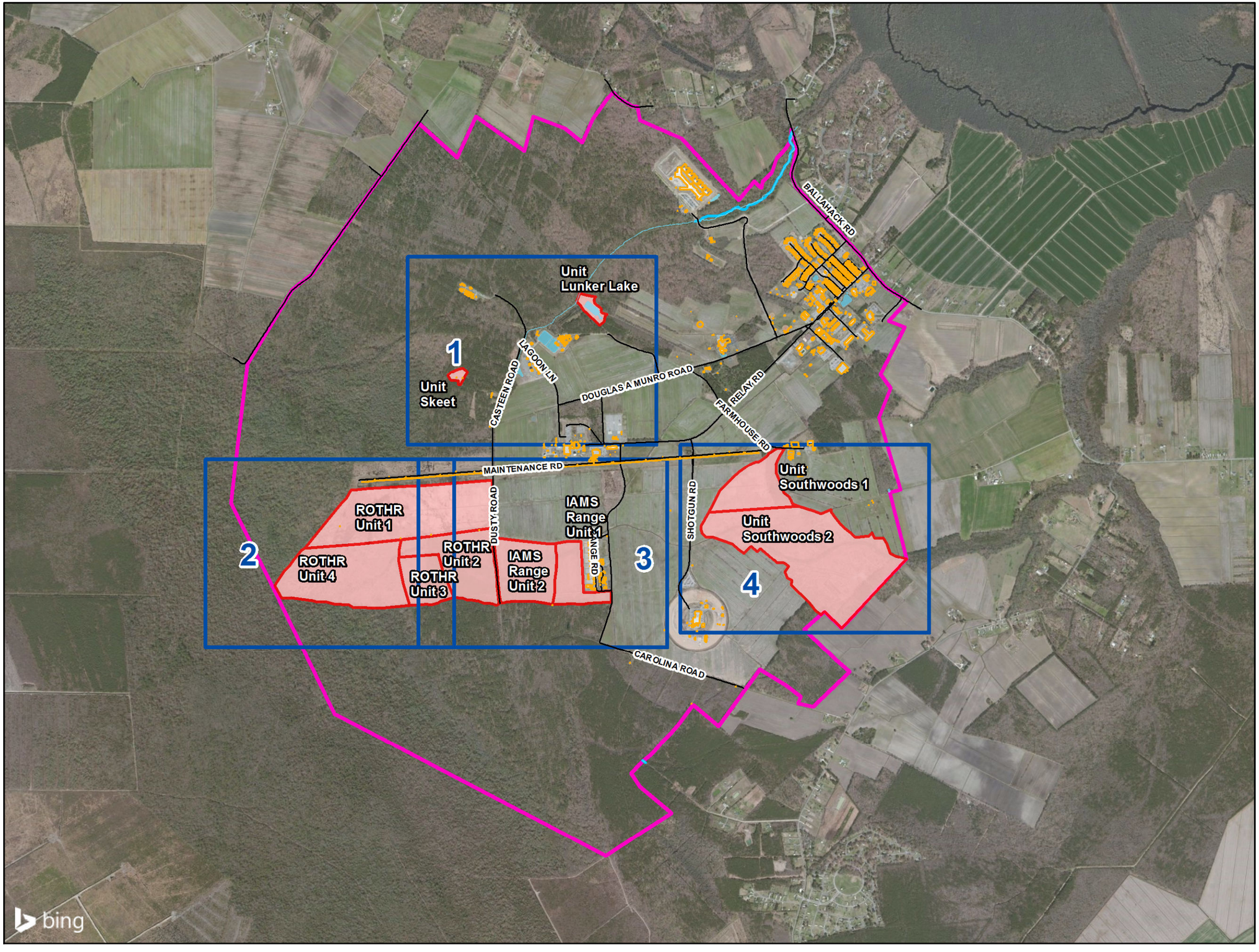
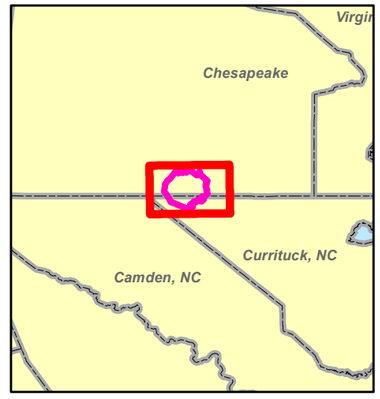


Legend

- Roads
- Stream
- Prescribed Fire Plan Areas
- Water Body
- Building/Structure
- Installation

NOTES:
Additional tree identification attribute information is contained in the geodatabase and related table.

Site Location



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Feet

Sheet Key

Appendix A: Prescribed Fire Plan
NSAHR Northwest Annex
Chesapeake, Virginia
Currituck, North Carolina

Prepared By:	Date:
TETRA TECH	8/7/2017

Base Map; ESRI BING Map Service 2013
Boundary from Navy 2015.

Coordinate System: WGS 84
Projection WGS 84 UTM Zone 18N

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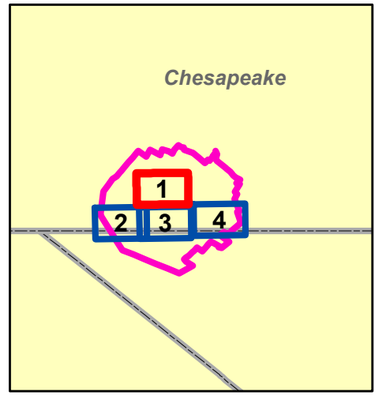
Legend

- Roads
- Stream
- Prescribed Fire Plan Areas
- Water Body
- Building/Structure
- Installation

NOTES:
Additional tree identification attribute information is contained in the geodatabase and related table.

Site Location



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Feet

Page 1 of 4

Appendix A: Prescribed Fire Plan
NSAHR Northwest Annex
Chesapeake, Virginia
Currituck, North Carolina

Prepared By:	**Date:**
TETRA TECH	8/7/2017

Base Map; ESRI BING Map Service 2013
Boundary from Navy 2015.

Coordinate System: WGS 84
Projection WGS 84 UTM Zone 18N

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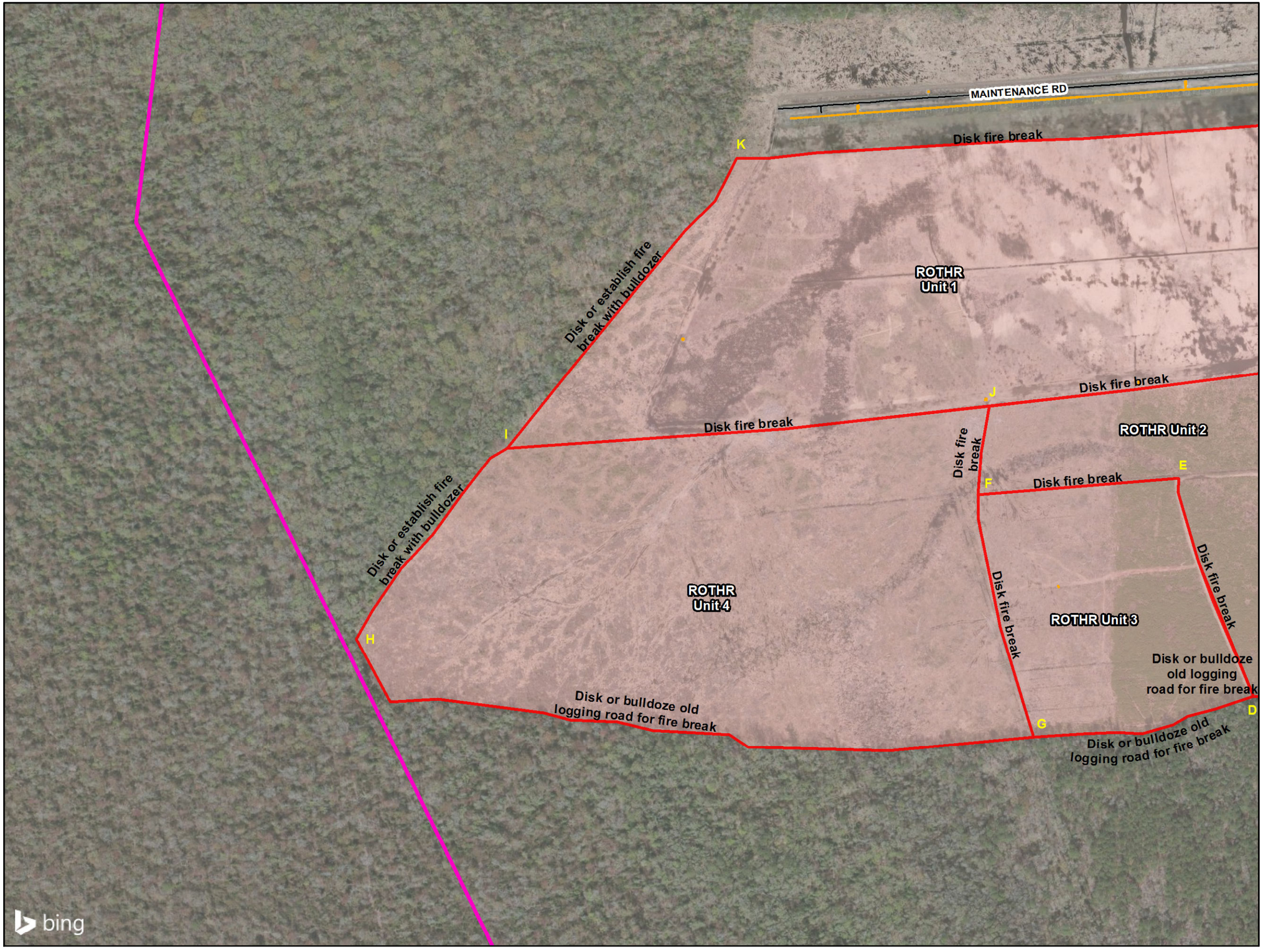

Legend

- Roads
- Stream
- Prescribed Fire Plan Areas
- Water Body
- Building/Structure
- Installation

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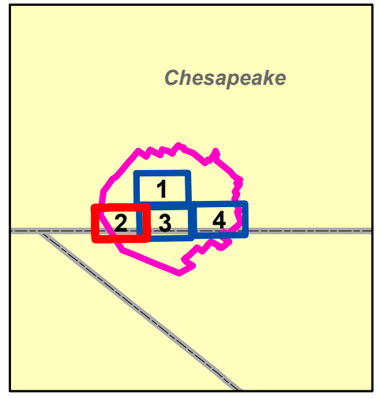
Additional tree identification attribute information is contained in the geodatabase and related table.

Site Location



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Feet

Appendix A: Prescribed Fire Plan
NSAHR Northwest Annex
Chesapeake, Virginia
Currituck, North Carolina

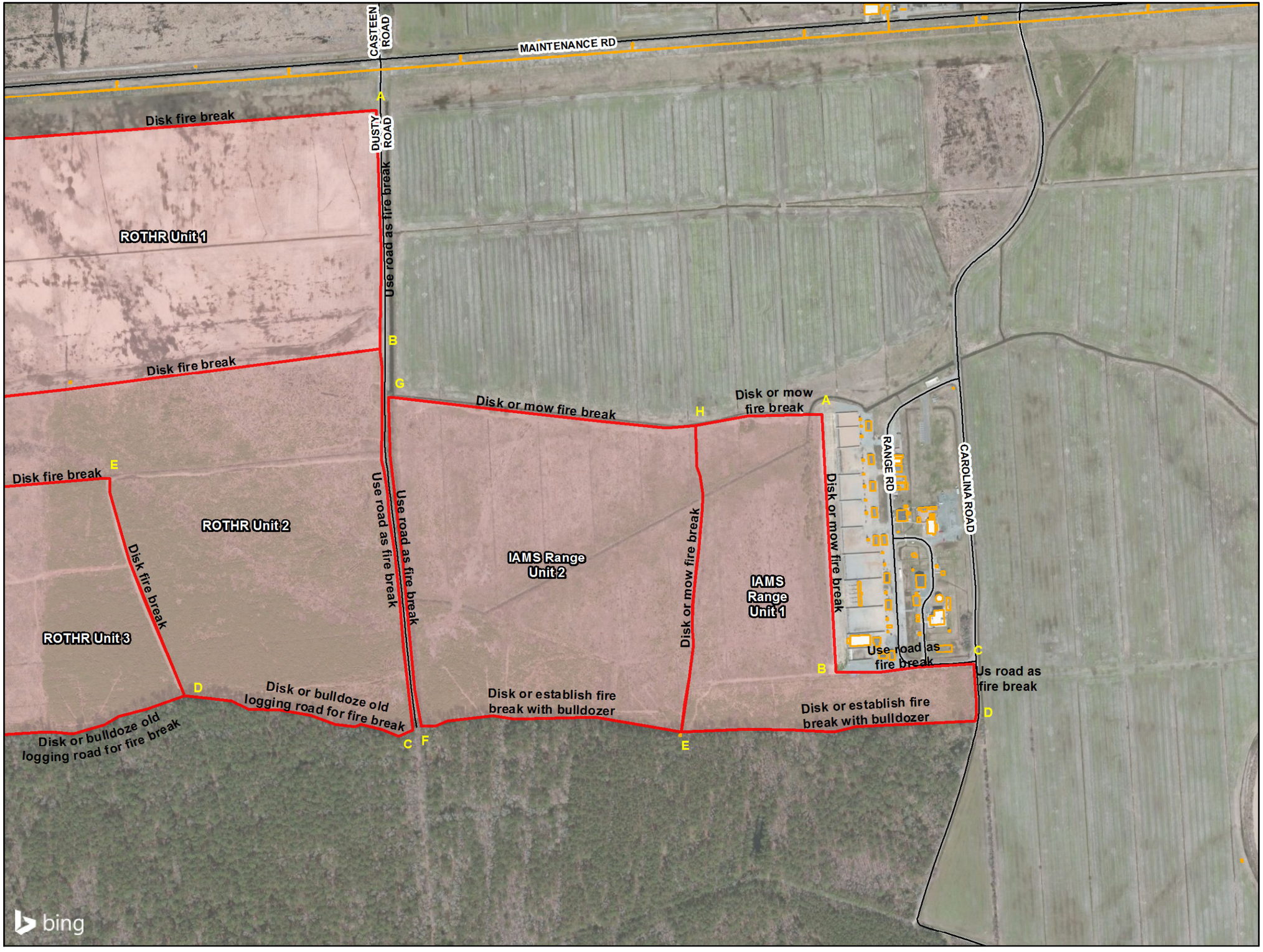
Prepared By: TETRA TECH

Date: 8/7/2017

Base Map; ESRI BING Map Service 2013
Boundary from Navy 2015.

Coordinate System: WGS 84
Projection WGS 84 UTM Zone 18N

G:\GIS_files\Nor-VB\MapDocs\UrbanForestry\NorthwestNorthwest_fire_mapbook.mxd MC

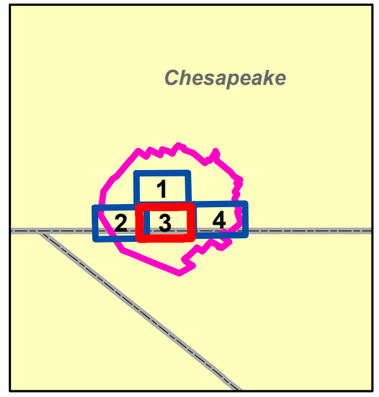


Legend

- Roads
- Stream
- Prescribed Fire Plan Areas
- Water Body
- Building/Structure
- Installation

NOTES:
Additional tree identification attribute information is contained in the geodatabase and related table.

Site Location



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Feet

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Appendix A: Prescribed Fire Plan
NSAHR Northwest Annex
Chesapeake, Virginia
Currituck, North Carolina

Prepared By:	Date:
TETRA TECH	8/7/2017

Base Map; ESRI BING Map Service 2013
Boundary from Navy 2015.

Coordinate System: WGS 84
Projection WGS 84 UTM Zone 18N

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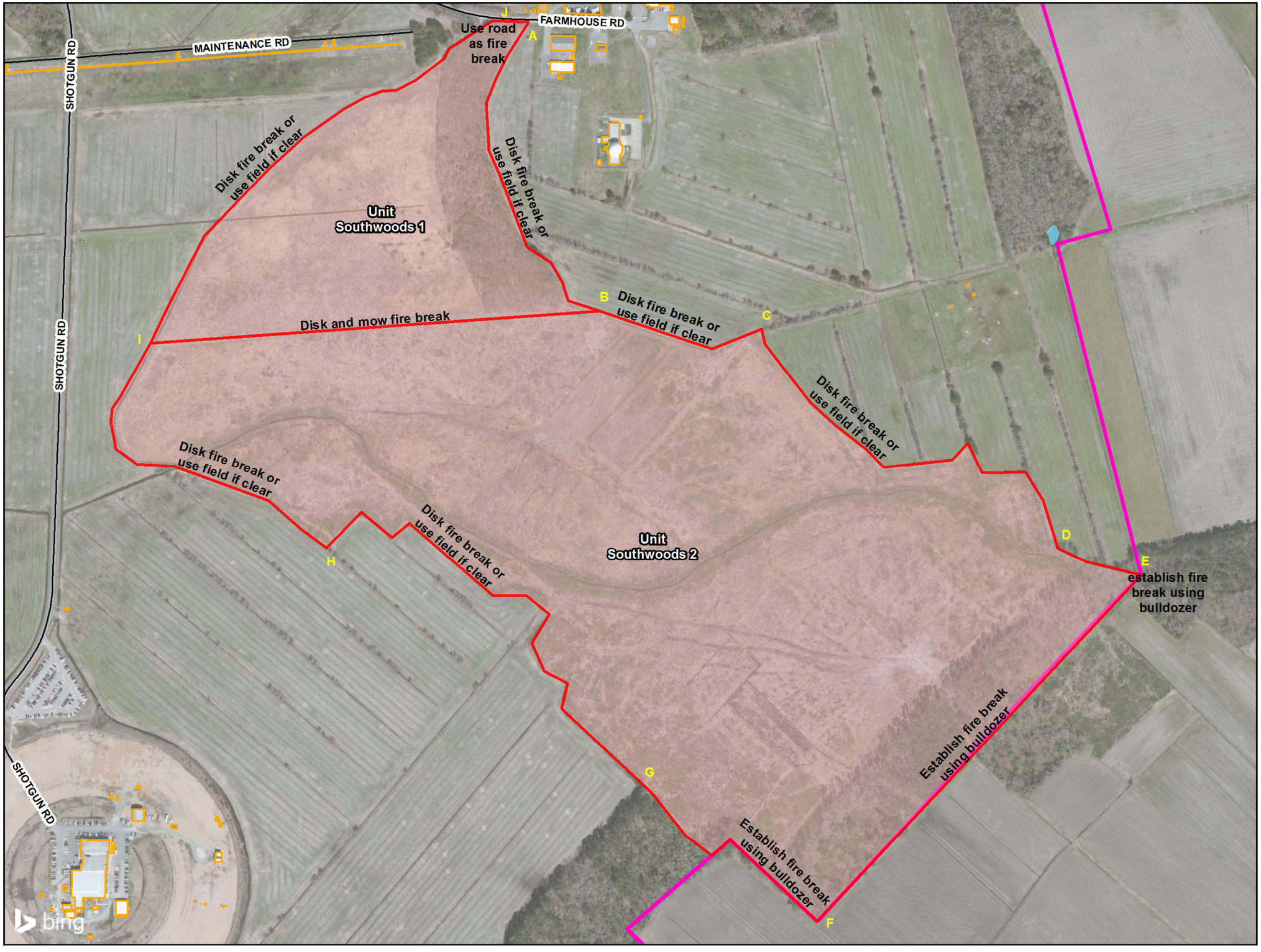
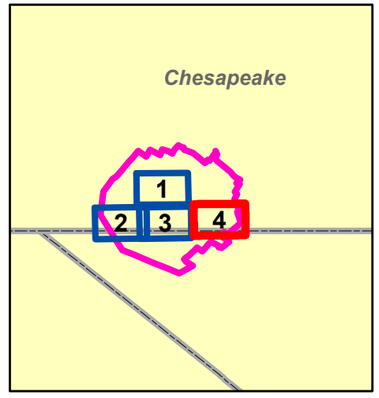


Legend

- Roads
- Stream
- Prescribed Fire Plan Areas
- Water Body
- Building/Structure
- Installation

NOTES:
Additional tree identification attribute information is contained in the geodatabase and related table.

Site Location



0 200 400 800
Feet

Page 4 of 4

Appendix A: Prescribed Fire Plan
NSAHR Northwest Annex
Chesapeake, Virginia
Currituck, North Carolina

Prepared By:	**Date:**
TETRA TECH	8/7/2017

Base Map; ESRI BING Map Service 2013
Boundary from Navy 2015.

Coordinate System: WGS 84
Projection WGS 84 UTM Zone 18N

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Appendix B: Technical Reviewer Checklist

Fill out this checklist based on the guidance provided in the Technical Review section in the *Interagency Prescribed Fire Planning and Implementation Procedures Guide*, PMS 484.

Rate each element in the following table with an "S" for Satisfactory or "U" for Unsatisfactory. Use Comment field as needed to support the element rating.

PRESCRIBED FIRE PLAN ELEMENTS	RATING	COMMENTS
1. Signature page		
2. A. Agency Administrator Ignition Authorization, PMS 485		
2. B. Prescribed Fire GO/NO-GO Checklist, PMS 486		
3. Complexity Analysis Summary		
4. Description of Prescribed Fire Area		
5. Objectives		
6. Funding		
7. Prescription: Prescription Narrative and Prescription Parameters		
8. Scheduling		
9. Pre-Burn Considerations and Weather		
10. Briefing		
11. Organization and Equipment		
12. Communication		
13. Public and Personnel Safety, Medical		
14. Test Fire		
15. Ignition Plan		
16. Holding Plan		
17. Contingency Plan		
18. Wildfire Declaration		
19. Smoke Management and Air Quality		
20. Monitoring		
21. Post-Burn Activities		
Appendix A: Maps		
Appendix C: Complexity Analysis		
Appendix D: Agency-Specific Job Hazard Analysis or Risk Assessment		
Appendix E: Fire Behavior Modeling Documentation or Empirical Documentation		
Appendix F: Smoke Management Plan and Smoke Modeling Documentation (Optional)		
Other		

☐ **Approval is recommended** subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.

☐ **Recommendation for approval is not granted**. Prescribed fire plan should be re-submitted for technical review subject to the completion of all requirements listed in the comments section, or on the Prescribed Fire Plan.

Technical Reviewer Signature: _____ Qualification and Currency: RXB2,

Date Signed:_____

Appendix C: Complexity Analysis

Prescribed Fire Complexity Rating System Guide Worksheet

NSAHR NWA 2018 / 2019

Project Name

Complexity elements:

1. Potential for Escape

Risk	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Fire spots into forest adjacent to ROTHR or Skeet units. Fire creeps through duff or along narrow strips of fuel by ditches.
Final Rating: *Low* *Moderate* *High*	Natural barriers and constructed fire breaks will limit the extent of any escape to adjoining areas. Holding resources will patrol lines frequently. Use planned weather with cool to cold air temps and constant wind direction will mitigate these risks.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Primary concern would be the potential escape into forested areas or if farm fields have grass and crop stubble that could burn. ROTHR unit has sensitive structures that are adjacent.
Final Rating: *Low* *Moderate* *High*	Risk to the structures is limited by completing pre-burn work to establish fire-breaks. Having adequate holding forces in place prior to ignition, and adhering to the burn prescription for temperature and wind direction.
Technical Difficulty	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Burn units are located within roadways, fuel-breaks, ditches, and agricultural fields. Secondary roads and barriers also exist beyond the individual burn units.
Final Rating: *Low* *Moderate* *High*	No change.

2. The Number and Dependency of Activities

Risk	Rationale
Preliminary Rating: *Low* *Moderate* *High*	This project will be a ground-based ignition. A moderate level of coordination is required between the holding and ignition resources to maintain safety and to properly regulate fire intensities.
Final Rating: *Low* *Moderate* *High*	Units are small and very manageable with the proposed equipment and personnel. Use personnel with burning experience.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Coordination failures could jeopardize timeliness of implementation, and the safety of fire personnel and the public. If all burn plan elements are not in place on burn day, ignition will not begin. Firing and holding are not in sync.
Final Rating: *Low* *Moderate* *High*	Ensure all aspects of burn plan are finished prior to day of burn. Follow the plan, conduct briefing, and ensure communications is in place.
Technical Difficulty	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	There will be a relatively small burn organization. Communication between all team members is necessary to maintain safe operations, particularly with regard to combining units in plan.
Final Rating: *Low* *Moderate* *High*	Communication procedures are identified and will be provided to all members on the burn. Coordinated activities are minimal.

3. Off-Site Values

Risk	Rationale
Preliminary Rating: *Low* *Moderate* *High*	Highways, Churches, military buildings, and dairy farms are located north and west of installation. The communities of Myock NC, and Hickory, VA are southeast and southwest. Smoke could impact these areas.
Final Rating: *Low* *Moderate* *High*	There are multiple fuel breaks between burn units and any values at risk to the northwest, west or southwest. Use prescribed weather to reduce any impacts from fire or smoke.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Units are small with many brakes in continuity of fuel. Use prescribed weather to accomplish objectives and have identified resources on-site.
Final Rating: *Low* *Moderate* *High*	No additional changes.
Technical Difficulty	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	No structure protection will be required. All units are readily accessible. Smoke impacts should be minimal when following prescription.
Final Rating: *Low* *Moderate* *High*	No change.

4. On-Site Values

Risk	Rationale
Preliminary Rating: *Low* *Moderate* *High*	Fire intensity could be higher than needed. Smoke could impact military structures and recreational areas. Hunting stands or pines get scorched. Smoke could impact ROTHR.
Final Rating: *Low* *Moderate* *High*	Use fire breaks and firing patterns to manage fire intensity. Make sure all fire breaks are in and clean prior to ignition. Secure all hunting stands prior to day of burn. Use prescribed weather. Communicate with ROTHR folks prior to burning to ensure particulate matter (PM) from smoke is cleared.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	It is highly unlikely the on-site resources could be negatively impacted by the project using prescribed weather and resources.
Final Rating: *Low* *Moderate* *High*	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Resource values within the unit are easily protected through normal planning process and burn day activities or site preparation work.
Final Rating: *Low* *Moderate* *High*	No change.

5. Fire Behavior

Risk	Rationale
Preliminary Rating: ***Low Moderate High***	Fire behavior in grass is fast and hot. Heavy fuel loads will add to fire intensity and spotting potential. Ground fire could cause smoke issues
Final Rating: ***Low Moderate High***	The terrain is flat, making fire behavior predictable. Easy access to all units by equipment will provide water if needed. Use planned firing patterns to manage fire behavior. Pay attention to on-site water / KBDI.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low Moderate High***	These are small units and very manageable. Fuels outside the units should be similar with many natural barriers to fire. Fire behavior in these areas is predictable and easily contained.
Final Rating: ***Low Moderate High***	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low Moderate High***	The terrain is flat. Ignition techniques are for the most part simple. Some units have the potential to burn with great intensity, so care must be taken to manage ignitions. Short-range spotting outside the units can be addressed by direct attack.
Final Rating: ***Low Moderate High***	No change.

6. Management Organization

Risk	Rationale
Preliminary Rating: *Low* *Moderate* *High*	These burns could be conducted with a very mixed crew from different organizations. Internal coordination could hamper project implementation. Media personnel will be interested in smoke source.
Final Rating: *Low* *Moderate* *High*	A PIO will be assigned if media interest is high. The burn crew needed is small. All internal coordination will take place annually and 48 hours prior to ignition.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Problems related to communications could lead to safety violations, confusion as to response and tactics, or the increased risk of a fire escape.
Final Rating: *Low* *Moderate* *High*	Pre-burn briefings and communication checks will mitigate these concerns. Internal planning is done throughout life of this burn plan.
Technical Difficulty	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Burn team members may not have worked with each other, due to the mix of other state, federal, local cooperators or contractor. Coordination and communication internally changes when commands change.
Final Rating: *Low* *Moderate* *High*	Communications and working procedures have been established and are used frequently. Pre-burn briefing between all team members prior to implementation.

7. Public and Political Interest

Risk	Rationale
Preliminary Rating: *Low* *Moderate* *High*	The community of Hickory and Myock, NC are southwest and southeast. Potential impacts which would generate interest include visibility and air quality, and the potential to involve government structures and improvements. Local media will be interested if these impacts occur.
Final Rating: *Low* *Moderate* *High*	Threats to improvements will be mitigated by having adequate holding forces on hand prior to ignition, by ensuring that natural and constructed fuel breaks are adequate, and air quality issues mitigated by burning under specified wind and atmospheric conditions. Use PIO to manage media interest.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Normal activities may require some public and media contact. Unexpected or adverse events would attract public, political and media interest. Local notification within the area will be conducted.
Final Rating: *Low* *Moderate* *High*	The Navy and cooperators have made efforts to educate the public and develop positive relations. The assigned PIO will work local political and media interests.
Technical Difficulty	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Contacts will be made with local agencies, internal programs, and select media members on or prior to the burn day. Press releases and internal / external public notices will be given leading up to the start of the project. A Public/Fire Information Officer will be designated prior to burn days.
Final Rating: *Low* *Moderate* *High*	No change.

8. Fire Treatment Objectives

Risk	Rationale
Preliminary Rating: ***Low*** *Moderate* *High*	Treatment objectives are non-competing which makes success easier. These are easily achieved under proper environmental conditions. Fire behavior and weather monitoring are easily conducted.
Final Rating: ***Low*** *Moderate* *High*	No change
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate* *High*	Burning is the best means to reduce the accumulated natural fuels. Failure to burn has negatively impacted resource management objectives for the units.
Final Rating: ***Low*** *Moderate* *High*	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate* *High*	Treatment objectives are simple, and easily achievable with favorable burning conditions. A long burn season allows for adequate time to complete critical units within established prescriptions.
Final Rating: ***Low*** *Moderate* *High*	No change

9. Constraints

Risk	Rationale
Preliminary Rating: *Low* ***Moderate*** *High*	Availability of burning windows, coordination with military missions, funding, base access, and timeliness of all phases are very possible.
Final Rating: *Low* ***Moderate*** *High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** *Moderate* *High*	The burning may not get accomplished under ideal conditions. No burning due to poor coordination. Due to small units and length of burn season and time to coordinate, burning should get accomplished.
Final Rating: ***Low*** *Moderate* *High*	No change
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate* *High*	Good coordination and communication should reduce any issues. Getting funding and all phases of burn program planned will reduce complexity.
Final Rating: ***Low*** *Moderate* *High*	No change.

10. Safety

Risk	Rationale
Preliminary Rating: ***Low Moderate High***	This is a ground-based ignition, personnel need to minimize exposure to smoke. This is a cool season / winter project, and personnel will be working in wet areas. Operations may be conducted from UTV or by foot.
Final Rating: ***Low Moderate High***	Wearing approved / required PPE will reduce burn potential but exposure to smoke will need to be monitored. UTV or ATV operators will be trained on equipment. Use motorized equipment in wetter areas.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low Moderate High***	Fire behavior is expected to be in manageable range. Escape routes and safety zones must be identified if personnel are conducting ground-based ignition. Crew will monitor each other.
Final Rating: ***Low Moderate High***	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low Moderate High***	Safety zones will be readily available, due to the proximity of roads, water, natural barriers. Ignition crew safety requires extra attention if conducting ground ignition. Thorough briefings prior to all operations will help mitigate risks.
Final Rating: ***Low Moderate High***	No change.

11. Ignition Procedures/Methods

Risk	Rationale
Preliminary Rating: *Low* *Moderate* *High*	Coordination between Burn Boss, and ground-based igniters is important to ensure safety and regulate fire intensity. Independent ground ignition methods will be simple, and may involve 1-2 ignition teams.
Final Rating: *Low* *Moderate* *High*	No change.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Fire intensities and pace of ignition must be regulated as much as possible until perimeters are secure to avoid potential safety issues or fire escapes.
Final Rating: *Low* *Moderate* *High*	Burn units are small and using prescribed weather will reduce issues.
Technical Difficulty	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Some coordination will be needed to make sure ignition does not compromise ground personnel.
Final Rating: *Low* *Moderate* *High*	No change

12. Interagency Coordination

Risk	Rationale
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Some coordination with the state, and local police and fire departments will also be needed. This coordination has been on-going through navy programs.
Final Rating: ***Low*** ***Moderate*** ***High***	No change.
Potential Consequences	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Prescribed fire work has been on-going for many years by cooperators. A good working relationship exists, which should not be effected by coordination or communication issues.
Final Rating: ***Low*** ***Moderate*** ***High***	No change.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** ***Moderate*** ***High***	Coordination has been on-going. No problems are anticipated. Interagency resources should be available, if needed.
Final Rating: ***Low*** ***Moderate*** ***High***	No change

13. Project Logistics

Risk	Rationale
Preliminary Rating: *Low* *Moderate* *High*	Internal coordination between naval programs is important for the success of these burns. Access to units maybe restricted due to military missions.
Final Rating: *Low* *Moderate* *High*	This will be mitigated with good planning.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Failure to provide proper support could compromise project. Transport of specialized equipment may need some additional time and planning.
Final Rating: *Low* *Moderate* *High*	Coordination 48 hours in advance of ignition will mitigate equipment transport and other logistical issues. Constant Internal communication.
Technical Difficulty	**Rationale**
Preliminary Rating: *Low* *Moderate* *High*	Contractor or cooperators will be self-supporting.
Final Rating: *Low* *Moderate* *High*	No change.

14. Smoke Management

Risk	Rationale
Preliminary Rating: *Low* ***Moderate*** *High*	This project will produce highly noticeable smoke for all burn units. Effects will be short-term, however, due to the expected rapid burn-out of fuels. There should be minimal impacts to communities, military facilities, and public roads. Burning under the wrong wind or atmospheric conditions would pose a moderate risk.
Final Rating: ***Low*** *Moderate High*	Adhering to the burn prescription will mitigate these risks.
Potential Consequences	**Rationale**
Preliminary Rating: *Low* ***Moderate*** *High*	The closest populated area for smoke impact are homes along Ballhack RD. and dairies north of installation.. There could be some visual impairment during the burns if the wind direction and dispersion index is poor.
Final Rating: ***Low*** *Moderate High*	Smoke direction and lift will be monitored during the burn, and post-burn patrols will be conducted to ensure there are no residual fire problems. Small units allow burn to be completed quickly or cutoff if needed.
Technical Difficulty	**Rationale**
Preliminary Rating: ***Low*** *Moderate High*	Wind and atmospheric conditions are specified in the burn plan to mitigate smoke impacts. Some coordination with State and Local fire and law enforcement personnel will be needed on burn days.
Final Rating: ***Low*** *Moderate High*	No change.

COMPLEXITY RATING SUMMARY

RISK: OVERALL RATING Low

POTENTIAL CONSEQUENCES: OVERALL RATING Low

TECHNICAL DIFFICULTY: OVERALL RATING Low

SUMMARY COMPLEXITY RATING: Low

RATIONALE: All units will be burned by hand which requires good coordination and communication. It has been several years since burning has been conducted on the Installation which adds some complexity. Smoke will be mitigated by using prescribed weather but drainage and smoke dispersion still has to potential to affect the public. Broken continuity of fuels, sparse population surrounding NSAHR NWA allows for several wind directions and small burn units make this a low complexity project.

Prepared by: Carolina Silvics, Inc. Date: 05/28/2017

Approved by: _____ Date: _____

(Agency Administrator)

Appendix D: Fire Behavior Modeling Documentation or Empirical Documentation

Refer to Element 7: Prescription, *in the Interagency Prescribed Fire Planning and Implementation Procedures Guide*, PMS 484, to fill out this appendix.

Description of fire danger indices is provided in section 4.1.2 of the Installation Wildland Fire Management Plan.

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BehavePlus 5.0.5 (Build 307)

NSAHR NWA 2018/2019 Prescribed Burns

Fri, Jun 02, 2017 at 14:02:56

Input Worksheet

Inputs: SURFACE

Input Variables	Units	Input Value(s)
Fuel/Vegetation, Surface/Understory		
Fuel Model		TL6,GR6,GS3,TL8,
Fuel Moisture		
1-h Moisture	%	6
10-h Moisture	%	8
100-h Moisture	%	16
Live Herbaceous Moisture	%	75
Live Woody Moisture	%	75
Weather		
Midflame Wind Speed (upslope)	mi/h	1,2,3,4,5,6,7
Terrain		
Slope Steepness	%	0
Notes		

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind is blowing upslope [SURFACE].

Results for: Surface Rate of Spread (maximum) (ch/h)

Fuel	Midflame Wind Speed (upslope)

Model	mi/h						
	1	2	3	4	5	6	7
tl6	1.1	2.0	3.1	4.4	6.0	7.7	9.5
gr6	6.4	13.7	23.4	34.9	48.1	62.8	78.8
gs3	4.7	9.8	15.9	22.9	30.5	38.8	47.5
tl8	1.3	2.2	3.3	4.6	6.1	7.7	9.4

Results for: Flame Length (ft)

Fuel	Midflame Wind Speed (upslope)						
Model	mi/h						
	1	2	3	4	5	6	7
tl6	1.2	1.6	2.0	2.3	2.7	3.0	3.3
gr6	4.1	5.9	7.5	9.0	10.4	11.8	13.1
gs3	3.1	4.4	5.5	6.4	7.4	8.2	9.0
tl8	1.6	2.1	2.5	3.0	3.4	3.7	4.1

End

BehavePlus 5.0.5 (Build 307)

NSAHR NWA 2018/2019 Adjacent fules

Fri, Jun 02, 2017 at 14:21:43

Input Worksheet

Inputs: SURFACE

Input Variables	Units	Input Value(s)
Fuel/Vegetation, Surface/Understory		
Fuel Model		TU3,GR6
Fuel Moisture		
1-h Moisture	%	6
10-h Moisture	%	8
100-h Moisture	%	16
Live Herbaceous Moisture	%	75
Live Woody Moisture	%	75
Weather		
Midflame Wind Speed (upslope)	mi/h	1,2,3,4,5,6,7
Terrain		
Slope Steepness	%	0
Notes		

Run Option Notes

Maximum reliable effective wind speed limit IS imposed [SURFACE].

Calculations are only for the direction of maximum spread [SURFACE].

Fireline intensity, flame length, and spread distance are always for the direction of the spread calculations [SURFACE].

Wind is blowing upslope [SURFACE].

Results for: Surface Rate of Spread (maximum) (ch/h)

Fuel	Midflame Wind Speed (upslope)

Model	mi/h						
	1	2	3	4	5	6	7
tu3	4.2	8.7	14.1	20.1	26.8	33.9	41.5
gr6	6.4	13.7	23.4	34.9	48.1	62.8	78.8

Results for: Flame Length (ft)

Fuel	Midflame Wind Speed (upslope)						
Model	mi/h						
	1	2	3	4	5	6	7
tu3	3.1	4.3	5.3	6.3	7.2	8.0	8.8
gr6	4.1	5.9	7.5	9.0	10.4	11.8	13.1

End

Appendix E

Post Burn Patrol log	**PROJECT NAME:**	**NSAHR NWA PRESCRIBED FIRE PLAN 2018/2019**
	BURN UNIT NAME:	**Unit: Skeet, IAMS Range 1&2, ROTHR 1-4, Supplywoods 1&2, and Lunker Lake**
	POST BURN PERIOD PATROL LOG	

PATROL DATE: PATROL TIME:				
# DAYS SINCE BURN UNTIL MOISTURE RECEIVED				
PRECIPITATION AMOUNT				
PRECIPITATION DURATION (HRS)				
WIND DIRECTION & SPEED				
OBSERVED PRESENCE OF NEEDLE CAST? Yes or No				
SMOKE – FOG POTENTIAL (index)				
1000 HOUR FUEL MOISTURE (from closest weather station)				
KEECH BYRAM DROUGHT INDEX				
ESTIMATED AREA OF ACTIVE FIRE				
PRESENCE OF GROUND FIRE? Yes or No				
VISIBILITY ON ROADWAYS (Distance)				
SMOKE SENSITIVE TARGETS IMPACTED? Yes or No				
INITIALS OF PATROLLER				

Environmental parameters discussion, or description of empirical evidence utilized:

Documented patrol information:

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APPENDIX D. FIRE DANGER INDICES

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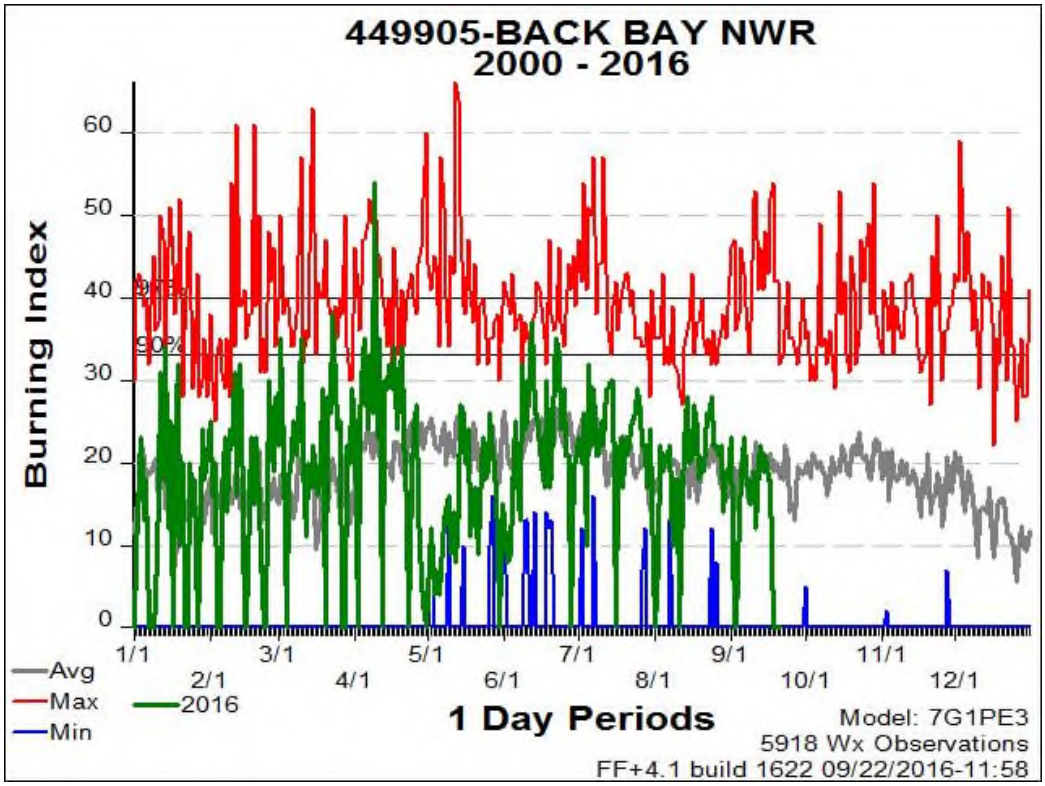
449905-BACK BAY NWR
2000 - 2016
Burning Index
60
50
40
30
20
10
0
97%
90%
1/1
3/1
5/1
7/1
9/1
11/1
2/1
4/1
6/1
8/1
10/1
12/1
Avg
Max
Min
2016
1 Day Periods
Model: 7G1PE3
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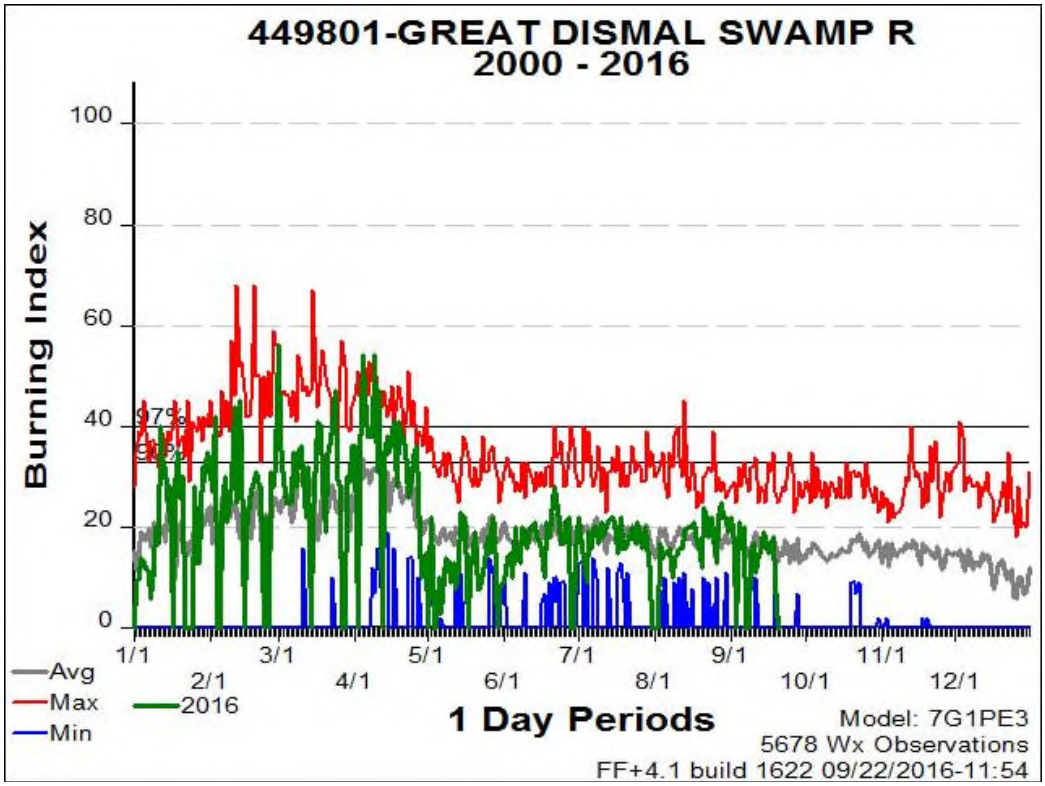
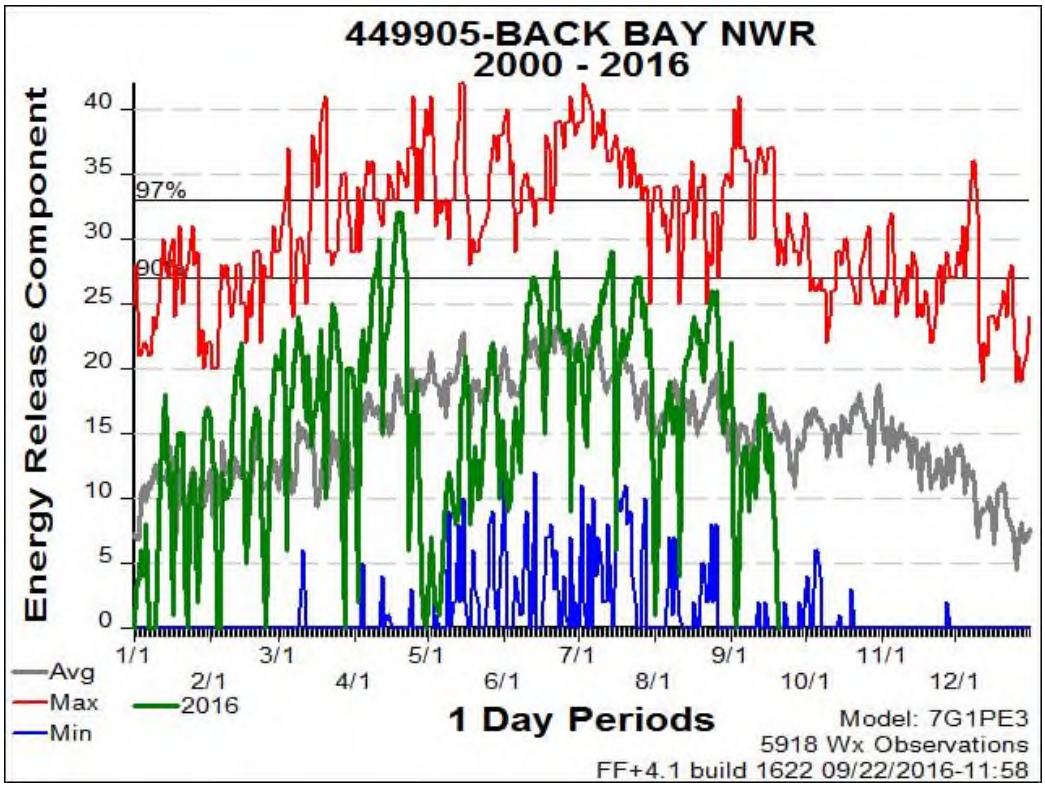
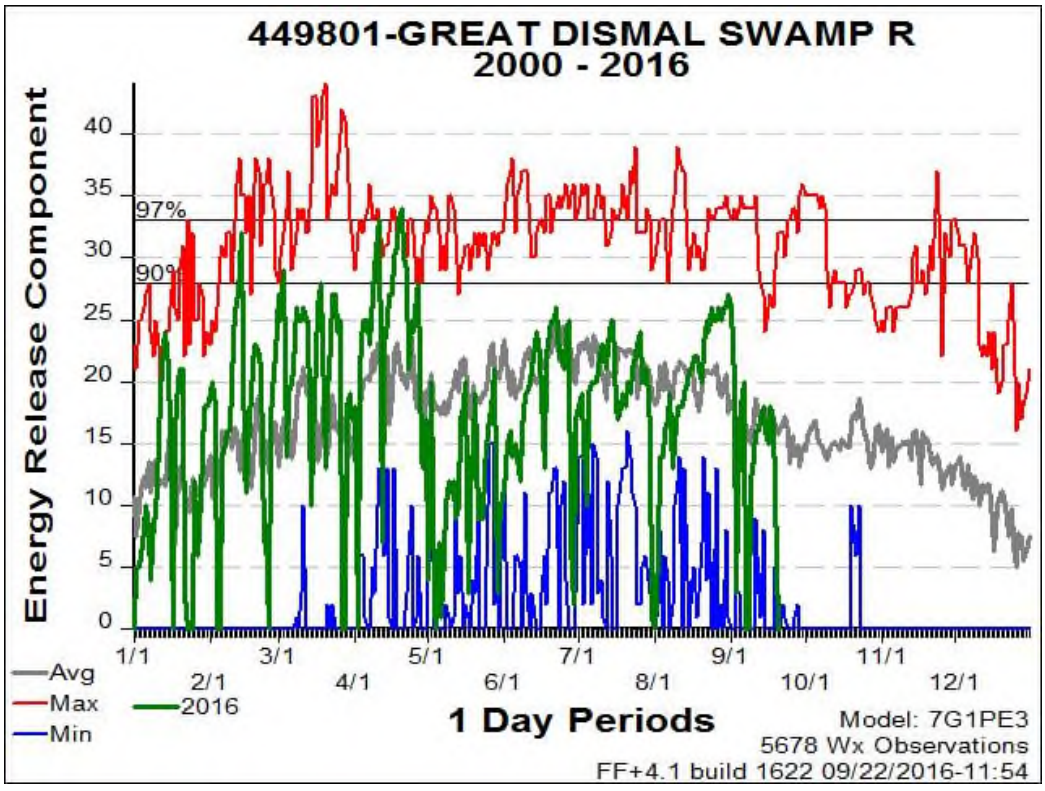
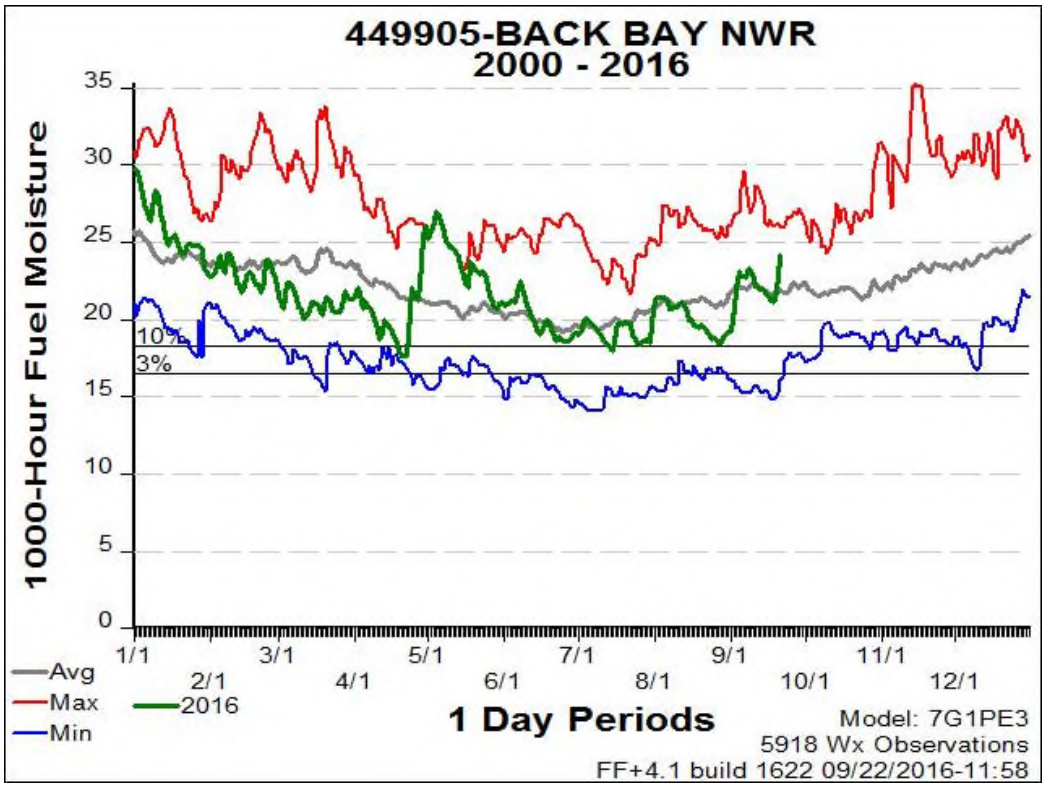
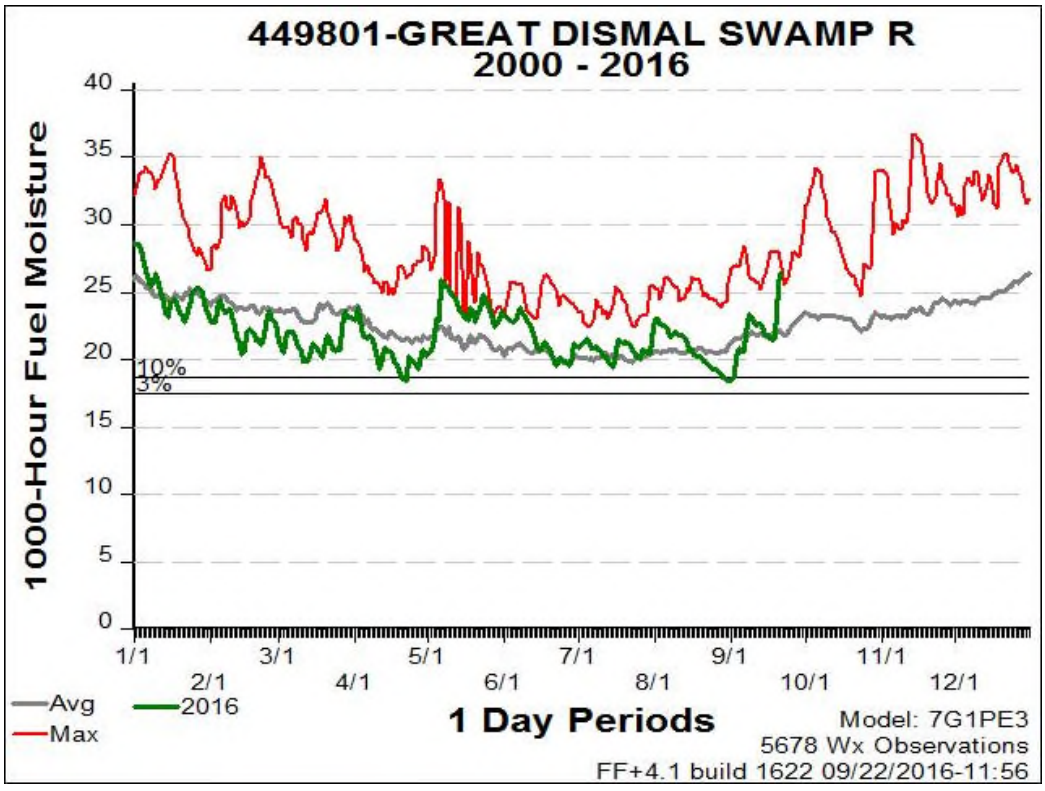
FF+4.1 build 1622 09/22/2016-11:58

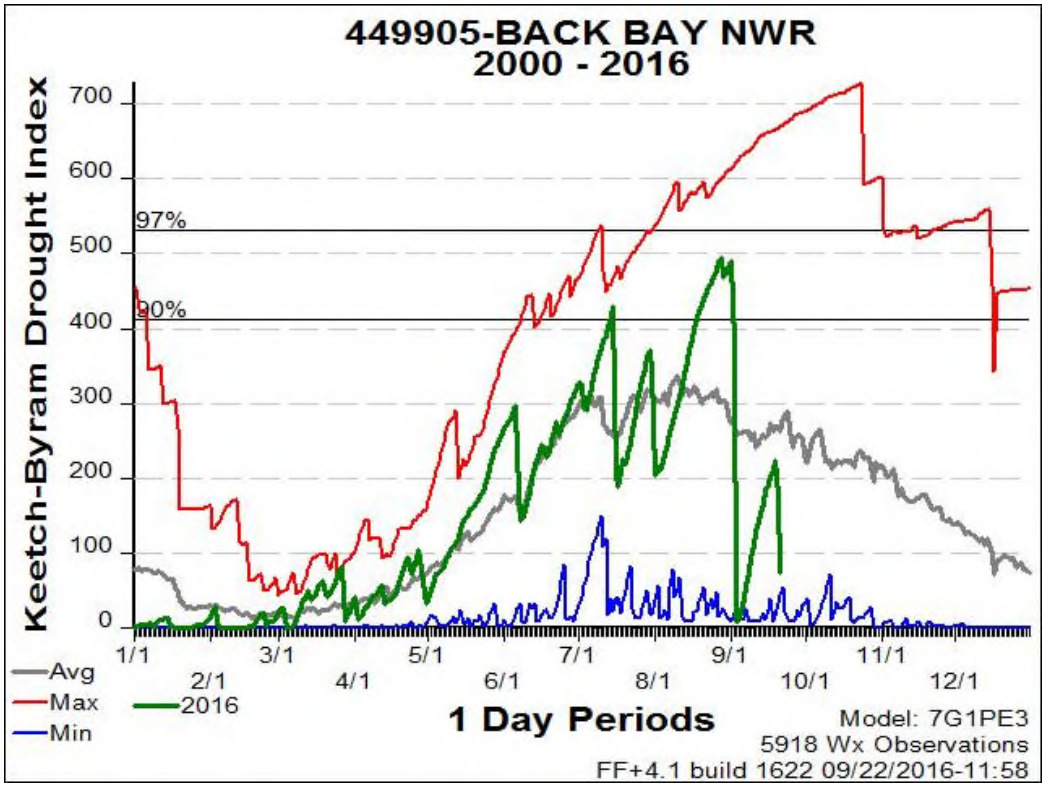

449801-GREAT DISMAL SWAMP R
2000 - 2016
Burning Index
100
80
60
40
20
0
97%
90%
1/1
3/1
5/1
7/1
9/1
11/1
2/1
4/1
6/1
8/1
10/1
12/1
Avg
Max
Min
2016
1 Day Periods
Model: 7G1PE3
5678 Wx Observations
FF+4.1 build 1622 09/22/2016-11:54

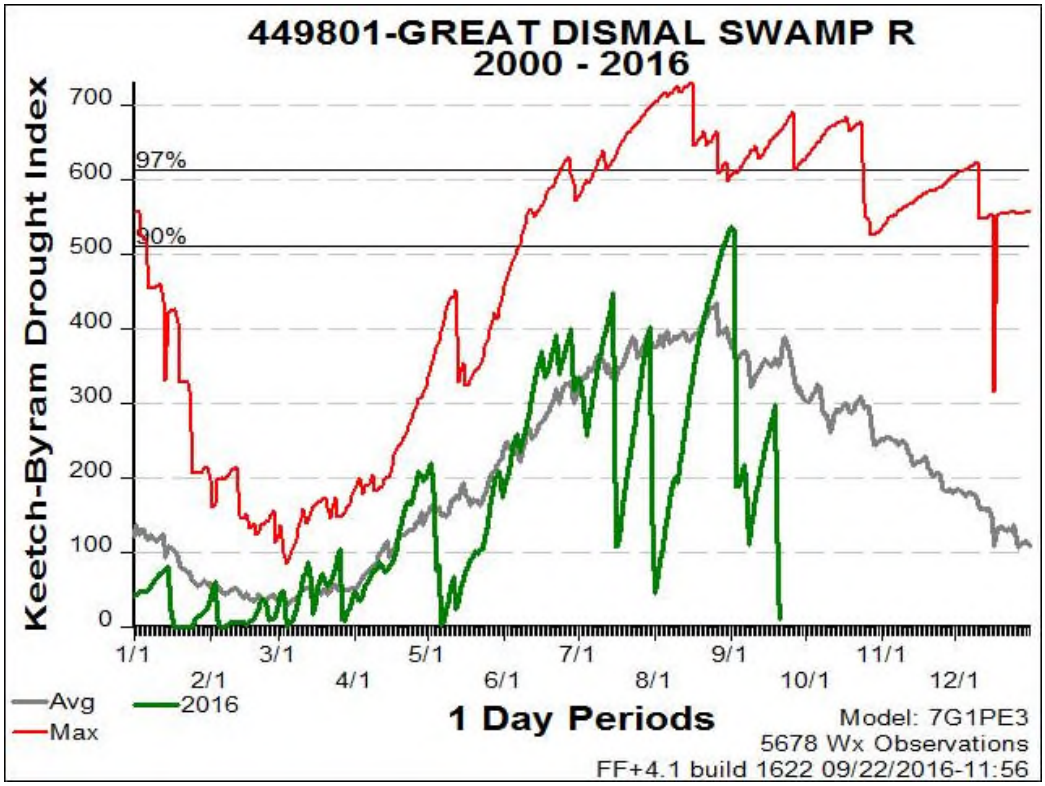

449905-BACK BAY NWR
2000 - 2016
Energy Release Component
40
35
30
25
20
15
10
5
0
97%
90%
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Avg
Max
Min
2016
1 Day Periods
Model: 7G1PE3
5918 Wx Observations
FF+4.1 build 1622 09/22/2016-11:58


449801-GREAT DISMAL SWAMP R
2000 - 2016
Energy Release Component
40
35
30
25
20
15
10
5
0
97%
90%
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Avg
Max
Min
2016
1 Day Periods
Model: 7G1PE3
5678 Wx Observations
FF+4.1 build 1622 09/22/2016-11:54


449905-BACK BAY NWR
2000 - 2016
1000-Hour Fuel Moisture
35
30
25
20
15
10
5
0
10%
3%
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Avg
Max
Min
2016
1 Day Periods
Model: 7G1PE3
5918 Wx Observations
FF+4.1 build 1622 09/22/2016-11:58


449801-GREAT DISMAL SWAMP R
2000 - 2016
1000-Hour Fuel Moisture
40
35
30
25
20
15
10
5
0
10%
3%
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Avg
Max
2016
1 Day Periods
Model: 7G1PE3
5678 Wx Observations
FF+4.1 build 1622 09/22/2016-11:56


449905-BACK BAY NWR
2000 - 2016
Keetch-Byram Drought Index
700
600
97%
500
90%
400
300
200
100
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Avg
Max
Min
2016
1 Day Periods
Model: 7G1PE3
5918 Wx Observations
FF+4.1 build 1622 09/22/2016-11:58


449801-GREAT DISMAL SWAMP R
2000 - 2016
Keetch-Byram Drought Index
700
600
97%
500
90%
400
300
200
100
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Avg
Max
2016
1 Day Periods
Model: 7G1PE3
5678 Wx Observations
FF+4.1 build 1622 09/22/2016-11:56

Enclosure 6. Naval Support Activity Northwest Annex Prescribed Burn Plan

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NAVAL SUPPORT ACTIVITY NORFOLK, NORTHWEST ANNEX (NAVSUPPACT NW)

PRESCRIBED BURN PLAN AND SMOKE MANAGEMENT PLAN

Prepared by: _____ Date: _____
Natural Resources Specialist, NAVFAC MidLant PWD Oceana, Environmental (757) 433-2883

Reviewed by: _____ Date: _____
Regional Natural Resources Manager, NAVFAC MidLant (757) 462-8564 ext. 388

Reviewed by: _____ Date: _____
Environmental Division Director, NAVFAC MidLant PWD Oceana, Environmental (757) 433-3437

Reviewed by: _____ Date: _____
Public Works Officer, NAVSUPPACT NW, (757) 421-8801

Reviewed by: _____ Date: _____
NAVSUPPACT NW Security Officer, (757) 421-8181

Reviewed by: _____ Date: _____
Navy Region Mid-Atlantic Fire and Emergency Services, (757) 433-3258

Approved by: _____ Date: _____
Officer-in-Charge, NAVSUPPACT NW, (757) 421-8201

Approved by: _____ Date: _____
Commanding Officer, NAVSUPPACT Norfolk, (757) 836-1488

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Need to make sure that we identify needed roadways to ensure proper access for fire suppression. New roads would require NEPA review. Old roads not being maintained need to be maintained.

http://www.dfr.state.nc.us/fire_control/fire_control.htm

PRESCRIBED BURN PLAN AND SMOKE MANAGEMENT PLAN 2008

DEFINITION: Prescribed, or controlled, burning is defined as skillfully applying fire to forest and grassland fuels, in a definite place, for a specific purpose, and under exacting conditions to achieve management objectives. For the purposes of this plan, all burning will be accomplished by the strip-head fire technique although backing fires may be used under certain conditions to minimize smoke impacts. Literature describing prescribed burn techniques is available upon request.

PURPOSE/JUSTIFICATION: The main objectives of controlled burning are to reduce forest fuel (i.e. pine needles, fallen wood, leaves, etc.) accumulations and thick understory, improve wildlife habitat, reduce potential for an uncontrollable fire, and to maintain vegetation in compliance with security and antenna requirements. Specifically at NAVSUPPACT NW, prescribed burning will be used to clear antenna array sites of woody vegetation as well as for forest management and wildlife habitat management purposes. This procedure is described in the NAVSUPPACT NW Integrated Natural Resources Management Plan. Prescribed burning is the most economical, practical and commonly used method of site preparation to meet management and maintenance goals at these sites.

TIME FRAME/SEASON: This plan will be valid upon signature until 30 November 2008. Virginia State Code 10.1-1142-B designates the period from February 15 to April 30 as fire season. The general public is prohibited from any burning before 1600 hours. Federal facilities are exempt from state law due to exclusive jurisdiction, but should comply with the intent of the law. Top priority should be given to prescribed burning when appropriate conditions are present, since there are few acceptable days available for burning in this region.

SPECIAL CONSIDERATIONS: When burning on the North Carolina side of the installation, North Carolina requires a burning permit, which may be obtained at Old's Auto Supply & Service Inc., (919) 435-6366 adjacent to Hardees in Moyock at no cost. The burning permit can be obtained the same day that the burning is planned and dates are specified on the permit.

When burning near the ROTHR antenna, firebreaks will be no closer than 20' from the clearly marked (grey with red stripes) ROTHR antenna ground screen boundary poles. No vehicles will be parked south of the boundary poles for a minimum of 565'. Wildland firefighting vehicles are authorized to park on the north side of the antenna service road (two wheels on asphalt, two on grass). No heavy equipment except the natural resources 5300 John Deere tractor (used for firebreaks) and natural resources ATV will utilize the antenna service road.

FSSC Facilities will be notified prior to commencing burning adjacent to the ROTHR antenna array at ROTHR POC Mr. Chris Long cell: 757-675-3303 and/or the ROTHR Watch Officer: 757-421-8742.

SMOKE MANAGEMENT PLAN: Each Burn Area will specify required conditions upon which burning may take place to minimize impacts to identified downwind sensitive smoke receptors. These sensitive targets include antennas, roadways, buildings, the IAMS range, and neighborhoods north of the installation on Ballahack Road. Note that certain low priority areas may be burned in advance of higher priority areas to provide crew training, to test communication procedures and insure equipment is working properly. Some of these areas are smaller than high priority burn areas and are located in accessible and secure locations.

DESCRIPTION OF BURN AREAS:

Locations of proposed burn areas are shown in Appendix D.

Description of Burn Areas are detailed to include the impetus for each site, total acreage, any critical information specific to each area, and if the site contains hunting areas. Descriptions also include the level of growth succession and vegetation contained in the areas. In addition, preferred wind direction, boundaries of each burn area, and firebreaks are specified.

Burn areas have been categorized either as high priority, mid-level priority, or low priority. High priority sites are shown in the overall map included in this plan. Those sites labeled with a high priority will be burned first, dependent upon weather conditions and availability of personnel, to maintain mission essential operations or reduce heavy fuel loads. It is recommended that areas containing the state threatened canebrake rattlesnake population be burned before 1 April.

Sites 1,2, 3A and 8 will be burned to control vegetation in the ROTHR Clear Zones. These sites have a high priority since vegetation will interfere with the operational needs of FSSC if this vegetation is not controlled. Site 5 is a high priority because it contains an underground cable and vegetation must be controlled so that root systems do not interfere with this cable. Site 7 is a high priority because it contains a high amount of fuel loads and is adjacent to the IAMS range. Site 9 is a high priority due to heavy fuel loads and is adjacent to buildings. Site 11 is a high priority due to its large amount of forest fuel in the area. All other sites will be burned for wildlife management purposes and/or to control understory growth in timber stands.

The remaining sites will be burned provided that adequate personnel and weather is available during the burn season. All natural firebreaks will be mowed and disked or plowed through use of a fire plow or tiller.

Burn Area 1 is prescribed in order to control vegetation in the ROTHR clear zone. It contains approximately 70 acres. This is a non-hunting area. It is an early successional field containing mostly grasses with some shrubbery. This area was successfully burned in 2004. Burning will

require easterly winds. Boundaries are defined by the ROTHR antenna maintenance road on the north, Dusty Road on the east, and forested areas on the south and west. These boundaries also serve as the firebreaks with the south and west boundaries being mowed and disked. Area 1 will be burned consecutively in two sections, a section between the ROTHR maintenance road and the ditch, and a section between the ditch and the treeline. Each section will be divided into three subsections. The section farthest from the direction of the prevailing winds will be burned first to enhance established firebreaks.
(Priority: High)

Burn Area 2 is prescribed in order to control vegetation in the ROTHR clear zone. It contains approximately 15 acres. This is an early successional field containing sweetgum, red maple, loblolly pine and understory growth. Burning will require north, northwest or northeasterly winds. Boundaries are defined by agricultural fields on the northwestern and southwestern boundaries, a firebreak on the eastern boundary, and forested areas on the southern boundary. These boundaries also serve as firebreaks and will be mowed and disked. Area 2 will be burned in two sections, a section between the ROTHR antenna ground screen and ditch, and a section between the ditch and the treeline.
(Priority: High)

Burn Area 3 has approximately 6 acres and is divided into two sections, 3A and 3B. 3A is significant in that it must be cleared for the ROTHR antenna. It has mid-successional growth containing loblolly pine, oak, and wax myrtle. Burning will require north, northwest or northeasterly winds. 3B is a non-critical area which could be converted for agricultural purposes. It has mid-successional growth containing mostly loblolly pine. Burning will require north or northeasterly winds. Boundaries for both 3A and 3B are defined by roads on the northern boundary, agricultural fields on the eastern boundary, a forested area on the southern boundary, and a firebreak on the western side. All natural edges of these areas will be mowed and disked to establish firebreaks. 3A will be burned first and 3B will be assessed for future burning.
(3A Priority: High)

Burn Area 4 is a mid-level priority area adjacent to the ROTHR antenna which will be burned for wildlife management and fuel reduction. It contains approximately 2 acres. It is an early to mid-successional field containing mostly understory vegetation of goldenrod, trumpet vine, and cane with a few loblolly pine, sweetgum, and red maple trees. Any wind direction can accommodate this area for burning. Boundaries are defined by Relay Road on the northern boundary, Shotgun Road on the eastern boundary, ROTHR maintenance road on the south, and an agricultural field on the western and southern sides. Firebreaks are provided by paved roads on the northern and eastern boundaries and agricultural fields provide the firebreaks on the southwestern boundary. This area will be burned in one section. This area is optional for demonstration purposes and for training of new crew personnel.
(Priority: Mid-level)

Burn Area 5 is prescribed to destroy woody vegetation to control root systems to prevent interference with an underground cable on site. This area is composed of approximately 2 acres. It is an early successional field containing mostly understory vegetation of goldenrod,

trumpet vine, and cane with a few loblolly, sweetgum, and red maple trees. Burning will require a north or east wind. Boundaries are defined by Farmhouse Road and an agricultural field on the north, and agricultural fields on the east, south and west. The road and agricultural fields will provide adequate firebreaks. This area will be burned in one section.
(Priority: High)

Burn Area 6 is prescribed to remove fuels but is a non-critical area. It is approximately 13 acres in size. This area is significant because the state endangered species of canebrake rattlesnake are prevalent here. This area has mid to late successional growth containing a dense stand of pine. A backing fire in combination with a head fire is recommended. Burning will require an east, north or south wind. Boundaries are defined by Dusty Road on the eastern boundary, ROTHR Antenna Maintenance Road on the southern boundary, and forested areas on the western and northern boundaries. Roads on the eastern and southern boundaries will provide firebreaks. Mowed and disked firebreaks will be established on the western and northern boundaries. This area will be burned in four sections.
(Priority: Low)

Burn Area 7 is prescribed because it contains heavy fuel loads and is adjacent to the IAMS range. This area must be burned when the range is inactive. The area contains approximately 55 acres and is designated as a hunting area. This area contains mature forests consisting of loblolly pine and deciduous trees. A wind direction ranging from southwest to southeast must be present. Boundaries are defined by Carolina Road on the eastern boundary, Red River Road on the southern boundary, Dusty Road on the western boundary, and the IAMS range and an agricultural field on the northern boundary. Roads on the eastern, southern, and western boundaries establish the firebreaks. Tree canopy on perimeter must be eliminated prior to commencement of burning. A mowed and disked firebreak will be established on the northern edge.
(Priority: High)

Burn Area 8 is critical to maintain the ROTHR clear zone. It contains approximately 9 acres. The area is an early successional field containing mostly grasses and shrubbery. Burning will require a west to east wind. Boundaries are defined by Carolina Road on the east and south, agricultural fields on the southwestern and western boundaries and the ROTHR antenna on the northern boundary. Roads on the eastern and southeastern boundaries, agricultural fields on the southwestern and western boundaries and a mowed/disked strip on the northern boundary establish the firebreaks.
(Priority: High)

Burn Area 9 contains approximately 10 acres and will be burned for forest fuel reduction. It is a mid-successional field containing sweetgum, maple and cane understory. An easterly wind will be required. Boundaries are defined by Crosscut Road on the east, Building 14 complex on the southern and southwestern boundary, an agricultural field on the northwestern boundary, and Monroe Road on the north. Established roads on the northern and eastern boundaries, agricultural fields on the western boundary and a mowed/disked area on the southwestern boundary provide firebreaks. This area will be burned in one section.
(Priority: High)

Burn Area 10 is a non-critical area with little to no fuels and is next to the Coast Guard parking lot. It is approximately 9 acres in size. It is a mid to late successional field containing loblolly pine, red maple, sweetgum, and understory growth. South to southeast winds are required to burn this area. Boundaries are defined by agricultural fields on the east and south, the Coast Guard parking lot and grass on the west, and a mowed grass area on the north, which will be disked if the area is burned. Agricultural fields on the east and south, the Coast Guard parking lot on the west, and mowed/disked grass on the north establishes firebreaks. This area would be burned in one section. This area is optional for demonstration purposes and for training of new crew personnel.
(Priority: Low)

Burn Area 11 is prescribed due to a large fuel load. It is approximately 47 acres in size. This area contains hunting stands. It has early to mid successional growth with deciduous saplings consisting mostly of red maple and sweetgum with cane understory. The area can be burned with winds coming from the west, north, or east. Boundaries are defined by a grassy trail on the eastern, southern and western boundary and Red River Road on the northern boundary. Firebreaks will be mowed and disked on the grass boundaries and Red River Road will serve as the north firebreak. Site 11 is sub-divided into many smaller sites by grassy trails and established roads. Tree canopy must be assessed to avoid crown fire transfer. This site will be burned in 4 sections.
(Priority: Low)

Actual burning techniques may be modified by the burn boss on the day of the burn to compensate for changes in weather, burn conditions, or fire behavior.

RESPONSIBILITIES:

NAVFAC MidLant Regional Natural Resources Manager:

1. Act as burn boss and conduct the safety brief.
2. Supervise burn procedures on the day of the burn.
3. Release burn crew from the site after mop-up.
4. Review the burn plan.
5. Provide technical assistance.

NAS Oceana Natural Resources Specialist:

1. Develop prescribed burn plan.
2. Coordinate personnel and equipment prior to burn.
3. Conduct post burn evaluation.
4. Notify Chain-of-command and concerned parties prior to burning.
5. Provide 4 portable radios with access to Security and Fire Dept. frequencies.
6. Establish firebreaks.

NSA Northwest Public Works Officer:

1. Review prescribed burn plan.

Navy Region Mid-Atlantic Fire and Emergency Services:

1. Provide standby fire crew in case of emergency
2. Coordinate available assistance from the local and regional fire departments.
3. If requested by the Natural Resources Manager, make hourly site inspections of burned area(s) for three consecutive hours after burn crew has secured site.

NSA Northwest Security Department:

1. Provide traffic control in the event of impaired visibility due to smoke
2. Provide traffic control in the event of an emergency

NSA Northwest Public Affairs:

1. Provide burn information to inquiring individuals, nearby residents and the news
2. media, if requested

REQUIRED WEATHER CONDITIONS:

The following conditions must be met before burning is initiated:

- No significant rain three to seven days prior to burning.
- Winds of 10 mph or less with gusts no higher than 15 mph.
- Preferred relative humidity of 30 to 50 percent.
- Preferred temperature of 20 to 50 degrees Fahrenheit.
- Front no less than four hours distant.
- Specific wind direction may be required to reduce smoke.
- Per the VDOF, no prescribed burning will occur above the 500 CSI (Cumulative Severity Index) maximum, which will be checked prior to burning assessment.

BURN PREPARATION:

Notification:
All concerned parties will receive notification and all necessary details specific to the proposed burn. Weather and mission operations are the controlling factors and will generally limit coordination to less than 24 hours and almost always less than one week prior to burning.

Fire Breaks:
Establishment of fire control breaks is discussed in the preceding burn area descriptions. Secondary firebreaks consisting of roads, ditches, clear zones, and agricultural fields are located around all burn areas, which further prevent fire from escaping outside of Navy property as well as protecting structures on board the installations.

Personnel/Materials:
A list of work crew personnel and equipment needed to control the burn is contained in this plan.

Required Clothing:
A list of required field clothing is contained in Appendix B.

Day of Burn Procedures:

1. Obtain current weather and burn forecast information.
   - Virginia Department of Forestry: (757) 465-6840; www.state.vipnet.org/dof/index.html
   - National Oceanic and Atmospheric Administration: www.nws.noaa.gov/
2. Notify all concerned parties prior to and immediately after burning.
3. Conduct a briefing by the Burn Boss covering the following items:
   - Burn Objectives
   - Techniques to be used
   - Safety
   - Burn Boundaries
   - Radio transmission signals
   - Use of fire tools
   - Chain of Command: natural resources staff, headed by the burn boss, will give direction to the work crew. The natural resources staff will remain in radio contact with security dispatch and the Fire Department in case of any issues that may require a halt to or redirection of the burning operation. The Commanding Officer, Security Officer, or the Public Works Officer may give such direction.

Burn Completion:
When all open flames within 25 feet of the burn perimeter and all smoldering material are extinguished, and the burn has been completed to the satisfaction of the burn boss, he/she may release the burn crew from the site. If requested by the Regional Natural Resources Manager, the Navy Region Mid-Atlantic Fire and Emergency Services will make hourly site inspections for three consecutive hours after the burn crew has secured the site. Burn crew personnel should be recalled only if fire escapes the burn perimeter or open flames persist within 100 feet of the burn perimeter during winds over 25 mph.

Post Burn Evaluation:
Each burned area will be evaluated with respect to the following questions:

- Was there adherence to the burn plan?
- Were pre-burn preparations made?
- Were objectives met?
- Were conditions of weather, fuel and fire behavior within planned limits?
- Was the burning technique employed appropriate?
- Was the fire confined by the fire control breaks?
- Did any accidents or near accidents occur?
- What were the environmental effects on soil, air, vegetation, water and wildlife?
- Were costs comparable with benefits derived?

EMERGENCY ACTION:

1. In the event of an emergency, these options are available and will be evaluated by the burn boss and the Fire Chief at the time of the incident:

    a. In direct coordination with the Burn Boss, have Navy Region Mid-Atlantic Fire and Emergency Services assist in extinguishing fire.
    b. Stop lighting new sections but allow the existing fire to continue to burn. However, under certain conditions, and in coordination with the Fire Department, backfires may be used to help control or extinguish fires.
    c. Continue normal burning procedures.

2. In case of a fire escape that cannot be controlled by the burn crew or the Navy Region Mid-Atlantic Fire and Emergency Services, the following can be contacted for assistance:
    a. Virginia Department of Forestry (434) 977-6555
    b. North Carolina Forest Service (252) 453-6770
    c. Chesapeake Fire Department (757) 382-6297/ 8292
    d. Dismal Swamp National Wildlife Refuge (757) 986-3705

"WATCH OUT" SITUATIONS:

IF ANY OF THE FOLLOWING CONDITIONS EXISTS, THE BURN WILL BE HALTED AND EXISTING FIRE WILL BE PUT OUT:

- Fire behaves erratically.
- Spot fires occur and are difficult to control.
- Winds shifting or other unforeseen changes in weather.
- Smoke not dispersing as predicted.
- Public roads or sensitive areas "smoked in".
- Burn does not comply with all laws, regulations and standards.
- Large fuels igniting and burning, not enough personnel available to secure before dark, and likely to "smoke in" sensitive areas.

APPENDIX A

BURN PLAN PERSONNEL TO BE NOTIFIED

Contact & Email	Phone
1. CO NAVSUPPACT Norfolk – CAPT Pollpeter scott.Pollpeter@navy.mil	(757) 836-1488
2. OIC NAVSUPPACT NW – LCDR Bachand phillip.bachand@navy.mil	(757) 421-8201
3. Navy Regional Fire Department: MidLant Region – Chief Kenneth Snyder kenneth.l.snyder@navy.mil Assistant Chief or Acting Chief	(757) 433-3258 (757) 433-2043
4. Base Security – Master Chief Vanderworken delbert.vanderworken@navy.mil	(757) 421-8181
5. Base Safety – De Michaelangelo deloris.michaelangel@navy.mil	(757) 322-2884
6. PWO, NAVSUPPACT NW – LCDR Darren Hale darren.hale@navy.mil APWO - LT Campbell monika.campbell@navy.mil	(757) 836-1836 (757) 421-8801
7. Director, FSSC – Mr. Buckingham jack.buckingham@navy.mil and sally.klugh@navy.mil	(757) 421-8400
8. ROTHR POC – Mr. Long (cell phone) christopher.long4@navy.mil	(757) 675-3303
9. ROTHR Watch Officer	(757) 421-8742
10. CO MCSFTCO – MAJ Yost seth.e.yost@navy.mil	(757) 421-8559
11. CO USCG CAMSLANT – CDR Godfrey sggodfrey@camslant.uscg.mil	(757) 421-6256
12. CO USCG SRT-1 – CDR Algernon algernon.j.kieth@uscg.mil	(757) 421-1801
13. OIC NSU SGT F-3 - LT Skinner	757) 421- 3838
14. OIC NSG Det Chesapeake – LCDR Kinnison william.kinnison@navy.mil	(757) 421-8130
15. OIC CENATNSF – CDR Robinson clayton.a.robinson@navy.mil	(757) 421-8797
16. Tech Dir NAVSATCOMMFAC – Mr. Graves douglas.graves@navy.mil	(757) 421-8611
17. SPAWAR 751 – Mr. Ward roy.ward@navy.mil	(757) 421-8369
18. SPECOMMDIV – Mr. Adams robert.l.adams@navy.mil	(757) 836-1069
19. NAVSUPPACT PAO – Ms. Welch heather.welch@navy.mil	(757) 836-1862
20. NAVSUPPACT NW Quarterdeck	(757) 421-8000
21. North Carolina Forestry Service	(252) 453-6770
22. Virginia Department of Forestry	(757) 465-6840
23. Virginia Air Pollution Control Board (PReP)	(757) 518-2077

24. Dismal Swamp National Wildlife Refuge	(757) 986-3705

APPENDIX B

BURN PLAN WORK CREW AND MATERIALS NEEDED:

1. Minimum of 8 personnel made up of active duty/retired military, DoD civilians or other personnel under DoD cooperative agreements.
2. Minimum of 4 portable radios.
3. Backpack pumps.
4. Fire tools (flappers, rakes, shovels).
5. 4 drip torches.
6. Matches, fuel and mixing container.
7. Compass.
8. First aid kits.
9. Maps and/or aerial photographs.
10. Fireproof clothing and boots.
11. Water coolers and cups.
12. Personal Protective Equipment (PPE)

REQUIRED PERSONAL PROTECTIVE EQUIPMENT:

1. Hardhat.
2. Leather gloves.
3. Bandanna or other smoke inhalant protection.
4. Leather boots.
5. Nomex fire proof or 100% cotton clothing.

APPENDIX C

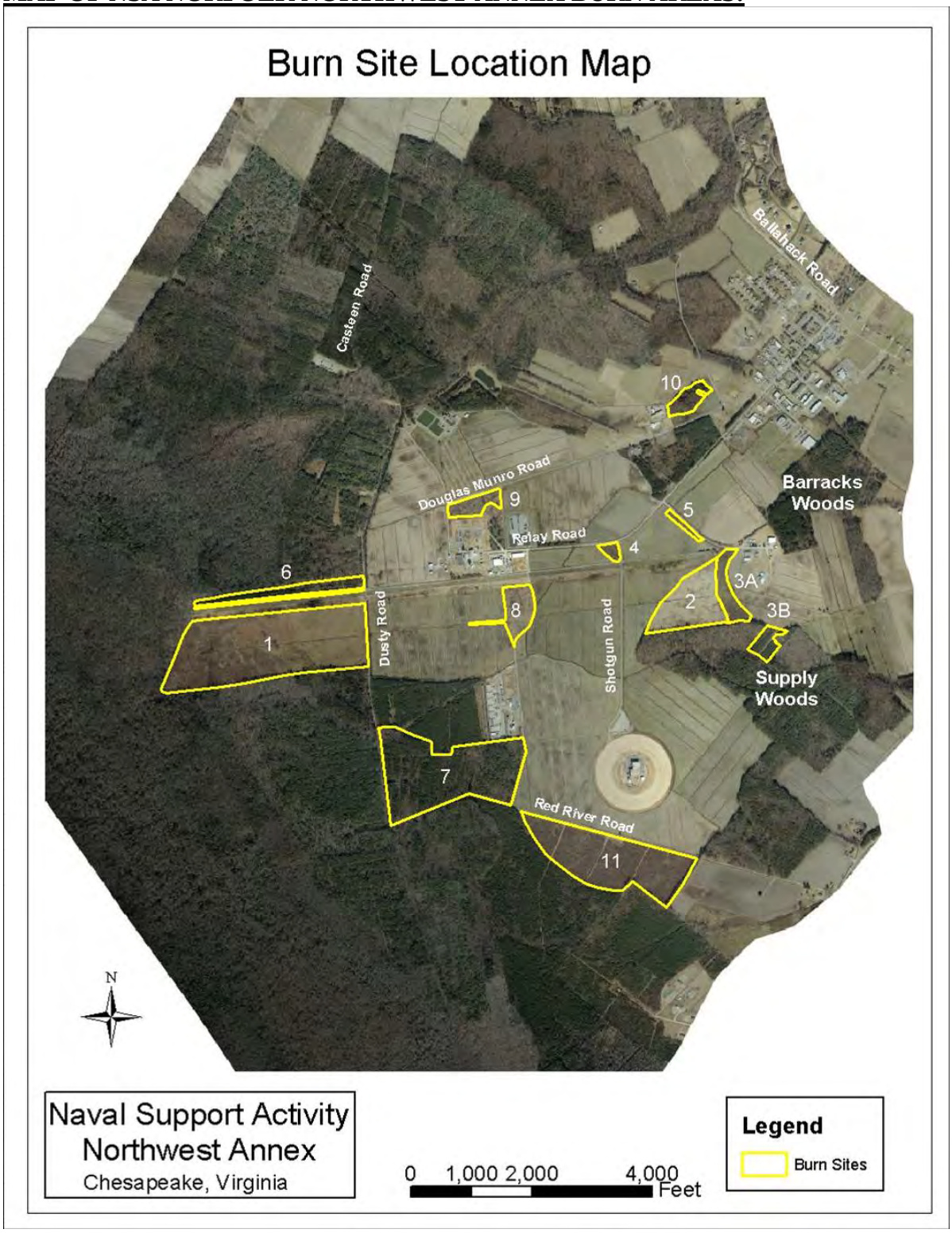
PERSONNEL:

Made up of active duty/retired military, DoD civilians, or other personnel under DoD cooperative agreements.

Contact	Certifications/Experience	Phone & Email
Emmett Carawan	Certified burn manager, VDOF	emmett.carawan@navy.mil (757) 462-8564 ext.388
Michael Farrell	Incident Command System (ICS) Orientation: I-100 ; Introduction to Wildland Fire Behavior: S-190; Advanced Firefighter Training: S-131 (Final Squad Boss certification, pending on-scene evaluation. Written test completed and passed.); Fire Operations in the Urban Interface: S-215; Intermediate Wildland Fire Behavior: S-290; and Red-card/Arduous Duty Certification.	michael.c.farrell@navy.mil (757) 433-2883
Patsy Kerr	Certified burn manager, VDOF	patricia.kerr@navy.mil (757) 836-6336
Brian Hostetter	Certified burn manager, VDOF	brian.hostetter@navy.mil (757) 462-8564 ext. 391
Charlie Wilson	Certified burn manager, VDOF	charles.h.wilson1@navy.mil (757) 887-4933
Nikki Brown	Certified burn manager, VDOF	tracy.n.brown@navy.mil (757) 433-3434
Lawrence McGrogan	Burn Experience	lawrence.mcgrogan@navy.mil (757) 433-2151
Michael Munley	Burn Experience	michael.munley@navy.mil (757) 433-2151
John Pulver	Burn Experience	john.pulver@navy.mil (757) 887-7605
Al Gregg	Burn Experience	alfred.gregg1@navy.mil (757) 887-4086
Sportsman's Quality Management Board	Volunteers	TBD…NRC (757) 433-2151
Regional Fire Station Personnel	Trained Fire-Fighters	kenneth.l.snyder@navy.mil (757) 433-3258
Regional Fire Station Support	Crash Truck	kenneth.l.snyder@navy.mil (757) 433-3258
Regional Fire Station Support	Brush Truck	kenneth.l.snyder@navy.mil (757) 433-3258

APPENDIX D

MAP OF NSA NORFOLK NORTHWEST ANNEX BURN AREAS:



Enclosure 7. SPCCs

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SPILL PREVENTION, CONTROL, AND COUNTERMEASURES PLAN

Naval Support Activity Hampton Roads Headquarters

Norfolk, Virginia

Prepared for:

Naval Facilities Engineering Command, Mid-Atlantic

Prepared by:

CDM - AECOM
Multimedia Joint Venture
10560 Arrowhead Drive, Suite 500
Fairfax, Virginia 22030
Contract No. N62470-14-D-9016, Task Order 5021

Update: June 2017

Technical Amendment: April 2020

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Facility Diagram

Figure 1 and Figure 2 are facility maps for Naval Support Activity Hampton Roads Headquarters that provide the physical location for each site with a Spill Prevention, Control, and Countermeasures (SPCC)-regulated asset. Figure 1 depicts the locations of all aboveground storage tanks (ASTs). Figure 2 depicts the locations of all assets other than ASTs. Individual diagrams for buildings with tanks are located in Section 5.2.1 and include site-specific compliance information such as oil storage container details, contents, capacity, discharge prevention measures, potential release scenarios with appropriate secondary containment assessments, and discharge controls. Similar details concerning drum storage areas, portable container storage areas, and oil-filled operating equipment (OFOE) are found in Sections 5.2.2, 5.2.3, and 5.2.4, respectively.

The Figure 1 and Figure 2 facility maps and the individual diagrams for each container site together satisfy the facility diagram requirements of 40 Code of Federal Regulations (CFR) 112.7(a)(3).

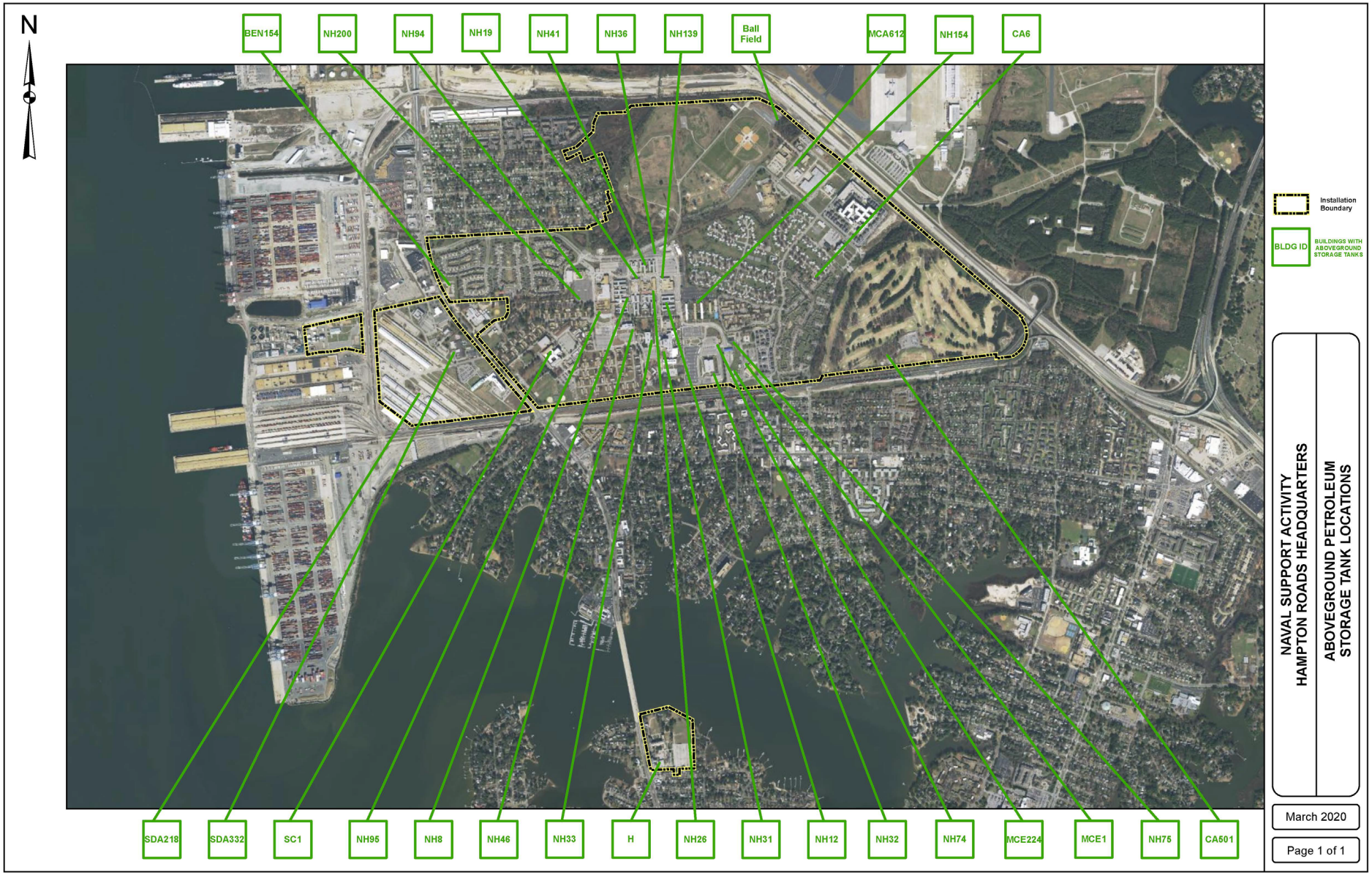


Figure 1. Naval Support Activity Hampton Roads Headquarters Aboveground Storage Tank Locations

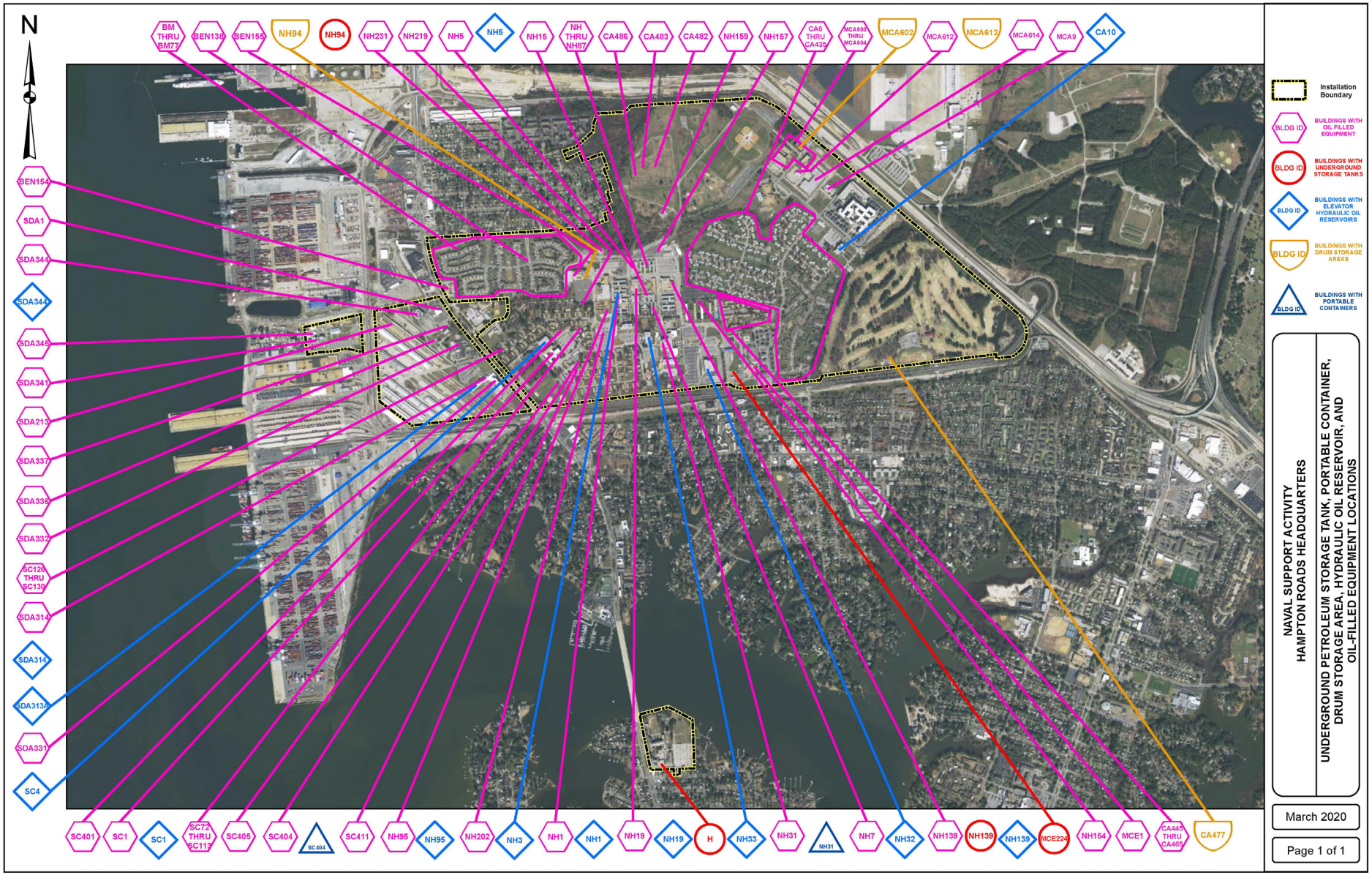


Figure 2. Naval Support Activity Hampton Roads Headquarters SPCC Assets Other than ASTs

Completion of Review/Management Approval

In accordance with 40 CFR 112.5(b), I have completed review and evaluation of this Spill Prevention, Control, and Countermeasures (SPCC) Plan for Naval Support Activity Hampton Roads Headquarters and as a result have approved the Plan on this date. Interim amendments made after this date will be documented in the Record of Review and Amendments on page vi of the Plan. A full review will again be accomplished within five years from this date.

In accordance with 40 CFR 112.7, this Plan is approved and will be implemented as described herein utilizing all necessary resources.

Digitally signed by
PRUITT.KERRY.R.1019114534
DN: c=US, o=U.S. Government, ou=DoD,
ou=PKI, ou=USN,
cn=PRUITT.KERRY.R.1019114534
Date: 2017.09.25 11:34:38 -04'00'

Ms. Kerry R. Pruitt — Date
Director, Air and Tank Compliance
Commander, Navy Region Mid-Atlantic

Certification of the Applicability of the Substantial Harm Criteria Checklist

Section 112.20(e) of the facility response plan regulation requires that all facilities regulated by the Oil Pollution Prevention Regulation (40 CFR Part 112) conduct an initial screening to determine whether they are required to develop a facility response plan. The criteria in this checklist can be found in 40 CFR 112.20(f)(1). Facilities should include this form with their SPCC Plan.

FACILITY NAME: Naval Support Activity Hampton Roads Headquarters

FACILITY ADDRESS: 7920 Blandy Road
Norfolk, VA 23511-2419

1. Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?

   Yes ☐ **No** ☑

2. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation within any aboveground oil storage tank area?

   Yes ☐ **No** ☑

3. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the formula in Attachment C-III, Appendix C, 40 CFR 112 or a comparable formula[1]) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments? For further description of fish and wildlife and sensitive environments, see Appendices I, II, and III to DOC/NOAA's "Guidance for Facility and Vessel Response Environments" (Section 10, Appendix E, 40 CFR 112 for availability) and the Mid-Atlantic Coastal Area Contingency Plan.

   Yes ☐ **No** ☑

4. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula (Attachment C-III, Appendix C, 40 CFR 112 or a comparable formula[1]) such that a discharge from the facility would shut down a public drinking water intake[2]?

   Yes ☐ **No** ☑

5. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?

   Yes ☐ **No** ☑

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Digitally signed by PRUITT.KERRY.R.1019114534
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=PRUITT.KERRY.R.1019114534
Date: 2017.09.25 11:36:10 -04'00'

Signature

Director, Air and Tank Compliance
Commander, Navy Region Mid-Atlantic
Title

Ms. Kerry R. Pruitt
Name (please type or print)

Date

[1] If a comparable formula is used, documentation of the reliability and analytical soundness of the comparable formula must be attached to this form.
[2] For the purposes of 40 CFR Part 112, public drinking water intakes are analogous to public water systems as described at 40 CFR 143.2(c).

Professional Engineer Certification [40 CFR 112.3(d)]

The undersigned licensed Professional Engineer attests:

(i) That I am familiar with the requirements of 40 CFR part 112.

(ii) That I have visited and examined the Facility.

(iii) That the Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards, and with the requirements of 40 CFR part 112.

(iv) That procedures for required inspections and testing have been established.

(v) That the Plan is adequate for the Facility.

(vi) That, if applicable, for a produced water container subject to 40 CFR 112.9(c)(6), any procedure to minimize the amount of free-phase oil is designed to reduce the accumulation of free-phase oil and the procedures and frequency for required inspections, maintenance and testing have been established and are described in the Plan.

This certification in no way relieves the owner or operator of the Facility of his/her duty to prepare and fully implement this Plan in accordance with the requirements of 40 CFR 112. This Plan is valid only to the extent that the Facility owner or operator maintains, tests, and inspects equipment, containment, and other devices as prescribed in this Plan.

Kevin R. Crow
Signature

56774
Virginia PE License Number

Kevin R. Crow
Name

Environmental Engineer
Title

CDM-AECOM Joint Venture
Company

8 June 2017
Date

Completion of Review / Management Approval
SPCC Plan Technical Amendment May 2019

In accordance with 40 Code of Federal Regulations (CFR) 112.5(b), I completed a review and evaluation of the Spill Prevention, Control, and Countermeasures (SPCC) Plan for Naval Support Activity Hampton Roads Headquarters and as a result have amended the SPCC Plan.

This SPCC Plan was prepared for Naval Support Activity Hampton Roads Headquarters in accordance with good engineering practices. In accordance with 40 CFR 112.7, this SPCC Plan is approved and will be implemented as described herein utilizing all necessary resources. The SPCC Plan will be reviewed and evaluated at least once every 5 years.

_____	_____
Signature	Date
Ms. Linda Hicks	_____
Printed Name	Title

Certification of the Applicability of the Substantial Harm Criteria Checklist

Section 112.20(e) of the facility response plan regulation requires that all facilities regulated by the Oil Pollution Prevention Regulation (40 CFR Part 112) conduct an initial screening to determine whether they are required to develop a facility response plan. The criteria in this checklist can be found in 40 CFR 112.20(f)(1). Facilities should include this form with their SPCC Plan.

FACILITY NAME: Naval Support Activity Hampton Roads Headquarters

FACILITY ADDRESS: 7920 Blandy Road
Norfolk, VA 23511-2419

6. Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?

Yes ☐ **No** ☑

7. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation within any aboveground oil storage tank area?

Yes ☐ **No** ☑

8. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the formula in Attachment C-III, Appendix C, 40 CFR 112 or a comparable formula[1]) such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments? For further description of fish and wildlife and sensitive environments, see Appendices I, II, and III to DOC/NOAA's "Guidance for Facility and Vessel Response Environments" (Section 10, Appendix E, 40 CFR 112 for availability) and the Mid-Atlantic Coastal Area Contingency Plan.

Yes ☐ **No** ☑

9. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and is the facility located at a distance (as calculated using the appropriate formula (Attachment C-III, Appendix C, 40 CFR 112 or a comparable formula[1]) such that a discharge from the facility would shut down a public drinking water intake[2]?

Yes ☐ **No** ☑

10. Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?

Yes ☐ **No** ☑

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Signature

Installation Environmental Program Director
NSA Hampton Roads PWD
Title

Ms. Linda Hicks
Name (please type or print)

Date

[1] If a comparable formula is used, documentation of the reliability and analytical soundness of the comparable formula must be attached to this form.
[2] For the purposes of 40 CFR Part 112, public drinking water intakes are analogous to public water systems as described at 40 CFR 143.2(c).

Professional Engineer Certification
SPCC Plan Technical Amendment April 2020
[40 CFR 112.3(d)]

The undersigned licensed Professional Engineer attests:

(i) That I am familiar with the requirements of 40 CFR part 112.

(ii) That I have visited and examined the Facility.

(iii) I have found the amendments to this SPCC Plan to have been prepared in accordance with good engineering practice, including consideration of applicable industry standards, and the requirements of 40 CFR Part 112.

(iv) That procedures for required inspections and testing have been established.

(v) The amendments to this SPCC Plan are adequate for Naval Support Activity Hampton Roads Headquarters.

This certification applies only to the items listed for the Technical Amendment, May 2019, shown in the accompanying table. Previous professional engineer certifications to this Plan are also included.

This certification in no way relieves the owner or operator of the Facility of his/her duty to prepare and fully implement this Plan in accordance with the requirements of 40 CFR 112. This Plan is valid only to the extent that the Facility owner or operator maintains, tests, and inspects equipment, containment, and other devices as prescribed in this Plan.

_____	VA 0402059165
Signature	Virginia PE License Number
Adam D. Smith	*Environmental Engineer*
Name	Title
CDM Smith	13 April 2020
Company	Date

Items Certified in April 2020 Technical Amendment to SPCC Plan
Naval Support Activity Hampton Roads Headquarters

Item	ID or Location
ASTs Added to this SPCC Plan	NSA HQ-BallField-AST-01A NSA HQ-BallField-AST-01B LR-H-AST-05 NSA HQ-NH8-AST-04 NSA HQ-NH41-AST-03 NSA HQ-SC1-AST-01
ASTs repairs confirmed	NSA HQ-NH41-AST-02
ASTs Removed from this SPCC Plan	LR-H-AST-04 NSA HQ-BEN154-AST-02 NSA HQ-NH8-AST-01 NSA HQ-NH41-AST-01
Mobile Equipment Removed from this SPCC Plan	NSA HQ-NH94-MOBILE-01
Drum Storage Area (DSA) Added to this SPCC Plan	NSA HQ-MCA602-DSA-01
DSA Updated in this SPCC Plan	NSA HQ-MCA612-DSA-01
DSAs Removed from this SPCC Plan	NSA HQ-BEN154-DSA-01 NSA HQ-MCA612-DSA-02 NSA HQ-MCA612-DSA-03 NSA HQ-MCA612-DSA-04
Portable Container Storage Areas Added to this SPCC Plan	NSA HQ-NH31C-PORT-01 NSA HQ-SC404-PORT-01
Entire Document The operator was changed from NAVFAC Mid-Atlantic to NSA HR PWD. NSA HQ-CA501-DSA-01 was renamed to NSA HQ-CA501-PORT-01.	
Section 5.1 Oil Container Inventory Summary: The inventory tables were updated to add the ASTs/DSAs/portable containers and associated inventory information for ASTs/DSAs/portable containers added to this SPCC Plan and to remove the ASTs/DSAs/mobile equipment and associated inventory information for ASTs/DSAs/mobile equipment removed from this SPCC plan.	

Section 5.2 Site-Specific Information: The individual summary sheets, individual site maps, and individual General Secondary Containment Compliance tables were updated to add the ASTs/DSAs/portable containers and associated information for ASTs/DSAs/portable containers added to this SPCC plan and to remove the ASTs/DSAs/mobile equipment and associated information for ASTs/DSAs/mobile equipment removed from this SPCC Plan.
Appendix A Storage Tank Management Plan: This appendix was deleted.
Appendix B Naval Support Activity Hampton Roads Headquarters SPCC Deficiencies: The deficiencies table was updated to add the ASTs/DSAs/Portable Containers and their associated deficiencies to this SPCC Plan and to remove the ASTs/DSAs/Mobile Equipment and their associated deficiencies from this SPCC Plan.
Appendix C Inspection Forms: The forms within this appendix were updated.
Appendix E Standard Operating Procedures: Standard Operating Procedure for Aboveground Storage Tanks was added
Appendix F Integrity Testing Program: The integrity testing table was updated to add the ASTs/DSAs/Portable Containers and associated integrity testing requirements for ASTs/DSAs/Portable Containers added to this SPCC Plan and to remove the ASTs/DSAs and associated integrity testing requirements for the ASTs/DSAs removed from this SPCC Plan. The table was updated to reflect the latest regulatory requirements.

RECORD OF REVIEW AND AMENDMENTS

All reviews and amendments to this SPCC Plan will be summarized below and signed by a Professional Engineer (PE) or Point of Contact (POC). A PE must certify technical amendments in accordance with §112.3(d).

Amend-ment No.	Date	Section/ Pages Affected	Description of Changes	PE or POC Name	PE or POC Signature
1	April 2020	a. Entire Document b. Section 5 c. Appendix A d. Appendix B e. Appendix C f. Appendix E g. Appendix F	As described in the PE Certification: a. Owner and Operator name within the entire document b. Container Inventory and tank data sheets updated c. Deleted Storage Tank Management Plan in Appendix B d. Updated SPCC Deficiencies in Appendix C e. Updated Inspection Forms in Appendix D f. Updated Standard Operating Procedures in Appendix F g. Updated SPCC Inspection Requirements in Appendix G	Adam Smith, P.E.	

ACRONYMS AND ABBREVIATIONS

AST	Aboveground Storage Tank
BEQ	Bachelor Enlisted Quarters
CDO	Command Duty Officer
CFR	Code of Federal Regulations
CNRMA	Commander, Navy Region Mid-Atlantic
CO	Commanding Officer
CRDM	Continuous Release Detection Method
DEQ	Department of Environmental Quality
ECATTS	Environmental Compliance and Assessment Training and Tracking System
ECC	Emergency Communications Center
EPA	U.S. Environmental Protection Agency
EPS	Environmental Protection Specialist
FIC	Facility Incident Commander
FR	Federal Register
FRP	Facility Response Plan
FRT	Facility Response Team
gpm	gallons per minute
GRI	SPCC Guidance for Regional Inspectors, EPA (2013 edition)
HR	Hampton Roads
IEEE	Institute of Electrical and Electronics Engineers
IEPD	Installation Environmental Program Director
MIDLANT	Mid-Atlantic
min	minute
NAVFAC	Naval Facilities Engineering Command
NFPA	National Fire Protection Association
NOAA	National Oceanographic and Atmospheric Administration
NOSC	Navy On-Scene Coordinator
NRC	National Response Center
NSA	Naval Support Activity
NSN	Naval Station Norfolk
ODCP	Oil Discharge Contingency Plan
OFOE	Oil-filled Operational Equipment
OHS	Oil and Hazardous Substance
OPNAV	Chief of Naval Operations
PE	Professional Engineer
POC	Point of Contact
POL	Petroleum, oil and lubricants
PWD	Public Works Department
RPB	Release Prevention Barrier
SDA	Storage Depot Area
sec	second
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control, and Countermeasures
STI	Steel Tank Institute
STMP	Storage Tank Management Plan
UST	Underground Storage Tank
VAC	Virginia Administrative Code
XO	Executive Officer

1.0 PLAN ADMINISTRATION

1.1 Purpose

The purpose of this Spill Prevention, Control, and Countermeasures (SPCC) Plan is to establish procedures, methods, equipment, and other requirements necessary to prevent the discharge of oil from Naval Support Activity (NSA) Hampton Roads (HR) Headquarters into or on navigable waters of the United States or adjoining shorelines. The term "oil" as defined under Title 40, Code of Federal Regulations (CFR) 112 (SPCC Rule or §112) means "oil of any kind or in any form, including, but not limited to: fats, oils, or greases of animal, fish, or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and, other oils and greases, including petroleum, fuel oil, sludge, synthetic oils, mineral oils, oil refuse, or oil mixed with wastes other than dredged spoil." The terms "petroleum, oil, and lubricants (POL)" and "oil" may be used interchangeably throughout the document and are intended to include the complete realm of substances regulated under §112.

This SPCC Plan is intended to prepare the owner, Commander, Navy Region Mid-Atlantic (CNRMA), and the operator, NSA HR Public Works Department (PWD) Environmental Department, to ensure early detection and quick response in the event of a discharge of oil and to allow the operator to respond in a safe, effective, and timely manner to mitigate the impacts of a discharge from the containers included in this SPCC Plan. The operator is responsible to accomplish all actions directed in this SPCC Plan.

This SPCC Plan was prepared in accordance with the provisions of Title 40, CFR 112, various industry standards (including applicable fire codes), and Chief of Naval Operations (OPNAV) M5090.1, Environmental Readiness Program Manual. Facilities located within the facility boundary of NSA HR Headquarters that store and transfer oil in support of U.S. Navy activities are included in this SPCC Plan due to the amount of oil stored and/or their location. Therefore, they may reasonably be expected to discharge oil in harmful quantities into or upon navigable waters of the United States, adjoining shorelines, into the subsurface aquifer, or outside the property onto non-federal land.

NSA HR Headquarters (UIC N57095) meets the definition of a "non-transportation-related" facility and stores more than 1,320 gallons of oil products in aboveground storage tanks (ASTs). The facility meets the applicability threshold of 40 CFR 112 and is therefore subject to the U.S. Environmental Protection Agency (EPA) SPCC regulations and must develop an SPCC Plan. Additionally, NSA HR Headquarters must meet applicable regulatory requirements related to oil storage and spill prevention of the Commonwealth of Virginia and the U.S. Navy.

NSA HR Headquarters is not required to be covered by a facility response plan (FRP) under 40 CFR 112.20 because the substantial harm criteria described in Section 1.2 are not met. Due to an aggregate aboveground oil storage capacity of less than 25,000 gallons for ASTs subject to Virginia's Facility and AST Regulation (9 Virginia Administrative Code [VAC] 25-91) the facility is also not subject to the Commonwealth of Virginia Department of Environmental Quality (DEQ) Oil Discharge Contingency Plan (ODCP) requirements (9VAC25-91-170).

NSA HR Headquarters is required to comply with the Navy Environmental Readiness Program Manual (OPNAV M5090.1) which includes the preparation of a Storage Tank Management Plan (STMP). The STMP has similar although not identical requirements as those of the SPCC program. The STMP requirements not addressed in the SPCC Plan are presented in

Appendix A. The intention of this approach is to meet all SPCC and STMP requirements in a single document.

1.2 Certification of Substantial Harm Determination [40 CFR 112.20(e)]

§112.20(e) If the owner or operator of a facility determines pursuant to paragraph (a)(2) of this section that the facility could not, because of its location, reasonably be expected to cause substantial harm to the environment by discharging oil into or on the navigable waters or adjoining shorelines, the owner or operator shall complete and maintain at the facility the certification form contained in appendix C to this part and, in the event an alternative formula that is comparable to one contained in appendix C to this part is used to evaluate the criterion in paragraph (f)(1)(ii)(B) or (f)(1)(ii)(C) of this section, the owner or operator shall attach documentation to the certification form that demonstrates the reliability and analytical soundness of the comparable formula and shall notify the Regional Administrator in writing that an alternative formula was used.

A Certification of the Applicability of the Substantial Harm Criteria Checklist has been prepared for NSA HR Headquarters, and those operations do not warrant an FRP as defined by the Substantial Harm Criteria in 40 CFR 112.20. NSA HR Headquarters operations are located in very close proximity to Naval Station Norfolk, and spill response personnel, equipment, and procedures will be consistent with those described in the Consolidated Regional FRP.

1.3 Designated Person [40 CFR 112.7(f)(2)]

§112.7(f)(2) Designate a person at each applicable facility who is accountable for discharge prevention and who reports to facility management.

The Installation Environmental Program Director (IEPD) for NSA HR PWD is the Designated Person described in 40 CFR 112.7(f)(2) who reports to facility management and is accountable for discharge prevention. Contact information for the IEPD is provided in Section 2.0.

1.4 Professional Engineer Certification [40 CFR 112.3(d)]

Professional Engineer (PE) Certification is located on page ix of the SPCC Plan.

1.5 Location of SPCC Plan [40 CFR 112.3(e)]

§112.3(e) If you are the owner or operator of a facility for which a Plan is required under this section, you must: (1) Maintain a complete copy of the Plan at the facility if the facility is normally attended at least four hours per day, or at the nearest field office if the facility is not so attended, and (2) Have the Plan available to the Regional Administrator for on-site review during normal working hours.

In accordance with 40 CFR 112.3(e), a complete copy of this SPCC Plan is maintained by the NSA HR PWD IEPD and the Fire Department; see IEPD contact information in Section 2. The SPCC Plan is available for on-site review during normal working hours. An archived copy of this SPCC Plan is kept at the NSA HR PWD Environmental Department at Building NH-34, NSA HR Headquarters, Norfolk, VA.

1.6 SPCC Plan Review [40 CFR 112.5(b)]

§112.5(b) Notwithstanding compliance with paragraph (a) of this section, complete a review and evaluation of the SPCC Plan at least once every five years from the date your facility becomes subject to this part; or, if your facility was in operation on or before August 16, 2002, five years from the date your last review was required under this part. As a result of this review and evaluation, you must amend your SPCC Plan within six months of the review to include more effective prevention and control technology if the technology has been field-proven at the time of the review and will significantly reduce the likelihood of a discharge as described in §112.1(b) from the facility. You must implement any amendment as soon as possible, but not later than six months following preparation of any amendment. You must document your completion of the review and evaluation, and must sign a statement as to whether you will amend the Plan, either at the beginning or end of the Plan or in a log or an appendix to the Plan. The following words will suffice, "I have completed review and evaluation of the SPCC Plan for (name of facility) on (date), and will (will not) amend the Plan as a result."

The NSA HR IEPD, in conjunction with the NSA HR PWD Environmental Department is responsible for initiating and coordinating comprehensive reviews of the SPCC Plan at least once every five years. The NSA HR PWD Environmental Department will amend this SPCC Plan within six months of the review and will implement the amended SPCC Plan within six months of the amendment to include more effective prevention and control technology if such technology will significantly reduce the likelihood of a spill event and if such technology has been field proven at the time of the review. Such updates are considered technical amendments and must be certified by a PE. Reviews and amendments of the SPCC Plan will be documented in the Record of Review and Amendments located on page xv of this SPCC Plan.

1.7 Amendments of SPCC Plans [40 CFR 112.5(a)]

§112.5(a) Amend the SPCC Plan for your facility in accordance with the general requirements in §112.7, and with any specific section of this part applicable to your facility, when there is a change in the facility design, construction, operation, or maintenance that materially affects its potential for a discharge as described in §112.1(b). Examples of changes that may require amendment of the Plan include, but are not limited to: commissioning or decommissioning containers; replacement, reconstruction, or movement of containers; reconstruction, replacement, or installation of piping systems; construction or demolition that might alter secondary containment structures; changes of product or service; or revision of standard operation or maintenance procedures at a facility. An amendment made under this section must be prepared within six months, and implemented as soon as possible, but not later than six months following preparation of the amendment.

In accordance with §112.5(a), the SPCC Plan will be amended and recorded in the Record of Review and Amendments whenever there is any change in the facility design, construction, operation, or maintenance that materially affects the facility's potential for an oil discharge, including, but not limited to:

- Commissioning or decommissioning containers
- Replacement, reconstruction, or movement of containers
- Reconstruction, replacement, or installation of piping systems
- Construction or demolition that might alter secondary containment structures
- Changes of product or service
- Revision of standard operation, inspection, or maintenance procedures

Amendments to this SPCC Plan made to address changes of this nature are considered technical amendments and will be certified by a PE. Non-technical amendments can be made by the NSA HR Headquarters IEPD or his/her designee and include changes to contact information and other changes to this SPCC Plan that do not affect the potential for an oil discharge. All amendments, whether technical or non-technical, will be recorded in the Record

of Review and Amendments page of this SPCC Plan. All copies of the SPCC Plan will be updated when the SPCC Plan is amended.

Deficiencies and recommended corrective actions noted during preparation of this SPCC Plan are listed in Appendix B. When deficiencies are corrected in accordance with the recommended actions in Appendix B, the Deficiency List will be noted with a date and signature to document completion of the corrective action. Such updates are not considered technical in nature and should be recorded in the Record of Review and Amendments page of this SPCC Plan as administrative updates.

1.8 Management Approval [40 CFR 112.7]

Management Approval acknowledgement is located on page vii of the SPCC Plan.

1.9 Cross-Reference with SPCC Provisions [40 CFR 112.7]

§112.7 If you do not follow the sequence specified in this section for the Plan, you must prepare an equivalent Plan acceptable to the Regional Administrator that meets all of the applicable requirements listed in this part, and you must supplement it with a section cross-referencing the location of requirements listed in this part and the equivalent requirements in the other prevention plan.

This SPCC Plan does not follow the exact order presented in the SPCC Rule. Table 1 presents a cross-reference of plan sections relative to applicable parts of the SPCC Rule. Section headings identify, where appropriate, the relevant section(s) of the SPCC Rule.

Table 1: Regulation Cross-Reference

40 CFR 112	Regulatory Requirement Description	Location
112.3(d)	Professional Engineer Certification	Section 1.4
112.3(e)	Location of SPCC Plan	Section 1.5
112.5(a)	Amendments	Section 1.7
112.5(b)	SPCC Plan Review	Section 1.6
112.7	Management Approval	Section 1.8
	Cross-Reference with SPCC Rule	Section 1.9
	Facilities, Procedures, Methods, or Equipment Not Yet Fully Operational	Section 2.1.2
112.7(a)(1)	Conformance with Requirements	Section 3.1
112.7(a)(2)	Environmental Equivalence	Section 3.2
112.7(a)(3)	Facility Information, Boundary and Facility Diagram	Section 2.0, Section 5.2 Fig. 1, Fig. 2 Fig. 3
112.7(a)(3)(i)	Container Storage Capacity and Oil Type	Section 5.1
112.7(a)(3)(ii)	Discharge Prevention Measures	Section 6.1
112.7(a)(3)(iii)	Discharge or Drainage Controls	Section 6.2
112.7(a)(3)(iv)	Discharge Discovery Countermeasures	Section 6.3
112.7(a)(3)(v)	Methods of Disposal of Recovered Material	Section 6.5
112.7(a)(3)(vi)	Contact List	Section 3.3.1 Section 6.0
112.7(a)(4)	Discharge Notification	Section 3.3.2
112.7(a)(5)	Discharge Response Procedures	Section 3.3.2
112.7(b)	Predicted Direction, Rate of Flow, and Total Quantity of Oil Discharged as a Result of Equipment Failure	Section 3.4
112.7(c)	Secondary Containment to Address Typical Failure Modes	Section 3.5
112.7(d)	Practicability of Secondary Containment	Section 3.6
112.7(e)	Inspections, Tests, and Records	Section 3.7
112.7(f)(1)	Oil-handling Personnel Training	Section 3.8
112.7(f)(2)	Designated Person	Section 1.3
112.7(f)(3)	Discharge Prevention Briefings	Section 3.8.2
112.7(g)	Security	Section 3.9
112.7(h)	Tank Truck Loading/Unloading Racks	Section 3.10
112.7(i)	Brittle Fracture Evaluation	Section 3.11
112.7(j)	Conformance with Applicable State and Local Requirements	Section 3.12
112.7(k)	Qualified Oil-filled Operational Equipment	Section 3.13
112.8(b)(1)	Diked Storage Area: Restrain Stormwater	Section 4.1
112.8(b)(2)	Diked Storage Area: Drainage Valves and Inspect Stormwater	Section 4.1
112.8(b)(3)	Facility Drainage: Design	Section 4.2
112.8(b)(4)	Facility Drainage: Equipment	Section 4.2

40 CFR 112	Regulatory Requirement Description	Location
112.8(b)(5)	Facility Drainage: Pump Transfer	Section 4.3
112.8(c)(1)	Bulk Storage Container Construction	Section 4.4
112.8(c)(2)	Secondary Containment for Capacity of Largest Bulk Storage Container Plus Freeboard	Section 4.5
112.8(c)(3)	Dike Drainage	Section 4.6
112.8(c)(4),(5)	Corrosion Protection for Buried, Partially Buried and Bunkered Storage Tanks	Section 4.7
112.8(c)(6)	Inspection of Bulk Storage Containers	Section 4.8
112.8(c)(7)	Heating Coils	Section 4.9
112.8(c)(8)	Overfill Prevention System	Section 4.10
112.8(c)(8)(v)	Liquid Level Sensing Device Testing	Section 4.11
112.8(c)(9)	Effluent Treatment Facilities	Section 4.12
112.8(c)(10)	Correct Visible Discharges	Section 4.13
112.8(c)(11)	Secondary Containment for Capacity of Largest Mobile or Portable Oil Storage Container Plus Freeboard	Section 4.14
112.8(d)(1)	Corrosion Protection for Buried Piping	Section 4.15
112.8(d)(2)	Terminal Connections	Section 4.16
112.8(d)(3)	Pipe Supports	Section 4.17
112.8(d)(4)	Piping, Aboveground Valves and Appurtenances Inspection	Section 4.18
112.8(d)(5)	Vehicle Warning	Section 4.19
112.12	Requirements for Animal Fats and Oils and Greases, and Fish and Marine Mammal Oils; and for Vegetable Oils, including Oils from Seeds, Nuts, Fruits, and Kernels	Section 4.0
112.20(e)	Certification of Substantial Harm Determination	Section 1.2

2.0 GENERAL FACILITY INFORMATION

Facility Name:	Naval Support Activity Hampton Roads Headquarters
Mailing Address:	NSA Hampton Roads Headquarters 7920 Blandy Road Norfolk, VA 23511-2419
Physical Location:	Naval Support Activity Hampton Roads Headquarters, Norfolk, VA
Type:	Fleet Headquarters Administrative and Communication Facilities
Owner:	Commander, Navy Region Mid-Atlantic
Operator:	Naval Support Activity Hampton Roads Public Works Department 7920 Blandy Road Norfolk, VA 23511-2419
Primary contact:	Ms. Linda Hicks Installation Environmental Program Director NSA Hampton Roads Headquarters 7920 Blandy Road Norfolk, VA 23511-2419 Office Phone: (757) 836-1862 linda.hicks1@navy.mil

2.1 Facility Description [40 CFR 112.7(a)(3)]

2.1.1 Location and Activities

§112.7(a)(3) Describe in your Plan the physical layout of the facility and include a facility diagram, which must mark the location and contents of each fixed oil storage container and the storage area where mobile or portable containers are located. The facility diagram must identify the location of and mark as "exempt" underground tanks that are otherwise exempted from the requirements of this part under §112.1(d)(4). The facility diagram must also include all transfer stations and connecting pipes, including intra-facility gathering lines that are otherwise exempted from the requirements of this part under §112.1(d)(11). You must also address in your Plan:

(i) The type of oil in each fixed container and its storage capacity. For mobile or portable containers, either provide the type of oil and storage capacity for each container or provide an estimate of the potential number of mobile or portable containers, the types of oil, and anticipated storage capacities;

NSA HR Headquarters has the largest concentration of fleet headquarters administrative and communication facilities outside of Washington, D.C. It is home to more than 6,000 personnel that includes major tenant commands: U.S. Fleet Forces Command, Joint Staff Hampton Roads and Joint Forces Staff College, U.S. Marine Corps Forces Command, Naval Submarine Forces,

Atlantic, and Naval Reserve Forces Command. It occupies approximately 780 acres located off Terminal Boulevard and Hampton Boulevard in Norfolk, Virginia. Also included in this SPCC Plan are the Navy Lodge, Fire Fighters School, and Storage Depot Area (SDA) on the west side of Hampton Boulevard (89 acres) and the Lafayette River Annex, which occupies 19 acres on the south bank of the Lafayette River off Hampton Boulevard. Facility boundaries for these noncontiguous areas are shown in Figure 3.

The operator has determined the extents of the Facility's boundary as defined in the SPCC Rule based on the ownership and operation of equipment at NSA HR Headquarters. Buildings with ASTs are identified on the map in Figure 1, and buildings with SPCC assets other than ASTs are identified on the map in Figure 2. NSA HR also operates other activities in the region that require SPCC plans. These include NSA Northwest River Annex and NSA Hampton Roads, Portsmouth Annex. Dedicated SPCC plans have been prepared for these activities, and assets associated with those plans are not included in this document.

Individual facility diagrams are contained in Section 5. Site-specific tank information, such as oil storage container details, contents, capacity, discharge prevention measures, potential release scenarios and appropriate secondary containment assessments, and discharge controls, can be found in Section 5.2.1. Similar details concerning drum storage areas, portable container storage areas, and oil-filled operational equipment (OFOE) are found in Section 5.2.2, Section 5.2.3, and Section 5.2.4, respectively. Spill response procedures, disposal, and contact lists can be found in Section 6.

Oil-containing equipment at NSA HR Headquarters not included in this SPCC Plan is limited to OFOE within the facility boundaries associated with the electrical utility/distribution system that is not under Navy ownership or control. These assets are owned and managed by Dominion Power and are therefore not included in this SPCC Plan.

2.1.2 Facilities, Procedures, Methods, or Equipment Not Yet Fully Operational [40 CFR 112.7]

§112.7 . . . If the Plan calls for additional facilities or procedures, methods, or equipment not yet fully operational, you must discuss these items in separate paragraphs, and must explain separately the details of installation and operational start-up.

The oil storage containers and operations included in this SPCC Plan are fully operational.

As discussed in Section 4.8.1, this SPCC Plan will be amended to incorporate new updated monthly inspection forms based on Steel Tank Institute (STI) SP001 (current edition). The current monthly inspection forms require updating in Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic (MIDLANT) regional procedures to fully incorporate content to STI SP001 6th edition content.

Figure 3. Facility Boundaries of NSA HR Headquarters

3.0 GENERAL REQUIREMENTS FOR SPCC PLANS

The following measures are implemented to prevent oil discharges during the handling, use, or transfer of oil products at NSA HR Headquarters.

3.1 Conformance with Requirements [40 CFR 112.7(a)(1)]

§112.7(a)(1) Include a discussion of your facility's conformance with the requirements listed in this part.

ASTs, and underground storage tanks (USTs) subject to the SPCC Rule. Portable containers, OFOE, and all associated management processes included in this SPCC Plan conform to the requirements of the SPCC Rule except as noted in the Deficiency List in Appendix B. There are no field-erected ASTs covered by this SPCC Plan; therefore, portions of the SPCC Rule specific to field-erected ASTs will not be discussed.

3.2 Environmental Equivalence [40 CFR 112.7(a)(2)]

§112.7(a)(2) Comply with all applicable requirements listed in this part. Except as provided in §112.6, your Plan may deviate from the requirements in paragraphs (g), (h)(2) and (3), and (i) of this section and the requirements in subparts B and C of this part, except the secondary containment requirements in paragraphs (c) and (h)(1) of this section, and §§112.8(c)(2), 112.8(c)(11), 112.9(c)(2), 112.9(d)(3), 112.10(c), 112.12(c)(2), and 112.12(c)(11), where applicable to a specific facility, if you provide equivalent environmental protection by some other means of spill prevention, control, or countermeasure. Where your Plan does not conform to the applicable requirements in paragraphs (g), (h)(2) and (3), and (i) of this section, or the requirements of subparts B and C of this part, except the secondary containment requirements in paragraph (c) and (h)(1) of this section, and §§112.8(c)(2), 112.8(c)(11), 112.9(c)(2), 112.10(c), 112.12(c)(2), and 112.12(c)(11), you must state the reasons for nonconformance in your Plan and describe in detail alternate methods and how you will achieve equivalent environmental protection. If the Regional Administrator determines that the measures described in your Plan do not provide equivalent environmental protection, he may require that you amend your Plan, following the procedures in §112.4(d) and (e).

Except as discussed in this section, this SPCC Plan does not deviate from requirements in §112. For instances where this SPCC Plan deviates from requirements in §112, this section includes the reason for nonconformance and a description of the environmentally equivalent alternative. Per the SPCC Guidance for Regional Inspectors (GRI), EPA (2013 edition) (p. 3-1), "environmental equivalence need not be a mathematical equivalence, but it must achieve the same desired outcome, though not necessarily through the same mode of operation (see 67 Federal Register [FR] 47095, July 17, 2002)."

3.2.1 Preventing Physical Damage to Aboveground Piping

Reason for Nonconformance
After considering facility layout and EPA guidance, the PE certifying this SPCC Plan is deviating from the requirement in §112.8(d)(5) to warn all vehicles entering the facility to be sure that no vehicle will endanger aboveground piping or other oil transfer operations. Physical damage to aboveground piping and other equipment may be protected from the possibility of a collision by installing fencing, barriers, curbing, or other physical obstacles.

Environmentally Equivalent Alternative
The primary protection for aboveground piping connected to bulk storage containers against vehicular collision is by routing piping runs away from traffic. In those cases where tank and/or pipe systems are located in areas susceptible to damage from vehicles, protective measures are in place such as fencing, barriers, or curbing. This approach provides superior

environmental protection as compared to verbal or written warnings to drivers by physically preventing vehicular damage to piping systems. Any sites with inadequate protection are included in the Deficiency List in Appendix B.

3.3 Spill Reporting [40 CFR 112.7(a)]

3.3.1 Contact List [40 CFR 112.7(a)(3)(vi)]

§112.7(a)(3)(vi) You must also address in your Plan: Contact list and phone numbers for the facility response coordinator, National Response Center, cleanup contractors with whom you have an agreement for response, and all appropriate Federal, State, and local agencies who must be contacted in case of a discharge as described in §112.1(b).

The contact list and phone numbers for the Facility Response Coordinator; National Response Center (NRC); cleanup contractors with whom the Facility has an agreement for response; and all appropriate federal, state, and local agencies who must be contacted in case of a discharge as described in §112.1(b) are provided in Section 6.0.

3.3.2 Discharge Notification and Response Procedures [40 CFR 112.7(a)(4) & 112.7(a)(5)]

§112.7(a)(4) Unless you have submitted a response plan under §112.20, provide information and procedures in your Plan to enable a person reporting a discharge as described in §112.1(b) to relate information on the exact address or location and phone number of the facility; the date and time of the discharge, the type of material discharged; estimates of the total quantity discharged; estimates of the quantity discharged as described in §112.1(b); the source of the discharge; a description of all affected media; the cause of the discharge; any damages or injuries caused by the discharge; actions being used to stop, remove, and mitigate the effects of the discharge; whether an evacuation may be needed; and, the names of individuals and/or organizations who have also been contacted.

§112.7(a)(5) Unless you have submitted a response plan under §112.20, organize portions of the Plan describing procedures you will use when a discharge occurs in a way that will make them readily usable in an emergency, and include appropriate supporting material as appendices.

Refer to Section 6.0 for spill notification procedures and emergency contacts.

3.4 Predicted Direction, Rate of Flow, and Total Quantity of Oil Discharged as a Result of Equipment Failure [40 CFR 112.7(b)]

§112.7(b) Where experience indicates a reasonable potential for equipment failure (such as loading or unloading equipment, tank overflow, rupture, or leakage, or any other equipment known to be a source of a discharge), include in your Plan a prediction of the direction, rate of flow, and total quantity of oil which could be discharged from the facility as a result of each type of major equipment failure.

Experience indicates a reasonable potential for equipment failure (such as loading or unloading equipment, tank overflow, rupture, or leakage, or any other equipment known to be a source of a discharge) for all bulk storage containers included in this SPCC Plan. Therefore, for each container site included in this SPCC Plan, a prediction of the direction, rate of flow, and total quantity of oil that could be discharged as a result of each type of major equipment failure is included as a companion document. A separate companion document has been prepared for each site. Appendix D is a list of general assumptions and calculations used to develop the numerical data presented in the companion document.

Site-specific compliance summary sheets and site maps for individual oil container sites in Section 5 depict flow direction and likely fate in the event of a release.

3.5 Secondary Containment to Address Typical Failure Modes [40 CFR 112.7(c)]

§112.7(c) Provide appropriate containment and/or diversionary structures or equipment to prevent a discharge as described in §112.1(b), except as provided in paragraph (k) of this section for qualified oil-filled operational equipment, and except as provided in §112.9(d)(3) for flowlines and intra-facility gathering lines at an oil production facility. The entire containment system, including walls and floor, must be capable of containing oil and must be constructed so that any discharge from a primary containment system, such as a tank, will not escape the containment system before cleanup occurs. In determining the method, design, and capacity for secondary containment, you need only to address the typical failure mode, and the most likely quantity of oil that would be discharged. Secondary containment may be either active or passive in design. At a minimum, you must use one of the following prevention systems or its equivalent:

(1) For onshore facilities:
(i) Dikes, berms, or retaining walls sufficiently impervious to contain oil;
(ii) Curbing or drip pans;
(iii) Sumps and collection systems;
(iv) Culverting, gutters, or other drainage systems;
(v) Weirs, booms, or other barriers;
(vi) Spill diversion ponds;
(vii) Retention ponds; or
(viii) Sorbent materials.

3.5.1 Bulk Storage Containers

Methods of passive and active secondary containment intended to comply with the provisions of §112.7(c) for containers included in this SPCC Plan include a combination of structures that serve as passive methods of containment (e.g., dike, spill pallet, or built-in secondary containment) and active spill response methods (e.g., drain cover, oil-dry or kitty litter sorbent) to prevent the most likely quantity of oil discharged during a typical failure mode from reaching navigable waters and adjoining shorelines. Typical failure modes, the most likely quantities of oil that would be discharged during typical failure modes, and any active or passive methods of secondary containment are presented on individual data sheets for each tank site in Section 5.2.1.

3.5.2 Drum Storage Areas

Methods of secondary containment intended to comply with the provisions of §112.7(c) for drum storage areas are presented in Section 5.2.2. The active or passive methods of secondary containment, typical failure modes, and most likely quantities of oil that would be discharged during typical failure modes are presented on individual data sheets for each portable container storage area in Section 5.2.2.

3.5.3 Portable Container Storage Areas

Methods of secondary containment intended to comply with the provisions of §112.7(c) for portable container storage areas are presented in Section 5.2.3. The active or passive methods of secondary containment, typical failure modes, and most likely quantities of oil that would be discharged during typical failure modes are presented on individual data sheets for each portable container storage area in Section 5.2.3.

3.5.4 Mobile Refuelers and Other Non-Transportation Related Tankers

NSA HR Headquarters does not operate mobile refuelers or other non-transportation related tankers per §112.8(c)(2).

3.5.5 Oil-Filled Operational Equipment

OFOE is equipment that includes an oil storage container in which the oil is present solely to support the function of the apparatus or device. OFOE at NSA HR Headquarters includes electrical transformers, oil circuit breakers, oil switches, and hydraulic elevators.

OFOE inventory is shown in Section 5.1. OFOE strategy for secondary containment is discussed in Section 5.2.4, and the OFOE inspection procedure is in Appendix H.

3.6 Practicability of Secondary Containment [40 CFR 112.7(d)]

§112.7(d) Provided your Plan is certified by a licensed Professional Engineer under §112.3(d), or, in the case of a qualified facility that meets the criteria in §112.3(g), the relevant sections of your Plan are certified by a licensed Professional Engineer under §112.6(d), if you determine that the installation of any of the structures or pieces of equipment listed in paragraphs (c) and (h)(1) of this section, and §§112.8(c)(2), 112.8(c)(11), 112.9(c)(2), 112.10(c), 112.12(c)(2), and 112.12(c)(11) to prevent a discharge as described in §112.1(b) from any onshore or offshore facility is not practicable, you must clearly explain in your Plan why such measures are not practicable; for bulk storage containers, conduct both periodic integrity testing of the containers and periodic integrity and leak testing of the valves and piping; and, unless you have submitted a response plan under §112.20, provide in your Plan the following:

(1) An oil spill contingency plan following the provisions of part 109 of this chapter.

(2) A written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful.

Secondary containment has been deemed practicable at all locations at NSA HR Headquarters. All containers with inadequate containment are included in the Appendix B Deficiency List.

3.7 Inspections, Tests, and Records [40 CFR 112.7(e)]

§112.7(e) Inspections, tests, and records. Conduct inspections and tests required by this part in accordance with written procedures that you or the certifying engineer develop for the facility. You must keep these written procedures and a record of the inspections and tests, signed by the appropriate supervisor or inspector, with the SPCC Plan for a period of three years. Records of inspections and tests kept under usual and customary business practices will suffice for purposes of this paragraph.

Inspections and tests of each bulk storage container are mandated in §112.8(c)(6) and described in Section 4.8 of this SPCC Plan. Monthly inspections are performed for each AST by the tank operator. Although §112.7(e) mandates keeping records for three years, state requirements found in 9VAC25-91-150 are more stringent and require records be kept for five years. Consequently, tank inspection records for tanks greater than or equal to 55 gallons will be maintained in accordance with the instructions written on the applicable inspection checklist (See Appendix C for the forms).

All other tank and training records will be maintained by the Tank Program Manager at the NSA HR PWD Environmental Department. All shell thickness testing and certified inspection reports, including formal external inspection reports, will be retained for the life of the container.

3.8 Oil-Handling Personnel Training [40 CFR 112.7(f)]

In accordance with §112.7(f), all oil-handling personnel receive initial SPCC training and annual Discharge Prevention Briefings. Oil-handling personnel include emergency response personnel, personnel that conduct AST inspections, and personnel engaged in operation and maintenance of oil storage containers and associated equipment. The term does not include administrative assistants, clerks, and other personnel who are never involved in operation or maintenance activities related to oil storage or equipment, oil transfer operations, emergency response, countermeasure functions, or similar activities.

Training requirements for oil-handling personnel are outlined in Section 3.8.1 and Section 3.8.2 of this SPCC Plan. Initial SPCC Training (3.8.1) and Annual Discharge Prevention Briefings (3.8.2) are required for all oil-handling personnel. AST Inspector Training is required for all personnel who conduct daily, weekly, monthly, and/or quarterly periodic visual AST Inspections. The primary means for delivering this training is through the use of the Navy's online environmental training system, *Environmental Compliance and Assessment Training and Tracking System* (ECATTS). ECATTS is available at: https://environmentaltraining.ecatts.com/. Classroom and/or on-site training may also be provided by environmental personnel as needed.

Oil-handling personnel training will be recorded and maintained in accordance with Section 3.7.

3.8.1 Initial Training [40 CFR 112.7(f)(1)]

§112.7(f)(1) Personnel, training, and discharge prevention procedures. (1) At a minimum, train your oil-handling personnel in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; applicable pollution control laws, rules, and regulations; general facility operations; and, the contents of the facility SPCC Plan.

In accordance with §112.7(f)(1), all oil-handling personnel will receive initial SPCC training at least once. At a minimum, the initial SPCC training includes:

- Operation and maintenance of equipment to prevent discharges
- Discharge procedure protocols
- Applicable pollution control laws, rules, and regulations
- General facility operations (Including Fuel Transfer Standard Operating Procedures listed in Appendix E)
- Contents of the NSA HR Headquarters SPCC Plan

3.8.2 Annual Discharge Prevention Briefings [40 CFR 112.7(f)(3)]

§112.7(f)(3) Schedule and conduct discharge prevention briefings for your oil-handling personnel at least once a year to assure adequate understanding of the SPCC Plan for that facility. Such briefings must highlight and describe known discharges as described in §112.1(b) or failures, malfunctioning components, and any recently developed precautionary measures.

In accordance with §112.7(f)(3), oil-handling personnel will receive discharge prevention briefings at least once a year to assure adequate understanding of the SPCC Plan, including any amendments. At a minimum, the discharge prevention briefing subject matter will include:

- Known discharges as described in §112.1(b)
- Known failures or malfunctioning components
- Recently developed spill prevention precautionary measures

3.9 Security [40 CFR 112.7(g)]

§112.7(g) Security (excluding oil production facilities). Describe in your Plan how you secure and control access to the oil handling, processing and storage areas; secure master flow and drain valves; prevent unauthorized access to starter controls on oil pumps; secure out-of-service and loading/unloading connections of oil pipelines; and address the appropriateness of security lighting to both prevent acts of vandalism and assist in the discovery of oil discharges.

In December 2008, EPA amended the facility security requirements to be more performance-based (73 FR 74236, December 5, 2008). As stated on page 3-19 of GRI 2013, "a facility owner may achieve the rule's security objectives by providing a description of the security measures and how they are implemented at the facility. This description may include a discussion of how measures employed by the facility help deter vandals and prevent unauthorized access to containers and equipment that could be involved in an oil discharge."

As stated on page 3-20 of GRI 2013, "SPCC Plans must describe how the facility owner addresses the appropriateness of security lighting to both prevent acts of vandalism and assist in the discovery of oil discharges." As stated on page 3-20 of GRI 2013, "No discussion of an environmentally equivalent alternative to security lighting is necessary because the rule does not specifically require lighting. Instead, the facility owner describes in the SPCC Plan how they prevent vandalism and discover oil discharges and whether security lighting is appropriate."

NSA HR Headquarters is a secure military facility with restricted access. The majority of the facility is fenced, and security personnel are present at the facility 24 hours per day, 365 days per year. Most of the facility has controlled access through manned security gates. Entrance to the facility is only accessible to personnel who have been cleared by Base Security. Emergency generators and other oil-filled equipment outside of fenced areas are kept locked.

A roving security patrol makes periodic rounds to check designated locations around NSA HR Headquarters. Security personnel are trained to make appropriate notifications to the Emergency Dispatch, Fire Department, and the Environmental Department in the event of an actual or suspected discharge of oil or hazardous materials at NSA HR Headquarters.

All drain valves or drains for double-wall oil storage containers are either locked in the closed position or sealed with a threaded plug to prevent unauthorized opening.

The aforementioned security fencing and guarded entrances are sufficient to deter vandalism. Therefore, security lighting at all oil storage locations is appropriate (regardless of lighting conditions) because lighting is not required to deter vandalism and portable lights are available for facility personnel to use to discover discharges.

3.10 Tank Truck Loading/Unloading Racks [40 CFR 112.7(h)]

§112.7(h) Facility tank car and tank truck loading/unloading rack (excluding offshore facilities).

(1) Where loading/unloading rack drainage does not flow into a catchment basin or treatment facility designed to handle discharges, use a quick drainage system for tank car or tank truck loading/unloading racks. You must design any containment system to hold at least the maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded at the facility.

(2) Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks or vehicle brake interlock system in the area adjacent to a loading/unloading rack, to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.

(3) Prior to filling and departure of any tank car or tank truck, closely inspect for discharges the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.

The fuel transfer areas associated with the containers included in this SPCC Plan are not equipped with loading arms and do not meet the definition of loading or unloading racks contained in §112.2. Therefore, §112.7(h) is not applicable at NSA HR Headquarters.

3.11 Brittle Fracture Evaluation [40 CFR 112.7(i)]

§112.7(i) If a field-constructed aboveground container undergoes a repair, alteration, reconstruction, or a change in service that might affect the risk of a discharge or failure due to brittle fracture or other catastrophe, or has discharged oil or failed due to brittle fracture failure or other catastrophe, evaluate the container for risk of discharge or failure due to brittle fracture or other catastrophe, and as necessary, take appropriate action.

There are no field-erected ASTs at NSA HR Headquarters. The brittle fracture evaluation is therefore not applicable.

3.12 Conformance with State and Local Applicable Requirements [40 CFR 112.7(j)]

§112.7(j) In addition to the minimal prevention standards listed under this section, include in your Plan a complete discussion of conformance with the applicable requirements and other effective discharge prevention and containment procedures listed in this part or any applicable more stringent State rules, regulations, and guidelines.

In addition to federal requirements, ASTs having a capacity of greater than 660 gallons of oil (with some exclusions) are regulated by VAC regulations, administered by the Virginia DEQ. Refer to the Virginia *Facility and Aboveground Storage Tank Regulation* (9VAC25-91), with changes effective 1 November 2015.

According to 9VAC25-91-30, the VAC requirements do not apply to ASTs with a storage capacity less than or equal to 660 gallons of oil, to non-petroleum hydrocarbon-based animal and vegetable oils, to oil-filled electrical equipment, to oil water separators, or to fuel tanks affixed into the frames of emergency generators. Only three oil tanks at NSA HR Headquarters are subject to any of the VAC requirements. Each of these tanks has a capacity of 1,000 gallons. One tank (NSA HQ-CA501-AST-01) contains gasoline, and the other two tanks (NSA HQ-NH94-AST-10 and NSA HQ-NH94-AST-11) contain used oil. The aggregate volume of these three tanks is 3,000 gallons.

Because the aggregate volume of 3,000 gallons is less than 25,000 gallons, only Part II (9VAC25-91) applies to the three tanks. Part II requires registration of the tanks with the Virginia DEQ and with the director or coordinator of emergency services. Notification to the Virginia DEQ is required for tank upgrades, major repairs, replacements, or changes in service. Specific closure requirements also apply to these tanks under Part II.

ODCP requirements under 9VAC25-91-170 only apply to facilities located within the Commonwealth of Virginia with an aggregate aboveground storage capacity of 25,000 gallons or greater of oil. ODCP requirements do not apply to the operations at NSA HR Headquarters.

Oil storage tanks must be installed and operated in accordance with the provisions of applicable National Fire Protection Association (NFPA) standards. Several NFPA standards are applicable for NSA HR Headquarters. NFPA 20 provides requirements for fire pump tanks. NFPA 30 provides requirements for storage of flammable and combustible liquids. NFPA 30A provides

requirements for motor fuel dispensing facilities and repair garages. NFPA 31 provides requirements for heating oil storage tanks. NFPA 704 provides tank labeling requirements to indicate hazards of what is being stored. All deficiencies, specific regulatory citations, and corrective actions relating to compliance with the various parts of applicable NFPA standards are included in Appendix B of this SPCC Plan.

3.13 Qualified Oil-Filled Operational Equipment [40 CFR 112.7(k)]

§112.7(k) Qualified Oil-filled Operational Equipment. The owner or operator of a facility with oil-filled operational equipment that meets the qualification criteria in paragraph (k)(1) of this sub-section may choose to implement for this qualified oil-filled operational equipment the alternate requirements as described in paragraph (k)(2) of this sub-section in lieu of general secondary containment required in paragraph (c) of this section.

> *(1) Qualification Criteria—Reportable Discharge History: The owner or operator of a facility that has had no single discharge as described in §112.1(b) from any oil-filled operational equipment exceeding 1,000 U.S. gallons or no two discharges as described in §112.1(b) from any oil-filled operational equipment each exceeding 42 U.S. gallons within any twelve month period in the three years prior to the SPCC Plan certification date, or since becoming subject to this part if the facility has been in operation for less than three years (other than oil discharges as described in §112.1(b) that are the result of natural disasters, acts of war or terrorism); and*
>
> *(2) Alternative Requirements to General Secondary Containment. If secondary containment is not provided for qualified oil-filled operational equipment pursuant to paragraph (c) of this section, the owner or operator of a facility with qualified oil-filled operational equipment must:*
>
> > *(i) Establish and document the facility procedures for inspections or a monitoring program to detect equipment failure and/or a discharge; and*
> > *(ii) Unless you have submitted a response plan under §112.20, provide in your Plan the following:*
> > *(A) An oil spill contingency plan following the provisions of part 109 of this chapter.*
> > *(B) A written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful.*

OFOE is equipment that includes an oil storage container in which the oil is present solely to support the function of the apparatus or device. Types of OFOE in use at NSA HR Headquarters include electrical equipment and elevator hydraulic reservoirs.

NSA HR Headquarters meets the qualification requirements and elects to use the alternative requirements to general secondary containment under §112.7(k).

§112.7(k)(1) Qualification

NSA HR Headquarters has had no single discharge as described in §112.1(b) from any OFOE exceeding 1,000 US gallons or no two discharges as described in §112.1(b) from any OFOE each exceeding 42 US gallons within any twelve-month period in the three years prior to the SPCC Plan certification date. The complete spill history is maintained in the Environmental Department office.

§112.7(k)(2)(i) Inspection Program

The OFOE management program is presented in Section 5.2.4 of this SPCC Plan. The OFOE inventory is included in Section 5.1.

§112.7(k)(2)(ii)(A) Oil Spill Contingency Plan

NSA HR Headquarters is not required to have an FRP. NSA HR Headquarters operations are located in very close proximity to Naval Station Norfolk, and spill response personnel, equipment, and procedures will be consistent with those described in the Consolidated Regional FRP.

§112.7(k)(2)(ii)(B) Written Commitment of Spill Response Resources

The SPCC Plan provides a written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful.

4.0 SPCC PLAN REQUIREMENTS FOR ONSHORE FACILITES (EXCLUDING PRODUCTION FACILITIES)

NSA HR Headquarters is an onshore facility and not a production facility; therefore, it must comply with the requirements in §112.8. Used cooking oil is also included in this SPCC Plan; analogous sections of §112.12 will not be repeated here.

4.1 Diked Storage Area: Restrain and Inspect Stormwater [40 CFR 112.8(b)(1) and (2)]

§112.8(b) Facility Drainage (1) Restrain drainage from diked storage areas by valves to prevent a discharge into the drainage system or facility effluent treatment system, except where facility systems are designed to control such discharge. You may empty diked areas by pumps or ejectors; however, you must manually activate these pumps or ejectors and must inspect the condition of the accumulation before starting, to ensure no oil will be discharged.

The majority of the bulk storage containers at NSA HR Headquarters are double-walled tanks constructed with integral secondary containment. For the tanks on NSA HR Headquarters that are in concrete or steel dikes, stormwater is retained in the dikes by open-and-closed type valves. There are no containment areas on NSA HR Headquarters that are constructed with pumps or ejectors. Refer to the site-specific information sheets and site maps in Section 5.2.1 and Section 5.2.2 of this SPCC Plan for descriptions of the specific drainage controls associated with tanks and portable container storage areas, respectively.

Facilities with open containment structures, including portable, temporary, or mobile flexible berms, must maintain a berm discharge log to document inspection of the accumulated rainfall prior to discharge. The Berm Discharge Log is discussed in Appendix G. Any discharges of oil into containment berms are recorded on a dedicated form.

§112.8(b)(2) Use valves of manual, open-and-closed design, for the drainage of diked areas. You may not use flapper-type drain valves to drain diked areas. If your facility drainage drains directly into a watercourse and not into an on-site wastewater treatment plant, you must inspect and may drain uncontaminated retained stormwater, as provided in paragraphs (c)(3)(ii), (iii), and (iv) of this section.

No flapper-type drain valves are utilized at this installation. Any stormwater retained in berms or other secondary containment structures is inspected for the presence of residual petroleum product prior to discharge. Refer to the berm discharge log instructions in Appendix G for draining accumulated rainfall.

4.2 Facility Drainage: Design and Equipment [40 CFR 112.8(b)(3) and (4)]

§112.8(b)(3) Design facility drainage systems from undiked areas with a potential for a discharge (such as where piping is located outside containment walls or where tank truck discharges may occur outside the loading area) to flow into ponds, lagoons, or catchment basins designed to retain oil or return it to the facility. You must not locate catchment basins in areas subject to periodic flooding.

§112.8(b)(4) If facility drainage is not engineered as in paragraph (b)(3) of this section, equip the final discharge of all ditches inside the facility with a diversion system that would, in the event of an uncontrolled discharge, retain oil in the facility.

2013 GRI page 3-7 states, “Sections 112.8(b)(3) and (b)(4) (and §112.12(b)(3) and (b)(4)) specify performance requirements for systems used to drain undiked areas with the potential for a discharge. These provisions apply only when the facility owner/operator chooses to use a

facility drainage system to meet general secondary containment requirements under §112.7(c) or a more specific containment requirement under §§112.7(h)(1), 112.8(c)(2) or 112.12(c)(2)."

For the containers included in this SPCC Plan, the Facility has chosen to meet the applicable secondary containment requirements under §112.7(c) and §112.8(c) through a combination of physical barriers and active management measures as discussed in Section 3.5 and Section 4.5 of this SPCC Plan. Therefore, as discussed in the 2013 GRI excerpt above, sections §112.8(b)(3) and §112.8(b)(4) do not apply to the containers included in this SPCC Plan.

4.3 Facility Drainage: Pump Transfer [40 CFR 112.8(b)(5)]

§112.8(b)(5) Where drainage waters are treated in more than one treatment unit and such treatment is continuous, and pump transfer is needed, provide two "lift" pumps and permanently install at least one of the pumps. Whatever techniques you use, you must engineer facility drainage systems to prevent a discharge as described in §112.1(b) in case there is an equipment failure or human error at the facility.

The requirements of §112.8(b)(5) are not applicable to the containers included in this SPCC Plan because drainage system treatment units are not used to treat drainage area stormwater.

4.4 Bulk Storage Container Construction [40 CFR 112.8(c)(1)]

§112.8(c)(1) Bulk storage containers. Not use a container for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature.

The primary tanks of the containers included in this SPCC Plan are constructed of steel. The design and construction of the containers are compatible with the characteristics of the oil product they contain and with temperature and pressure conditions. Refer to the site-specific information sheets in Section 5.2.1 of this SPCC Plan for descriptions of the tank construction materials. Any deficiencies and required corrective actions are listed in Appendix B.

4.5 Secondary Containment for Capacity of Largest Bulk Storage Container Plus Freeboard [40 CFR 112.8(c)(2)]

§112.8(c)(2) Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. You must ensure that diked areas are sufficiently impervious to contain discharged oil. Dikes, containment curbs, and pits are commonly employed for this purpose. You may also use an alternative system consisting of a drainage trench enclosure that must be arranged so that any discharge will terminate and be safely confined in a facility catchment basin or holding pond.

Methods of secondary containment intended to comply with the provisions of §112.8(c)(2) for bulk storage containers include dikes, spill pallets, and built-in secondary containment. Double-walled containers included in this SPCC Plan provide intrinsic secondary containment for 100% of the tank capacity. Because the secondary containment is not open to precipitation, this volume is sufficient to fully contain the product in the event of a leak from the primary container. All tanks with inadequate containment are listed in the Appendix B Deficiency List.

Sufficient freeboard is not defined in §112; however, in 67 FR 137, EPA suggested that freeboard should be able to contain the precipitation of a 25-year, 24-hour storm event. According to the National Oceanic and Atmospheric Administration (NOAA) rainfall intensity chart, the 25-year, 24-hour storm event at Station 44-6139 (Norfolk Weather Service Office

[WSO] Airport) is 6.82 inches. Therefore, for the purposes of this SPCC Plan, sufficient freeboard for Norfolk, Virginia, is considered to be 6.82 inches.

All areas with any type of tanks or mobile/portable petroleum containers are required to have sufficient secondary containment, including freeboard to prevent a discharge from reaching navigable waters. Information regarding fixed location storage tanks, drums, portable containers, and OFOEs is presented in Sections 5.2.1, 5.2.2, 5.2.3, and 5.2.4, respectively. Any deficiencies and required corrective actions are listed in Appendix B.

4.6 Diked Area Drainage [40 CFR 112.8(c)(3)]

§112.8(c)(3) Not allow drainage of uncontaminated rainwater from the diked area into a storm drain or discharge of an effluent into an open watercourse, lake, or pond, bypassing the facility treatment system unless you:

(i) Normally keep the bypass valve sealed closed.

(ii) Inspect the retained rainwater to ensure that its presence will not cause a discharge as described in §112.1(b).

(iii) Open the bypass valve and reseal it following drainage under responsible supervision; and

(iv) Keep adequate records of such events, for example, any records required under permits issued in accordance with §§122.41(j)(2) and 122.41(m)(3) of this chapter.

Open containment structures subject to rainfall accumulation are maintained with the drainage valve in the closed position. The berms are checked for the presence of oil prior to discharge as outlined in Appendix G. This evaluation is documented in the berm discharge log maintained at the tank site.

If free product or sheen is observed, Emergency Dispatch should be notified immediately to determine the source of the sheen (e.g., overfill or leak). The NSA HR Headquarters Environmental Protection Specialist (EPS) may be contacted for cleanup options and assistance in determining the cause of the release. The contaminants are removed by a vacuum truck and transported off-site for disposal. Rainwater collected in containment areas that does not have a sheen is released to the ground through drainage valves. If a sheen is observed, once the source of the sheen is determined, appropriate corrective measures are taken.

4.7 Corrosion Protection for Buried, Partially Buried and Bunkered Storage Tanks [40 CFR 112.8(c)(4) and (5)]

§112.8(c)(4) Protect any completely buried metallic storage tank installed on or after January 10, 1974 from corrosion by coatings or cathodic protection compatible with local soil conditions. You must regularly leak test such completely buried metallic storage tanks.

§112.8(c)(5) Not use partially buried or bunkered metallic tanks for the storage of oil, unless you protect the buried section of the tank from corrosion. You must protect partially buried and bunkered tanks from corrosion by coatings or cathodic protection compatible with local soil conditions.

NSA HR Headquarters has no partially buried or bunkered metallic storage tanks. There are two completely buried storage tanks not fully regulated by 40 CFR 280 and therefore subject to the SPCC Rule; however, these two USTs (LR-H-UST-01 and LR-H-UST-02) are nonmetallic construction not subject to corrosion. USTs that supply an emergency generator are now fully regulated by the 2015 UST regulations (40 CFR 280) and are no longer SPCC assets.

4.8 Test or Inspect Each Aboveground Container for Integrity [40 CFR 112.8(c)(6)]

§112.8(c)(6) Test or inspect each aboveground container for integrity on a regular schedule and whenever you make material repairs. You must determine, in accordance with industry standards, the appropriate qualifications for personnel performing tests and inspections, the frequency and type of testing and inspections, which take into account container size, configuration, and design (such as containers that are: shop-built, field-erected, skid-mounted, elevated, equipped with a liner, double-walled, or partially buried). Examples of these integrity tests include, but are not limited to: visual inspection, hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or other systems of non-destructive testing. You must keep comparison records and you must also inspect the container's supports and foundations. In addition, you must frequently inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas. Records of inspections and tests kept under usual and customary business practices satisfy the recordkeeping requirements of this paragraph.

All tanks are assigned unique identification numbers to maintain inspection records. Tanks found to have inadequate or illegible identification marking are listed as deficient in Appendix B.

All aboveground containers at NSA HR Headquarters are inspected on a monthly and annual basis in accordance with applicable industry standards as described below. Some tanks are also inspected on a daily and weekly basis in accordance with Commonwealth of Virginia regulations.

The integrity testing industry standard and schedule for all tanks at NSA HR Headquarters is presented in Appendix F.

4.8.1 Shop-Fabricated Tank Inspection Program

The industry standard for inspection and integrity testing of shop-built storage tanks in use at NSA HR Headquarters is the STI Standard for the Inspection of Aboveground Storage Tanks SP001 (current edition). Regular integrity testing under STI SP001 varies based on tank size, configuration, and condition. Tanks are determined to be STI category 1, 2, or 3 by the presence of a continuous release detection method (CRDM), a release prevention barrier (RPB), and a spill control strategy. STI SP001 provides a matrix based on tank size range and STI category to define different integrity testing regimes. STI tank category, CRDM, RPB, and spill control strategy are provided for each tank on the individual data sheets presented in Section 5.2.1 of this SPCC Plan. The integrity testing requirements for each container are presented in Appendix F.

The monthly inspection forms in use at NSA HR Headquarters have the same content as the forms in STI SP001 (5th Edition) but have been condensed into a different format. The forms are based on regional NAVFAC MIDLANT procedures and will be updated to the same content as described in Section 2.1.2.

4.8.2 Shop-Fabricated Tank Hybrid Inspection Program

The accepted industry standard for integrity testing of shop-built tanks at NSA HR Headquarters as discussed earlier is STI SP001 (current edition). The inspection forms provided in the STI SP001 current edition provide evaluation criteria for concrete-encased tanks. However, the monthly inspection forms in use at NSA HR Headquarters have the same content as the forms in STI SP001 (5th Edition) but have been condensed into a different format. These inspection forms do not provide evaluation criteria for concrete-encased tanks.

In accordance with guidance contained in an EPA Office of Emergency Management Bulk Storage Container Fact Sheet dated July 2012, a hybrid inspection program has been developed for the concrete-encased double-walled tanks at NSA HR Headquarters, which accomplishes the intent of the periodic inspection and integrity testing requirements. The amended process consists of performing STI SP001 (5th Edition) to the maximum extent practicable, with STI SP001 (5th Edition) Annual Inspection Checklist Numbers 4.1 and 4.2 omitted from the inspection program. The hybrid inspection plan is consistent with the ConVault Manufacturer's Inspection Checklist and the recommendations contained in the ConVault Manufacturer Integrity Testing open letter dated August 19, 2002. The EPA fact sheet states that an environmental equivalence determination is not required for a hybrid inspection program.

4.8.3 Field-Constructed Container Inspection Program

NSA HR Headquarters does not own or operate any field-constructed ASTs.

4.8.4 Drum and Portable Container Inspection Program

Integrity testing on 55-gallon drums and other portable containers will be conducted in accordance with STI SP001, which consists of monthly visual inspections and recertification inspections during the container service life. Portable containers at this facility consist of drums and one metal container for used cooking oil. These containers are located such that all sides are visible. This allows the facility personnel the ability to visually inspect the container, detect, and clean up any discharge before reaching navigable waters. As noted in the preamble to the SPCC rule at 67 FR 47120, these are acceptable industry practices for portable container storage and provide an effective means of verifying container integrity. Sites in which drums are not stored on pallets or other containment are listed as deficient in Appendix B. Integrity testing is documented through the CNRMA MONTHLY Inspection Checklist – Portable Containers included in Appendix C. Plastic portable containers must be recertified every seven years, and steel containers must be recertified every 12 years. In the unlikely event that any individual container remains on-site long enough to require recertification, documentation will be provided by the recertification agency and must be maintained at the NSA HR PWD Environmental Department Office for the life of that container. Alternatively, the container may be discarded in lieu of recertification.

4.9 Heating Coils [40 CFR 112.8(c)(7)]

§112.8(c)(7) Control leakage through defective internal heating coils by monitoring the steam return and exhaust lines for contamination from internal heating coils that discharge into an open watercourse, or pass the steam return or exhaust lines through a settling tank, skimmer, or other separation or retention system.

The containers included in this SPCC Plan do not contain heating coils. Therefore, the requirements under §112.8(c)(7) do not apply to the containers included in this SPCC Plan.

4.10 Overfill Prevention [40 CFR 112.8(c)(8)]

§112.8(c)(8) Engineer or update each container installation in accordance with good engineering practice to avoid discharges. You must provide at least one of the following devices:

(i) High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice.
(ii) High liquid level pump cutoff devices set to stop flow at a predetermined container content level.
(iii) Direct audible or code signal communication between the container gauger and the pumping station.

(iv) A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers.
(v) You must regularly test liquid level sensing devices to ensure proper operation.

All containers at NSA HR Headquarters were examined during preparation of this SPCC Plan. Tanks found to not have effective overfill protection as defined in §112.8(c)(8) are listed as deficient in Appendix B.

In addition to the overfill protection requirements in §112.8(c)(8), NAVFAC MIDLANT policy is to configure double-walled ASTs in accordance with the requirements of 30 NFPA Chapter 22.11.4.5. 30 NFPA Chapter 22.11.4.5 stipulates an audible or visual high level alarm at the 90% tank capacity and an automatic shutoff system such as an overfill prevention valve that activates at 95% tank capacity. Tanks found to be inconsistent with 30 NFPA Chapter 22.11.4.5 are listed as deficient in Appendix B.

4.11 Liquid Level Sensing Devices [40 CFR 112.8(c)(8)(v)]

§112.8(c)(8)(v) Engineer or update each container installation in accordance with good engineering practice to avoid discharges. You must regularly test liquid level sensing devices to ensure proper operation.

Liquid level sensing devices (e.g., level gauges and interstitial leak detectors) are examined during the monthly periodic inspection, and any deficiencies are documented on the monthly inspection checklist. The inspection checklists used at NSA HR Headquarters are included in Appendix C. Any tanks found to have defective level sensing devices during preparation of this SPCC Plan are listed as deficient in Appendix B.

4.12 Effluent Treatment Facility Observations [40 CFR 112.8(c)(9)]

§112.8(c)(9) Observe effluent treatment facilities frequently enough to detect possible system upsets that could cause a discharge as described in §112.1(b).

The containers included in this SPCC Plan are not located in drainage areas that discharge to a treatment facility. Therefore, the requirements under §112.8(c)(7) do not apply to the containers included in this SPCC Plan.

4.13 Correct Visible Discharges [40 CFR 112.8(c)(10)]

§112.8(c)(10) Promptly correct visible discharges which result in a loss of oil from the container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts. You must promptly remove any accumulations of oil in diked areas.

Personnel conducting periodic tank inspections are trained to initiate corrective action when visible oil leaks from container walls, piping, pumps, valves, rivets, bolts, or other components are discovered during tank operation or inspection. Corrective actions range from minor oil seepage cleanup to submittal of an emergency work request to ensure oil is removed and the cause repaired as soon as possible to prevent a larger spill or a discharge to navigable waters or adjoining shorelines. Oil is promptly removed and disposed of according to the waste disposal method described in Section 6.5 of this SPCC Plan.

Accumulated liquids in diked areas are removed in accordance with the berm discharge procedures described in Appendix G.

4.14 Secondary Containment for Capacity of Largest Mobile or Portable Oil Storage Container Plus Freeboard [40 CFR 112.8(c)(11)]

§112.8(c)(11) Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation.

Portable container storage areas are typically located on spill pallets or other areas with sized secondary containment. Refer to the site-specific information sheets in Section 5.2.2 and Section 5.2.3 of this SPCC Plan for a description of secondary containment at each drum and portable container storage area site.

Any deficiencies, specific regulatory citations, and recommended corrective actions relating to sized secondary containment for drums and portable containers are included in Appendix B.

4.15 Corrosion Protection for Buried Piping [40 CFR 112.8(d)(1)]

§112.8(d)(1) Facility transfer operations, pumping, and facility process. Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage.

All but one UST at NSA HR Headquarters has nonmetallic buried piping. The UST with tank number NSA HQ-NH139-UST-02 has single-walled buried piping made of copper. The installation date for this UST and its underground piping is January 1, 1989. Because this date is prior to the regulatory date of August 16, 2002, it is not required to have a protective wrapping and coating.

4.16 Terminal Connections [40 CFR 112.8(d)(2)]

§112.8(d)(2) Cap or blank-flange the terminal connection at the transfer point and mark it as to origin when piping is not in service or is in standby service for an extended time.

All oil storage tanks located at NSA HR Headquarters are considered to be in active service and do not have capped or blanked off connections.

4.17 Pipe Supports [40 CFR 112.8(d)(3)]

§112.8(d)(3) Properly design pipe supports to minimize abrasion and corrosion and allow for expansion and contraction.

AST pipes are installed with adequate support to minimize the likelihood of failure resulting from metal fatigue from excessive movement, abrasion, and corrosion while allowing for expansion and contraction.

Any deficiencies, specific regulatory citations, and recommended corrective actions are included in Appendix B.

4.18 Piping, Aboveground Valves and Appurtenances [40 CFR 112.8(d)(4)]

§112.8(d)(4) Regularly inspect all aboveground valves, piping, and appurtenances. During the inspection you must assess the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces. You must also conduct integrity and leak testing of buried piping at the time of installation, modification, construction, relocation, or replacement.

During the monthly and annual periodic inspection, the inspector assesses the general condition of items associated with each tank system, including, but not limited to, aboveground piping, overfill prevention valves, high-level alarms, flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces. The condition of each item is recorded in the applicable sections or in the Additional Comments section of the inspection forms included in Appendix C of this SPCC Plan.

4.19 Vehicle Warning [40 CFR 112.8(d)(5)]

§112.8(d)(5) Warn all vehicles entering the facility to be sure that no vehicle will endanger aboveground piping or other oil transfer operations.

After considering facility layout and EPA guidance, the PE certifying this SPCC Plan is deviating from the requirement in §112.8(d)(5) to warn all vehicles entering the facility to be sure that no vehicle will endanger aboveground piping or other oil transfer operations.

All aboveground piping connected to bulk storage containers included in this SPCC Plan are protected from the possibility of collision by routing piping away from vehicular traffic. This provides superior environmental protection compared to verbal or written warnings to drivers by physically preventing vehicular damage to piping systems. In those cases where tank and/or pipe systems are located in areas susceptible to damage from vehicles, protective measures are in place such as fencing, barriers, or curbing. Any sites with inadequate protection are included in the Deficiency List in Appendix B.

A complete discussion of the equivalent environmental protection afforded by this approach is presented in Section 3.2.1.

5.0 Facility Information

5.1 Oil Container Inventory Summary

The following is a comprehensive list of petroleum storage containers located at NSA HR Headquarters. Individual data sheets are presented for each container.

Aboveground Storage Tanks				
Tank Number	**Capacity (gallons)**	**Usage**	**Contents**	**STI Category**
NSA HQ-BallField-AST-01A (Added in Amendment 1)	250	Product Dispenser	Gasoline	1
NSA HQ-BallField-AST-01B (Added in Amendment 1)	250	Product Dispenser	Diesel	1
NSA HQ-BEN154-AST-01	250	Product Dispenser	Diesel	1
~~NSA HQ-BEN154-AST-02 (Removed in Amendment 1)~~	~~70~~	~~Emergency Generator Base Tank~~	~~Diesel~~	~~3~~
NSA HQ-CA6-AST-05	200	Emergency Generator Base Tank	Diesel	1
NSA HQ-CA501-AST-01	1,000	Product Dispenser	Gasoline	1
NSA HQ-CA501-AST-02	500	Product Dispenser	Diesel	1
NSA HQ-CA501-AST-03	250	Used Oil Storage	Used Oil	1
~~LR-H-AST-04 (Removed in Amendment 1)~~	~~275~~	~~Fire Pump Day Tank~~	~~Diesel~~	~~3~~
LR-H-AST-05 (Added in Amendment 1)	275	Fire Pump Day Tank	Diesel	1
NSA HQ-MCA612-AST-04	500	Used Oil Storage	Used Oil	1
NSA HQ-MCE1-AST-01	875	Emergency Generator Base Tank	Diesel	1
NSA HQ-MCE224-AST-05	250	Used Oil Storage	Used Oil	1
~~NSA HQ-NH8-AST-01 (Removed in Amendment 1)~~	~~100~~	~~Emergency Generator Base Tank~~	~~Diesel~~	~~3~~
NSA HQ-NH8-AST-02	200	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH8-AST-03	200	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH8-AST-04 (Added in Amendment 1)	75	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH12-AST-01	500	Emergency Generator Supply	Diesel	1
NSA HQ-NH19-AST-07	500	Emergency Generator Supply	Diesel	1
NSA HQ-NH26-AST-01	350	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH31-AST-02	500	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH31-AST-03	150	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH31-AST-04	150	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH31-AST-05	1,000	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH32-AST-01	898	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH33-AST-01	1,250	Emergency Generator Base Tank	Diesel	1

Aboveground Storage Tanks				
Tank Number	**Capacity (gallons)**	**Usage**	**Contents**	**STI Category**
NSA HQ-NH36-AST-01	100	Emergency Generator Base Tank	Diesel	1
~~NSA HQ-NH41-AST-01~~ (Remove in Amendment 1)	~~245~~	~~Emergency Generator Base Tank~~	~~Diesel~~	~~3~~
NSA HQ-NH41-AST-02 (Repairs confirmed in Amendment 1)	75	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH41-AST-03 (Added in Amendment 1)	408	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH46-AST-01	4,400	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH74-AST-01	100	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH75-AST-02	255	Emergency Generator Base Tank	Diesel	1
NSA HQ-NH94-AST-06	500	Emergency Generator Day Tank	Diesel	1
NSA HQ-NH94-AST-07	500	Emergency Generator Day Tank	Diesel	1
NSA HQ-NH94-AST-08	500	Emergency Generator Day Tank	Diesel	1
NSA HQ-NH94-AST-09	500	Emergency Generator Day Tank	Diesel	1
NSA HQ-NH94-AST-10	1,000	Used Oil Storage	Used Oil	1
NSA HQ-NH94-AST-11	1,000	Used Oil Storage	Used Oil	1
NSA HQ-NH95-AST-01	200	Emergency Generator Base Tank	Diesel	3
NSA HQ-NH139-AST-01	75	Emergency Generator Day Tank	Diesel	3
NSA HQ-NH139-AST-02	75	Emergency Generator Day Tank	Diesel	3
NSA HQ-NH139-AST-03	200	Emergency Generator Base Tank	Diesel	3
NSA HQ-NH154-AST-01	500	Emergency Generator Supply	Diesel	1
NSA HQ-NH200-AST-01	194	Emergency Generator Base Tank	Diesel	1
NSA HQ-SC1-AST-01 (Added in Amendment 1)	382	Emergency Generator Base Tank	Diesel	1
NSA HQ-SDA218-AST-01	500	Product Dispenser	Diesel	1
NSA HQ-SDA218-AST-02	500	Product Dispenser	Diesel	1
NSA HQ-SDA218-AST-03	500	Used Oil Storage	Used Oil	3
NSA HQ-SDA313A-AST-01	278	Emergency Generator Supply	Diesel	1
NSA HQ-SDA332-AST-02	196	Emergency Generator Base Tank	Diesel	1

23,311 Gallons Total AST Capacity
3,000 Gallons AST Capacity of tanks regulated by Virginia
3 Number of tanks regulated by Virginia
47 Total number of ASTs

Underground Storage Tanks			
Tank Number	**Capacity (gallons)**	**Usage**	**Contents**
LR-H-UST-01	10,000	Heating System Supply	Fuel Oil
LR-H-UST-02	10,000	Heating System Supply	Fuel Oil
LR-H-UST-03	1,000	Emergency Generator Supply	Diesel
NSA HQ-MCE224-UST-06	10,000	Product Dispenser	Gasoline
NSA HQ-MCE224-UST-07	10,000	Product Dispenser	Gasoline
NSA HQ-MCE224-UST-08	6,000	Product Dispenser	Gasoline
NSA HQ-NH94-UST-01	25,000	Emergency Generator Supply	Diesel
NSA HQ-NH94-UST-02	25,000	Emergency Generator Supply	Diesel
NSA HQ-NH94-UST-03	25,000	Emergency Generator Supply	Diesel
NSA HQ-NH139-UST-02	2,000	Emergency Generator Supply	Diesel
NSA HQ-NH139-UST-03	4,000	Emergency Generator Supply	Diesel

Note: USTs that are fully regulated by 40 CFR 280 are not SPCC assets. USTs that supply an emergency generator are now fully regulated by the 2015 UST regulations (40 CFR 280) and are no longer SPCC assets.

128,000 Gallons Total UST Capacity
20,000 Gallons Total UST SPCC Assets
11 Total Number of USTs
2 Total Number of USTs as SPCC Assets

Drum Storage Areas			
ID Number	**Number of units**	**Total Capacity (gallons)**	**Contents**
~~NSA HQ-BEN154-DSA-01 (Removed in Amendment 1)~~	~~2 drums~~	~~110~~	~~Oil~~
NSA HQ-CA477-DSA-01	3 dispensing drums	165	Oil
NSA HQ-MCA602-DSA-01 (Added in Amendment 1)	3 drums	165	Used Cooking Oil
NSA HQ-MCA612-DSA-01 (Updated in Amendment 1)	5 drums	275	Lube Oil, Hydraulic Oil
~~NSA HQ-MCA612-DSA-02 (Removed in Amendment 1)~~	~~6 drums~~	~~330~~	~~Gasoline, Used Oil~~
~~NSA HQ-MCA612-DSA-03 (Removed in Amendment 1)~~	~~2 drums~~	~~110~~	~~Hydraulic Oil, Gasoline~~
~~NSA HQ-MCA612-DSA-04 (Removed in Amendment 1)~~	~~2 drums~~	~~110~~	~~Gasoline~~
NSA HQ-NH94-DSA-01	2 drums	110	Lube Oil
NSA HQ-NH94-DSA-02	1 drum	55	Lube Oil
NSA HQ-NH94-DSA-03	1 drum	55	Lube Oil

825 Gallons Total Drum Capacity
15 Total Number of Drums

Mobile Equipment		
ID Number	**Total Capacity (gallons)**	**Contents**
~~NSA HQ-NH94-MOBILE-01~~ (Removed in Amendment 1)	~~100~~	~~Diesel~~

0 Gallons Total Mobile Equipment Capacity

Portable Containers			
ID Number	**Number of units**	**Total Capacity (gallons)**	**Contents**
NSA HQ-CA501-PORT-01 (Renamed in Amendment 1)	1 steel container	275	Used Cooking Oil & Grease
NSA HQ-NH31C-PORT-01 (Added in Amendment 1)	1 portable container	135	Used Cooking Oil
NSA HQ-SC404-PORT-01 (Added in Amendment 1)	1 portable container	275	Used Cooking Oil & grease

685 Gallons Total Portable Container Capacity
3 Total Number of Portable Containers

Oil-Filled Operational Equipment			
ID Number	**Building Number**	**Type**	**Oil Capacity (gallons)**
NSA HQ-BEN138-OFE-01	NS-BEN138	Transformer	153
NSA HQ-BEN138-OFE-02	NS-BEN138	Transformer	153
NSA HQ-BEN154-OFE-01	NS-BEN154	Transformer	240
NSA HQ-BEN155-OFE-01	NS-BEN155	Transformer	220
NSA HQ-BM-OFE-01	NS-BEN	Transformer	166
NSA HQ-BM2-OFE-01	NS-BM2	Transformer	173
NSA HQ-BM3-OFE-01	NS-BM3	Transformer	161
NSA HQ-BM4-OFE-01	NS-BM4	Transformer	184
NSA HQ-BM6-OFE-01	NS-BM6	Transformer	183
NSA HQ-BM6-OFE-02	NS-BM6	Transformer	140
NSA HQ-BM8-OFE-01	NS-BM8	Transformer	184
NSA HQ-BM13-OFE-01	NS-BM13	Transformer	173
NSA HQ-BM14-OFE-01	NS-BM14	Transformer	184
NSA HQ-BM14-OFE-02	NS-BM14	Transformer	161
NSA HQ-BM18-OFE-01	NS-BM18	Transformer	149
NSA HQ-BM18-OFE-02	NS-BM18	Transformer	184
NSA HQ-BM18-OFE-03	NS-BM18	Transformer	173
NSA HQ-BM20-OFE-01	NS-BM20	Transformer	173
NSA HQ-BM21-OFE-01	NS-BM21	Transformer	173
NSA HQ-BM24-OFE-01	NS-BM24	Transformer	173
NSA HQ-BM24-OFE-02	NS-BM24	Transformer	161
NSA HQ-BM27-OFE-01	NS-BM27	Transformer	184
NSA HQ-BM28-OFE-01	NS-BM28	Transformer	184
NSA HQ-BM32-OFE-01	NS-BM32	Transformer	184
NSA HQ-BM32-OFE-02	NS-BM32	Transformer	161
NSA HQ-BM33-OFE-01	NS-BM33	Transformer	161
NSA HQ-BM34-OFE-01	NS-BM34	Transformer	162
NSA HQ-BM34-OFE-02	NS-BM34	Transformer	173
NSA HQ-BM36-OFE-01	NS-BM36	Transformer	161
NSA HQ-BM38-OFE-01	NS-BM38	Transformer	184
NSA HQ-BM39-OFE-01	NS-BM39	Transformer	173
NSA HQ-BM42-OFE-01	NS-BM42	Transformer	184
NSA HQ-BM42-OFE-02	NS-BM42	Transformer	161

Oil-Filled Operational Equipment			
ID Number	**Building Number**	**Type**	**Oil Capacity (gallons)**
NSA HQ-BM45-OFE-01	NS-BM45	Transformer	104
NSA HQ-BM46-OFE-01	NS-BM46	Transformer	173
NSA HQ-BM48-OFE-01	NS-BM48	Transformer	184
NSA HQ-BM50-OFE-01	NS-BM50	Transformer	184
NSA HQ-BM52-OFE-01	NS-BM52	Transformer	173
NSA HQ-BM52-OFE-02	NS-BM52	Transformer	161
NSA HQ-BM56-OFE-01	NS-BM56	Transformer	184
NSA HQ-BM56-OFE-02	NS-BM56	Transformer	149
NSA HQ-BM56-OFE-03	NS-BM56	Transformer	162
NSA HQ-BM57-OFE-01	NS-BM57	Transformer	161
NSA HQ-BM57-OFE-02	NS-BM57	Transformer	140
NSA HQ-BM58-OFE-01	NS-BM58	Transformer	173
NSA HQ-BM60-OFE-01	NS-BM60	Transformer	161
NSA HQ-BM62-OFE-01	NS-BM62	Transformer	173
NSA HQ-BM64-OFE-01	NS-BM64	Transformer	173
NSA HQ-BM67-OFE-01	NS-BM67	Transformer	184
NSA HQ-BM68-OFE-01	NS-BM68	Transformer	162
NSA HQ-BM70-OFE-01	NS-BM70	Transformer	161
NSA HQ-BM71-OFE-01	NS-BM71	Transformer	184
NSA HQ-BM72-OFE-01	NS-BM72	Transformer	184
NSA HQ-BM72-OFE-02	NS-BM72	Transformer	184
NSA HQ-BM76-OFE-01	NS-BM76	Transformer	140
NSA HQ-BM76-OFE-02	NS-BM76	Transformer	173
NSA HQ-BM77-OFE-01	NS-BM77	Transformer	161
NSA HQ-CA6-OFE-01	NS-CA6	Transformer	146
NSA HQ-CA10-OFOE-01	NSA HQ-CA10	Elevator Reservoir	150
NSA HQ-CA10-OFOE-02	NSA HQ-CA10	Elevator Reservoir	150
NSA HQ-CA94-OFE-01	NS-CA94	Transformer	192
NSA HQ-CA94-OFE-02	NS-CA94	Transformer	191
NSA HQ-CA98-OFE-01	NS-CA98	Circuit Breaker	220
NSA HQ-CA98-OFE-02	NS-CA98	Circuit Breaker	220
NSA HQ-CA230-OFE-01	NS-CA230	Transformer	263
NSA HQ-CA230-OFE-02	NS-CA230	Switch	92

Oil-Filled Operational Equipment			
ID Number	**Building Number**	**Type**	**Oil Capacity (gallons)**
NSA HQ-CA246-OFE-01	NS-CA246	Transformer	191
NSA HQ-CA248-OFE-01	NS-CA248	Transformer	191
NSA HQ-CA250-OFE-01	NS-CA250	Transformer	191
NSA HQ-CA251-OFE-01	NS-CA251	Transformer	191
NSA HQ-CA251-OFE-02	NS-CA251	Transformer	192
NSA HQ-CA256-OFE-01	NS-CA256	Transformer	191
NSA HQ-CA260-OFE-01	NS-CA260	Transformer	191
NSA HQ-CA262-OFE-01	NS-CA262	Transformer	192
NSA HQ-CA263-OFE-01	NS-CA263	Transformer	192
NSA HQ-CA265-OFE-01	NS-CA265	Transformer	191
NSA HQ-CA267-OFE-01	NS-CA267	Transformer	192
NSA HQ-CA268-OFE-01	NS-CA268	Transformer	192
NSA HQ-CA270-OFE-01	NS-CA270	Transformer	192
NSA HQ-CA270-OFE-02	NS-CA270	Transformer	192
NSA HQ-CA271-OFE-01	NS-CA271	Transformer	191
NSA HQ-CA272-OFE-01	NS-CA272	Transformer	191
NSA HQ-CA274-OFE-01	NS-CA274	Transformer	192
NSA HQ-CA276-OFE-01	NS-CA276	Transformer	192
NSA HQ-CA277-OFE-01	NS-CA277	Transformer	191
NSA HQ-CA277-OFE-02	NS-CA277	Transformer	192
NSA HQ-CA280-OFE-01	NS-CA280	Transformer	192
NSA HQ-CA281-OFE-01	NS-CA281	Transformer	192
NSA HQ-CA282-OFE-01	NS-CA282	Transformer	192
NSA HQ-CA283-OFE-01	NS-CA283	Transformer	191
NSA HQ-CA284-OFE-01	NS-CA284	Transformer	191
NSA HQ-CA285-OFE-01	NS-CA285	Transformer	192
NSA HQ-CA286-OFE-01	NS-CA286	Transformer	191
NSA HQ-CA288-OFE-01	NS-CA288	Transformer	191
NSA HQ-CA293-OFE-01	NS-CA293	Transformer	151
NSA HQ-CA293-OFE-02	NS-CA293	Transformer	192
NSA HQ-CA297-OFE-01	NS-CA297	Transformer	191
NSA HQ-CA302-OFE-01	NS-CA302	Transformer	191
NSA HQ-CA325-OFE-01	NS-CA325	Transformer	127

Oil-Filled Operational Equipment			
ID Number	**Building Number**	**Type**	**Oil Capacity (gallons)**
NSA HQ-CA330-OFE-01	NS-CA330	Transformer	130
NSA HQ-CA335-OFE-01	NS-CA335	Transformer	130
NSA HQ-CA340-OFE-01	NS-CA340	Transformer	130
NSA HQ-CA342-OFE-01	NS-CA342	Transformer	130
NSA HQ-CA351-OFE-01	NS-CA351	Transformer	127
NSA HQ-CA354-OFE-01	NS-CA354	Transformer	127
NSA HQ-CA357-OFE-01	NS-CA357	Transformer	130
NSA HQ-CA382-OFE-01	NS-CA382	Transformer	130
NSA HQ-CA385-OFE-01	NS-CA385	Transformer	130
NSA HQ-CA387-OFE-01	NS-CA387	Transformer	130
NSA HQ-CA389-OFE-01	NS-CA389	Transformer	127
NSA HQ-CA391-OFE-01	NS-CA391	Transformer	127
NSA HQ-CA393-OFE-01	NS-CA393	Transformer	127
NSA HQ-CA401-OFE-01	NS-CA401	Transformer	127
NSA HQ-CA406-OFE-01	NS-CA406	Transformer	127
NSA HQ-CA410-OFE-01	NS-CA410	Transformer	127
NSA HQ-CA412-OFE-01	NS-CA412	Transformer	130
NSA HQ-CA415-OFE-01	NS-CA415	Transformer	130
NSA HQ-CA416-OFE-01	NS-CA416	Transformer	130
NSA HQ-CA419-OFE-01	NS-CA419	Transformer	130
NSA HQ-CA421-OFE-01	NS-CA421	Transformer	130
NSA HQ-CA431-OFE-01	NS-CA431	Transformer	127
NSA HQ-CA432-OFE-01	NS-CA432	Transformer	127
NSA HQ-CA435-OFE-01	NS-CA435	Transformer	127
NSA HQ-CA445-OFE-01	NS-CA445	Transformer	170
NSA HQ-CA445-OFE-02	NS-CA445	Transformer	170
NSA HQ-CA446-OFE-01	NS-CA446	Transformer	170
NSA HQ-CA448-OFE-01	NS-CA448	Transformer	170
NSA HQ-CA449-OFE-01	NS-CA449	Transformer	170
NSA HQ-CA449-OFE-02	NS-CA449	Transformer	170
NSA HQ-CA450-OFE-01	NS-CA450	Transformer	170
NSA HQ-CA451-OFE-01	NS-CA451	Transformer	170
NSA HQ-CA454-OFE-01	NS-CA454	Transformer	170

Oil-Filled Operational Equipment			
ID Number	**Building Number**	**Type**	**Oil Capacity (gallons)**
NSA HQ-CA457-OFE-01	NS-CA457	Transformer	170
NSA HQ-CA458-OFE-01	NS-CA458	Transformer	170
NSA HQ-CA459-OFE-01	NS-CA459	Transformer	170
NSA HQ-CA462-OFE-01	NS-CA462	Transformer	170
NSA HQ-CA465-OFE-01	NS-CA465	Transformer	170
NSA HQ-CA482-OFE-01	NS-CA482	Transformer	172
NSA HQ-CA483-OFE-01	NS-CA483	Transformer	90
NSA HQ-CA486-OFE-01	NS-CA486	Transformer	320
NSA HQ-MCA9-OFE-01	NS-MCA9	Transformer	150
NSA HQ-MCA600-OFE-01	NS-MCA600	Transformer	165
NSA HQ-MCA602-OFE-01	NS-MCA602	Transformer	365
NSA HQ-MCA603-OFE-01	NS-MCA603	Transformer	170
NSA HQ-MCA604-OFE-01	NS-MCA604	Transformer	269
NSA HQ-MCA612-OFE-01	NS-MCA612	Transformer	159
NSA HQ-MCA614-OFE-01	NS-MCA614	Transformer	151
NSA HQ-MCA614-OFE-02	NS-MCA614	Transformer	107
NSA HQ-MCE1-OFE-01	NS-MCE1	Transformer	150
NSA HQ-NH-OFE-01	NS-NH	Transformer	194
NSA HQ-NH1-OFE-01	NS-NH1	Transformer	409
NSA HQ-NH1-OFOE-02	NSA HQ-NH1	Elevator Reservoir	150
NSA HQ-NH3-OFOE-01	NSA HQ-NH3	Elevator Reservoir	150
NSA HQ-NH5-OFE-01	NS-NH5	Transformer	147
NSA HQ-NH5-OFE-02	NS-NH5	Transformer	199
NSA HQ-NH5-OFOE-03	NSA HQ-NH5	Elevator Reservoir	150
NSA HQ-NH7-OFE-01	NS-NH7	Transformer	220
NSA HQ-NH11-OFE-01	NS-NH11	Transformer	250
NSA HQ-NH11-OFE-03	NS-NH11	Transformer	179
NSA HQ-NH15-OFE-01	NS-NH15	Transformer	510
NSA HQ-NH18-OFE-01	NS-NH18	Transformer	305
NSA HQ-NH19-OFE-01	NS-NH19	Transformer	396
NSA HQ-NH19-OFOE-02	NSA HQ-NH19	Elevator Reservoir	150
NSA HQ-NH19-OFOE-03	NSA HQ-NH19	Elevator Reservoir	150
NSA HQ-NH20A-OFE-01	NS-NH20A	Transformer	184

Oil-Filled Operational Equipment			
ID Number	**Building Number**	**Type**	**Oil Capacity (gallons)**
NSA HQ-NH21-OFE-01	NS-NH21	Transformer	305
NSA HQ-NH23-OFE-01	NS-NH23	Transformer	143
NSA HQ-NH25-OFE-01	NS-NH25	Transformer	184
NSA HQ-NH28-OFE-01	NS-NH28	Transformer	195
NSA HQ-NH31-OFE-01	NS-NH31	Transformer	452
NSA HQ-NH31-OFE-02	NS-NH31	Switch	378
NSA HQ-NH31-OFE-03	NS-NH31	Transformer	325
NSA HQ-NH32-OFOE-01	NSA HQ-NH32	Elevator Reservoir	150
NSA HQ-NH33-OFOE-01	NSA HQ-NH33	Elevator Reservoir	150
NSA HQ-NH34-OFE-01	NS-NH34	Transformer	184
NSA HQ-NH38-OFE-01	NS-NH38	Transformer	220
NSA HQ-NH44-OFE-01	NS-NH44	Transformer	220
NSA HQ-NH87-OFE-01	NS-NH87	Transformer	440
NSA HQ-NH95-OFE-01	NS-NH95	Transformer	206
NSA HQ-NH95-OFE-02	NS-NH95	Transformer	83
NSA HQ-NH95-OFE-03	NS-NH95	Transformer	83
NSA HQ-NH95-OFE-04	NS-NH95	Transformer	412
NSA HQ-NH95-OFE-05	NS-NH95	Transformer	412
NSA HQ-NH95-OFE-06	NS-NH95	Transformer	385
NSA HQ-NH95-OFE-07	NS-NH95	Transformer	238
NSA HQ-NH95-OFE-08	NS-NH95	Transformer	238
NSA HQ-NH95-OFE-09	NS-NH95	Transformer	248
NSA HQ-NH95-OFE-10	NS-NH95	Transformer	248
NSA HQ-NH95-OFE-11	NS-NH95	Transformer	436
NSA HQ-NH95-OFE-12	NS-NH95	Transformer	436
NSA HQ-NH95-OFOE-13	NSA HQ-NH95	Elevator Reservoir	150
NSA HQ-NH95-OFOE-14	NSA HQ-NH95	Elevator Reservoir	150
NSA HQ-NH95-OFOE-15	NSA HQ-NH95	Elevator Reservoir	150
NSA HQ-NH95-OFOE-16	NSA HQ-NH95	Elevator Reservoir	150
NSA HQ-NH139-OFE-01	NS-NH139	Transformer	349
NSA HQ-NH139-OFE-02	NS-NH139	Switch	380
NSA HQ-NH139-OFE-03	NS-NH139	Transformer	424
NSA HQ-NH139-OFE-04	NS-NH139	Switch	354

Oil-Filled Operational Equipment			
ID Number	**Building Number**	**Type**	**Oil Capacity (gallons)**
NSA HQ-NH139-OFE-05	NS-NH139	Switch	370
NSA HQ-NH139-OFOE-06	NSA HQ-NH139	Elevator Reservoir	150
NSA HQ-NH139-OFOE-07	NSA HQ-NH139	Elevator Reservoir	150
NSA HQ-NH154-OFE-01	NS-NH154	Transformer	244
NSA HQ-NH157-OFE-01	NS-NH157	Transformer	140
NSA HQ-NH159-OFE-01	NS-NH159	Transformer	3,835
NSA HQ-NH159-OFE-02	NS-NH159	Circuit Breaker	73
NSA HQ-NH159-OFE-03	NS-NH159	Circuit Breaker	73
NSA HQ-NH159-OFE-04	NS-NH159	Circuit Breaker	73
NSA HQ-NH159-OFE-05	NS-NH159	Circuit Breaker	73
NSA HQ-NH159-OFE-06	NS-NH159	Circuit Breaker	73
NSA HQ-NH159-OFE-07	NS-NH159	Circuit Breaker	73
NSA HQ-NH159-OFE-08	NS-NH159	Circuit Breaker	220
NSA HQ-NH159-OFE-09	NS-NH159	Circuit Breaker	170
NSA HQ-NH202-OFE-01	NS-NH202	Transformer	220
NSA HQ-NH202-OFE-02	NS-NH202	Transformer	199
NSA HQ-NH219-OFE-01	NS-NH219	Transformer	120
NSA HQ-NH231-OFE-01	NS-NH231	Transformer	1,331
NSA HQ-NH231-OFE-02	NS-NH231	Transformer	1,331
NSA HQ-NH231-OFE-03	NS-NH231	Circuit Breaker	220
NSA HQ-NH231-OFE-04	NS-NH231	Circuit Breaker	220
NSA HQ-NH231-OFE-05	NS-NH231	Circuit Breaker	220
NSA HQ-NH231-OFE-06	NS-NH231	Circuit Breaker	220
NSA HQ-SC1-OFE-01	NS-SC1	Transformer	287
NSA HQ-SC1-OFOE-02	NAS HQ-SC1	Elevator Reservoir	150
NSA HQ-SC4-OFOE-01	NSA HQ-SC4	Elevator Reservoir	150
NSA HQ-SC72-OFE-01	NS-SC72	Transformer	185
NSA HQ-SC73-OFE-01	NS-SC73	Transformer	100
NSA HQ-SC79-OFE-01	NS-SC79	Transformer	110
NSA HQ-SC84-OFE-01	NS-SC84	Transformer	110
NSA HQ-SC85-OFE-01	NS-SC85	Transformer	155
NSA HQ-SC87-OFE-01	NS-SC87	Transformer	120
NSA HQ-SC90-OFE-01	NS-SC90	Transformer	110

Oil-Filled Operational Equipment			
ID Number	**Building Number**	**Type**	**Oil Capacity (gallons)**
NSA HQ-SC93-OFE-01	NS-SC93	Transformer	120
NSA HQ-SC97-OFE-01	NS-SC97	Transformer	180
NSA HQ-SC97-OFE-02	NS-SC97	Transformer	100
NSA HQ-SC100-OFE-01	NS-SC100	Transformer	120
NSA HQ-SC102-OFE-01	NS-SC102	Transformer	100
NSA HQ-SC104-OFE-01	NS-SC104	Transformer	110
NSA HQ-SC113-OFE-01	NS-SC113	Transformer	100
NSA HQ-SC113-OFE-02	NS-SC113	Transformer	180
NSA HQ-SC126-OFE-01	NS-SC126	Transformer	110
NSA HQ-SC127-OFE-01	NS-SC127	Transformer	120
NSA HQ-SC128-OFE-01	NS-SC128	Transformer	110
NSA HQ-SC128-OFE-02	NS-SC128	Transformer	120
NSA HQ-SC130-OFE-01	NS-SC130	Transformer	110
NSA HQ-SC401-OFE-01	NS-SC401	Transformer	250
NSA HQ-SC404-OFE-01	NS-SC404	Transformer	184
NSA HQ-SC405-OFE-01	NS-SC405	Transformer	184
NSA HQ-SC411-OFE-01	NS-SC411	Transformer	143
NSA HQ-SDA1-OFE-01	NS-SDA1	Transformer	151
NSA HQ-SDA213-OFE-01	NS-SDA213	Transformer	225
NSA HQ-SDA313A-OFOE-01	NSA HQ-SDA313A	Elevator Reservoir	150
NSA HQ-SDA314-OFE-01	NS-SDA314	Transformer	315
NSA HQ-SDA314-OFOE-01	NSA HQ-SDA314	Elevator Reservoir	150
NSA HQ-SDA331-OFE-01	NS-SDA331	Transformer	570
NSA HQ-SDA332-OFE-01	NS-SDA332	Transformer	140
NSA HQ-SDA336-OFE-01	NS-SDA336	Transformer	178
NSA HQ-SDA337-OFE-01	NS-SDA337	Transformer	255
NSA HQ-SDA341-OFE-01	NS-SDA341	Transformer	263
NSA HQ-SDA344-OFE-01	NS-SDA344	Transformer	301
NSA HQ-SDA344-OFOE-02	NSA HQ-SDA344	Elevator Reservoir	150
NSA HQ-SDA345-OFE-01	NS-SDA345	Transformer	263

54,642 Gallons OFOE Capacity
261 Total Number of OFOE

Total Facility Oil Capacity SPCC Regulated	
23,331	**Gallons AST**
20,000	**Gallons UST SPCC Assets**
825	**Gallons Drum**
0	**Gallons Mobile Equipment**
685	**Gallons Portable Container**
54,642	**Gallons OFOE**
99,483	**Gallons Grand Total SPCC Regulated**

5.2 Site-Specific Information

Site-specific information sheets have been prepared following inspection of each oil storage container and each portable container storage area throughout the facility. Information presented in this section is intended to provide owners, operators, and inspectors a quick reference which indicates the types of equipment utilized and how the oil storage or transfer system complies with §112.

Additional sites not listed in this section may store petroleum products in containers less than 55 gallons.

5.2.1 Tank Systems Data Sheets and Maps

Each bulk storage container addressed in this SPCC Plan has an individual summary sheet which provides a synopsis of the technical description of the container, contents, and containment system. An individual site map is included which depicts the following for each container site:

- General Location
- Size
- Contents
- Projected discharge path in case of a container failure
- Staging area for any vehicular transfer
- Projected discharge path for releases associated with vehicular transfer
- Containment systems if other than a double-walled tank
- Surface features which potentially impact or contain the flow of released oil.

Several containers in close proximity may be designated as a single “site” and are therefore included on a single map page.

In addition, each container site also contains two companion documents. The first is a summary of the failure scenarios and associated general secondary containment compliance measures required under §112.7(b) and (c). The second is a summary of assorted compliance issues associated with each tank. As with the site maps, several containers located at one “site” may be included in a single companion document.

USTs that are fully regulated by 40 CFR 280 are not SPCC assets. Three USTs that provide gasoline storage at a fuel dispensing facility at NSA HR Headquarters are Commonwealth of Virginia regulated but exempt from SPCC requirements, other than to be shown on the SPCC facility diagram. These three USTs are marked “Exempt” on the facility diagram.

USTs that supply an emergency generator are now fully regulated by the 2015 UST regulations (40 CFR 280) and are no longer SPCC assets. Six USTs that only supply diesel to emergency power generators at NSA HR Headquarters are exempt from SPCC requirements, other than to be shown on the SPCC facility diagram. These six USTs are marked “Exempt” on the facility diagrams.

The two USTs that are not fully regulated by 40 CFR 280 and therefore are subject to the SPCC Rule provide fuel oil to a heating system.

An individual summary sheet has been included for each of the eleven USTs, and the companion document is also provided for all eleven USTs. The UST locations are shown on individual facility diagram maps in this section.

The information presented has been reviewed for compliance with §112, Virginia regulations, and industry standards. All deficiencies, specific regulatory citations, and recommended corrective actions are presented in Appendix B.

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active
- Other Storage Facility

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line
- Storm Sewer Manhole
- Storm Sewer Drop Inlet

POL Vehicle Activity Site

- Fuel Offload Site
- Mobile Equipment Site
- Mobile Refueler
- Oil Transfer Site

POL Compliance Site Flow Direction

Installation Boundary

For use with site-specific diagrams

Spill Prevention, Control, and Countermeasures Plan
Naval Support Activity Hampton Roads HQ

NAVFAC Naval Facilities Engineering Command
Environmental Business Line, Mid-Atlantic Region

Legend

Tank Systems

General Information

Tank No.:	**NSA HQ-BallField-AST-01A**	Date Installed:	Unknown
Building No.:	BaseballField	Tank Use:	Product Dispenser
TankType:	AST	Activity/ Operator:	MWR

Tank Design Information

Capacity (gallons):	250
Contents:	Gasoline
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	None

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	None
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☑ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Unnumbered storm drain system

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 6/26/2018

Tank Systems

General Information

Tank No.:	**NSA HQ-BallField-AST-01B**	Date Installed:	Unknown
Building No.:	BaseballField	Tank Use:	Product Dispenser
TankType:	AST	Activity/ Operator:	MWR

Tank Design Information

Capacity (gallons):	250
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	None

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	None
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☑ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Unnumbered storm drain system

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 6/26/2018

General Secondary Containment Compliance Tanks NSA HQ-BallField-AST-01A and -01B

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-BallField-AST-01A	Tank rupture	West 140' to catch basin	Inst	250	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	West 140' to catch basin	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	West 140' to catch basin	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	45	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	West 140' to catch basin	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	45	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (Dispensing)	West 140' to catch basin	10	2	Yes	6	1	Active measures will be used. Absorbent materials are available to the dispenser operator.		Visual	45	1	5	After	1	Spill location	Across asphalt	Absorbent materials available to the dispenser operator	1	10	Yes	Dispenser Operator	Yes	Sufficient	Yes
NSA HQ-BallField-AST-01B	Tank rupture	West 140' to catch basin	Inst	250	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	West 140' to catch basin	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	West 140' to catch basin	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	45	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	West 140' to catch basin	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	45	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (Dispensing)	West 140' to catch basin	10	12	Yes	6	1	Active measures will be used. Absorbent materials are available to the dispenser operator.		Visual	45	1	5	After	1	Spill location	Across asphalt	Absorbent materials available to the dispenser operator	1	10	Yes	Dispenser Operator	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
NSA HQ-BallField-AST-01A and -01B

Drum Storage Area/Cont-ainer ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-BallField-AST-01A	No[A]	Yes	No[A]	Yes	Yes	No[2]	Yes	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]
NSA HQ-BallField-AST-01B	No[A]	Yes	No[A]	Yes	No[A]	No[2]	Yes	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1] Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2] As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

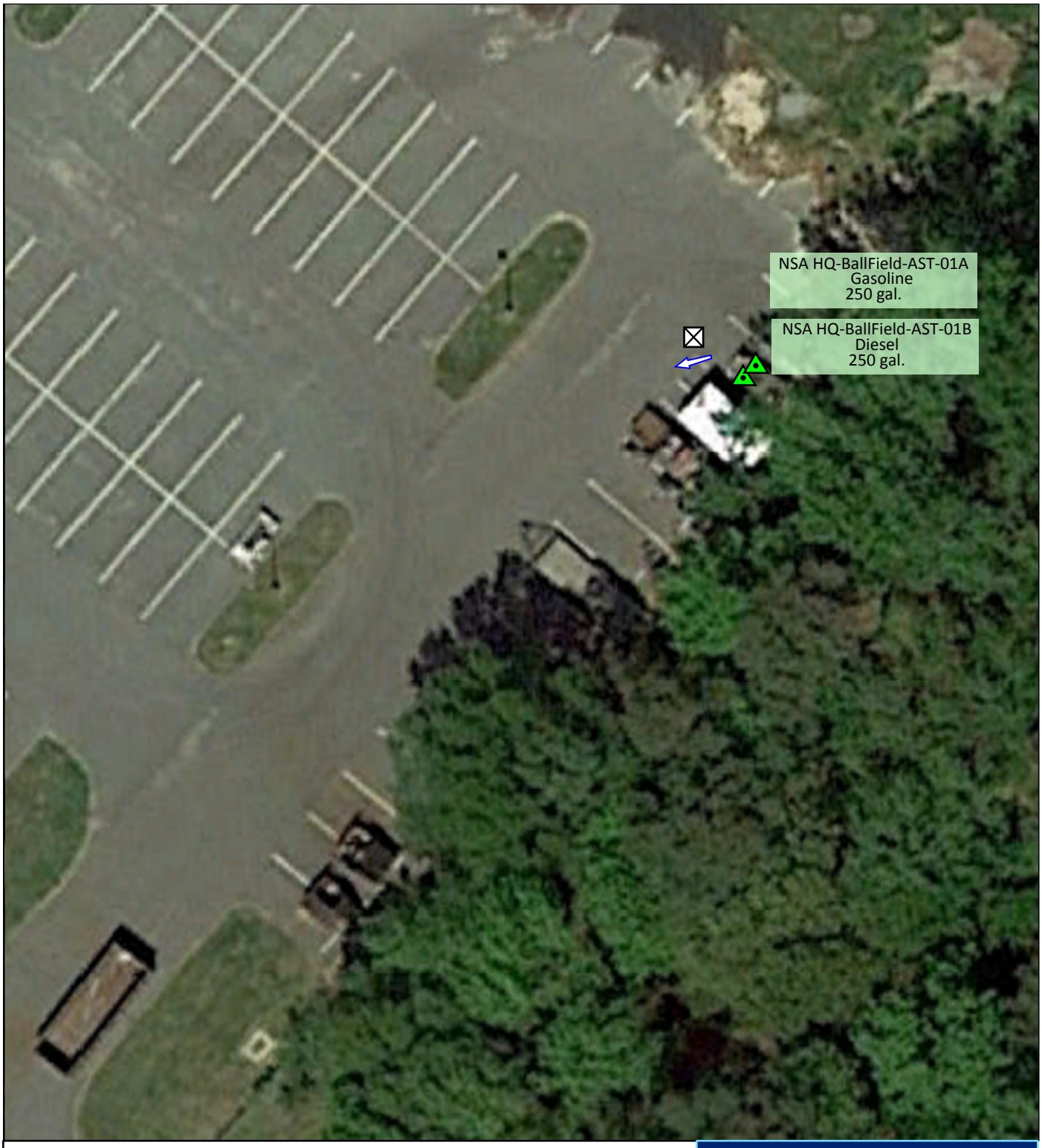
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

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Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

Baseball Fields

Tank Systems

General Information

Tank No.:	**NSA HQ-BEN154-AST-01**	Date Installed:	1/1/1995
Building No.:	BEN154	Tank Use:	Product Dispenser
TankType:	AST	Activity/ Operator:	Ben Moreell Fire Station

Tank Design Information

Capacity (gallons):	250
Contents:	Diesel
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☑ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Elizabeth River
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-BEN154-AST-02**	Date Installed:	Unknown
Building No.:	BEN154	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Ben Moreell Fire Station

Tank Design Information

Capacity (gallons):	70
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	None -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled F ible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suctio eturn
Underground Piping:	Non
Underground Piping Corrosion Protection:	/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Contain t

Type:	Active Measures
Construction	N/A
Capacity:	N/A
Draina	N/A
Rele od:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	No
High level Alarm:	None
Comm. link b/w gauger & pumper:	No
Level Gauge Linked to Computer:	No
CRDM:	No
Spill Control:	None
STI Category:	STI-Cat 3
Spill Prevention:	Active Spill Preventi
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is t portable.

on:
asures
unication Link b/w Gauger and Pumper (Electronic)
munication Link b/w Gauger and Pumper (Visual)
evel Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☑ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atl tic Oil Recovery would respond should assist ce be required as described in Section 6.
Worst Case Discharge:	Full Ta Capacity -
Probable Discharge Cause:	Ove l -
Probable Discharge:	gal
Natural Resources at Risk:	lizabeth River
Municipal Services at R k:	Stormwater Outfall - 613

Security

Does adequate nting exist for spill detectio uring darkness:	Yes
Is Fill Port d/or Spill Bucket Secured	Yes

Caption: AST

Date Taken: 1/11/2016

REMOVED FROM SITE

General Secondary Containment Compliance Tank NSA HQ-BEN154-AST-01 and -02

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																							
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																	
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropr-iateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-BEN154-AST-01	Tank rupture	NW 50' to road	Inst	250	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																							
	Tanker rupture	NW 50' to road	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																							
	Overfill	NW 50' to road	50	5	Yes	5	4	Spillbucket	5	N/A, passive measure used																	
	Hose retrieval	NW 50' to road	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (Dispensing)	NW 50' to road	10	1	Yes	5	1	Active measures will be used. Absorbent materials maintained on site.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Dispenser Operator	Yes	Sufficient	Yes
NSA HQ-BEN154-AST-02	Tank rupture	NW 100' to road	Inst	70	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehi																							
	Tanker rupture	NW 100' to road	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel deliv																							
	Overfill	NW 100' to road	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After				materials maintained on elivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	NW 100' to road	60	60	Yes	5	5	Active measures will be used. Absorbent mate vehicle.		V								Absorbent materials maintained on elivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe	NW 100' to		1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visi				ter	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

REMOVED FROM SITE

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building BEN154, Tanks NSA HQ-BEN154-AST-01 and -02

Drum Storage Area/Cont-ainer ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-BEN154-AST-01	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	Yes	Yes, double-walled tank	Yes	Yes	Yes	No[5]	Yes	N/A	N/A	Yes	Yes	Yes
NSA HQ-BEN154-AST-02	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	No[2]	No[4], Single-walled	N/A,		N/A	single-walled tank	single-walled tank	N/A	N/A	Yes	Yes	N/A, not neaby vehicle traffic

REMOVED FROM SITE

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance
[A] Apply required tank labels.
[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements
Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)
No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids
NFPA Diamond required by Code 704 for all fixed ASTs containing Oil and Hazardous Substances (OHS) liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and
Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances
Capacity marking is a primary means to protect against overfill.
"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]
1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

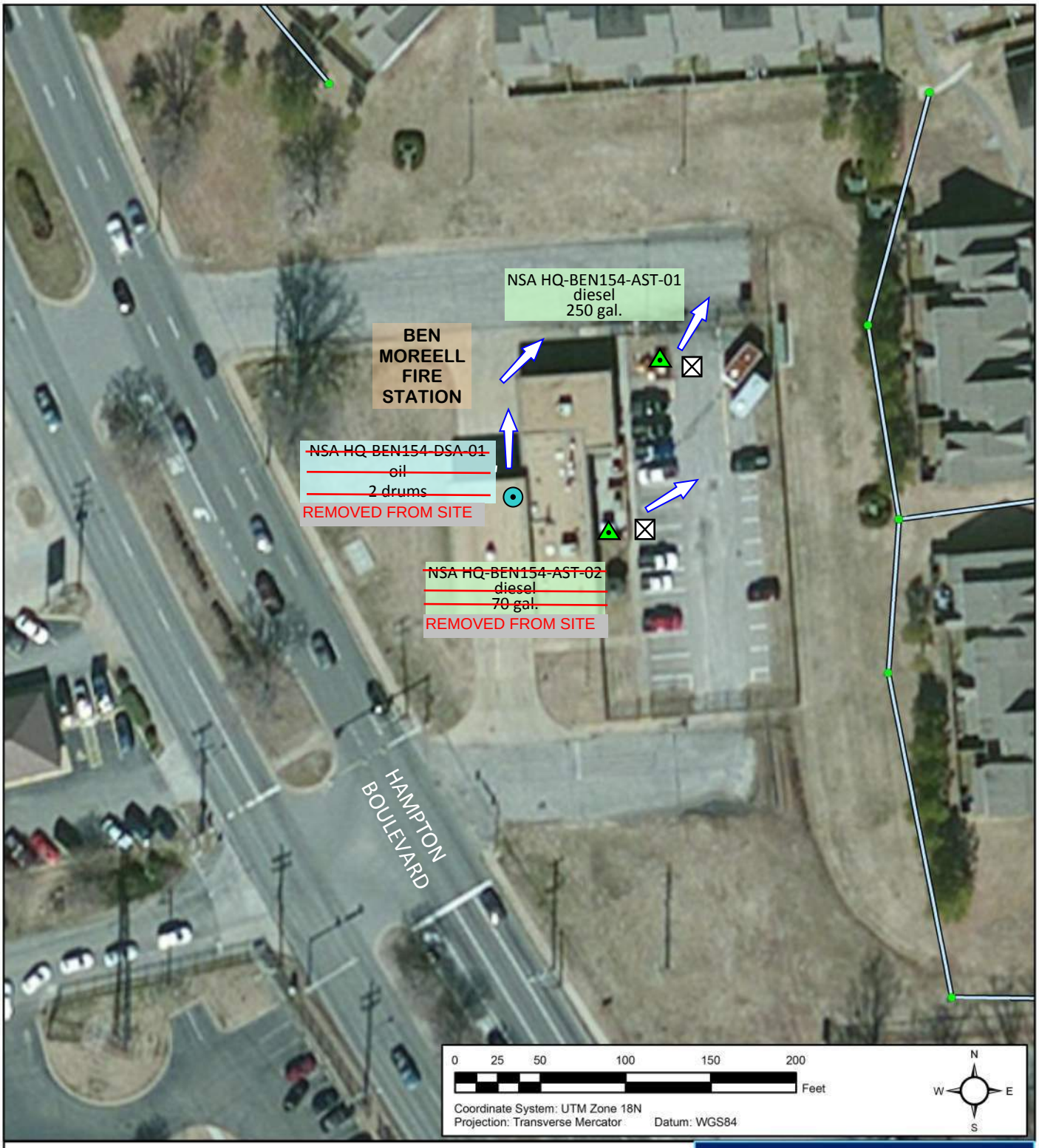
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

Naval Station Norfolk

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

BEN154

Tank Systems

General Information

Tank No.:	**NSA HQ-CA6-AST-05**	Date Installed:	Unknown
Building No.:	CA6	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	NAVFAC Mid-Atlantic, Utilities

Tank Design Information

Capacity (gallons):	200
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	DW Steel Tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	NAVFAC Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-CA6-AST-05

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																				
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)															
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-CA6-AST-05	Tank rupture	SW 185' to storm sewer	Inst	200	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																			
	Tanker rupture	SW 165 to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	SW 185' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	SW 185' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	SW 185' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building CA6, Tank NSA HQ-CA6-AST-05

Drum Storage Area/Cont-ainer ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-CA6-AST-05	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, no neaby vehicle traffic

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

CA6

Tank Systems

General Information

Tank No.:	**NSA HQ-CA501-AST-01**	Date Installed:	11/15/1997
Building No.:	CA501	Tank Use:	Product Dispenser
TankType:	AST	Activity/ Operator:	Morale Welfare & Recreation - Golf Course

Tank Design Information

Capacity (gallons):	1,000
Contents:	Gasoline
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☑ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Mason Creek
Municipal Services at Risk:	Stormwater Outfall - 301

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-CA501-AST-02**	Date Installed:	1/1/1995
Building No.:	CA501	Tank Use:	Product Dispenser
TankType:	AST	Activity/ Operator:	Morale Welfare & Recreation - Golf Course

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Mason Creek
Municipal Services at Risk:	Stormwater Outfall - 301

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-CA501-AST-03**	Date Installed:	Unknown
Building No.:	CA501	Tank Use:	Used Oil Storage
TankType:	AST	Activity/ Operator:	Morale Welfare & Recreation - Golf Course

Tank Design Information

Capacity (gallons):	250
Contents:	Used Oil
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	N/A
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	None

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Mason Creek
Municipal Services at Risk:	Stormwater Outfall - 301

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tanks NSA HQ-CA501-AST-01, -02, and -03

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																						
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																	
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-CA501-AST-01	Tank rupture	Southwest to grass	Inst	1,000	Yes	120	1,000	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																			
	Tanker rupture	Southwest to grass	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																					
	Overfill	Southwest to grass	50	5	Yes	5	4	Spill bucket	5	N/A, passive measure used																	
	Hose retrieval	Southwest to grass	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	> 180	1	5	After	1	Spill location	Across grass area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (Dispensing)	Southwest to grass	1	1	Yes	5	1	Active measures will be used. Absorbent materials maintained on site.		Visual	> 180	1	5	After	1	Spill location	Across grass area	Absorbent materials maintained on site	1	10	Yes	Dispenser Operator	Yes	Sufficient	Yes
NSA HQ-CA501-AST-02	Tank rupture	Southwest to grass	Inst	500	Yes	120	500	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																			
	Tanker rupture	Southwest to grass	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																					
	Overfill	Southwest to grass	50	5	Yes	5	4	Spill bucket	5	N/A, passive measure used																	
	Hose retrieval	Southwest to grass	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	> 180	1	5	After	1	Spill location	Across grass area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (Dispensing)	Southwest to grass	1	1	Yes	5	1	Active measures will be used. Absorbent materials maintained on site.		Visual	> 180	1	5	After	1	Spill location	Across grass area	Absorbent materials maintained on site	1	10	Yes	Dispenser Operator	Yes	Sufficient	Yes
NSA HQ-CA501-AST-03	Tank rupture	Southwest to grass	Inst	250	Yes	120	500	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																			
	Pumper truck tank rupture	Southwest to grass	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial oil collection vehicle is inspected regularily under DOT regulations.																					
	Overfill	Southwest to grass	50	5	Yes	5	4	Spill bucket	5	N/A, passive measure used																	
	Hose retrieval	Southwest to grass	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on site.		Visual	> 180	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	5	10	Yes	Collection Truck Driver	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building CA501, Tank NSA HQ-CA501-AST-01, -02, and -03

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construction is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Automatic Flow Restrictor or Flow Shut-off Device	All Product Transfers are Constantly Monitored	Protectively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-CA501-AST-01	Yes	Yes	No[A]	Yes, sign damaged	Yes	Yes	No[2]	Yes	Yes	Yes, double-walled tank	Yes	Yes	Yes	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]
NSA HQ-CA501-AST-02	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]
NSA HQ-CA501-AST-03	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No, not required for used oil tank	No, not required for used oil tank	Yes	N/A	N/A	Yes	Yes	No[B]

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection law NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)
No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids
NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.
Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances
Capacity marking is a primary means to protect against overfill.
"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC
Naval Facilities Engineering Command
Environmental Business Line, Mid-Atlantic Region

CA501

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active
- Other Storage Facility

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC
Naval Facilities Engineering Command
Environmental Business Line, Mid-Atlantic Region

CA501

Tank Systems

General Information

Tank No.: **LR-H-AST-04**
Building No.: H
TankType: AST

Date Installed: Unknown
Tank Use: Fire Pump Day Tank
Activity/ Operator: Navfac Mid-Atlantic, Utilities

Tank Design Information

Capacity (gallons): 275
Contents: Diesel
Tank Corrosion Protection: Painted
Tank Construction: Single Walled Steel
Tank Fabrication: Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier: None -
Bunkered Tank: No
Direct ground contact: No

Secondary Containment

Type: None
Construction Material: N/A
Capacity: N/A
Drainage Controls: N/A
Release Detection Method: Visual Monitoring

Piping Design Information

Aboveground Piping: Single Walled St
Aboveground Piping Corrosion Protection: Painted
Pipe Pressurization: Pressur
Underground Piping: Non
Underground Piping Corrosion Protection:
Ancillary Equipment:
Automatic Line Leak Detection:

Secondary Containr

Type: e Measures
Construction A
Capacity: N/A
Drainag N/A
Releas d: Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge: No
High level Alarm: None
Comm. link b/w gauger & pumper: No
Level Gauge Linked to Computer: No
CRDM: No
Spill Control: None
STI Category: STI-Cat 3
Spill Prevention: Direct connection to
Auto Pump Shutoff: No
Is Tank Portable: No
Positioned to prevent spill from reaching navigable waters? N/A, tank is

n:
sures
nication Link b/w Gauger and Pumper (Electronic)
unication Link b/w Gauger and Pumper (Visual)
vel Gauge
Overfill/High Level Alarm
☐ Vent Whistle
☐ Overfill Prevention Valve (AST)
☐ Automatic Restrictor/Shutoff Device (UST)
☐ Not Required (UST fill event < 25 gallons/event)
☐ None

Potential Discharge Information

Spill Response Procedures: Navfac Mid-Atla ould respond should assista described in Section 6.
Worst Case Discharge: Full Tan Capacity -
Probable Discharge Cause: Pipin ailures/Breaking Lines -
Probable Discharge: > gal
Natural Resources at Risk: afayette River
Municipal Services at Ri Unnumbered storm drain system

Security

Does adequate l ting exist for spill detection during darkness: Yes
Is Fill Port a /or Spill Bucket Secured: Yes

Caption: AST

Date Taken: 1/11/2016

REMOVED FROM SITE

General Secondary Containment Compliance Tank LR-H-AST-04

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																				
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)															
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
LR-H-AST-04	Tank rupture	Indoor flow then south 20' to storm sewer	Inst	275	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near norma																			
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this ta supply from a separate supply tank.																			
	Overfill	Indoor flow then south 20' to storm sewer	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because t tronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply ta ed to the supply tank.																			
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																			
	Transfer out (pipe	Indoor flow then sewer		1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

REMOVED FROM SITE

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building H, Tank LR-H-AST-04

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
LR-H-AST-04	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	No[2]	No[2]	No[4], Single-walled	N/A,				A, gle-led tank	N/A	N/A	Yes	Yes	N/A, tank located indoors

REMOVED FROM SITE

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Tank Systems

General Information

Tank No.:	**LR-H-AST-05**	Date Installed:	Unknown
Building No.:	H	Tank Use:	Fire Pump Day Tank
TankType:	AST	Activity/Operator:	NAVFAC Mid-Atlantic, Utilities

Tank Design Information

Capacity (gallons):	275
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel double bottom tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	Painted
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	None
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Electronic
Level Gauge Linked to Computer:	Yes
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Fill is hardpiped to supply tank
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- [ ] Active Measures
- [x] Communication Link b/w Gauger and Pumper (Electronic)
- [ ] Communication Link b/w Gauger and Pumper (Visual)
- [ ] Level Gauge
- [ ] Overfill/High Level Alarm
- [ ] Vent Whistle
- [ ] Overfill Prevention Valve (AST)
- [ ] Automatic Restrictor/Shutoff Device (UST)
- [ ] Not Required (UST fill event < 25 gallons/event)
- [ ] None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Piping Failures/Breaking Lines -
Probable Discharge:	>25gal
Natural Resources at Risk:	Lafayette River
Municipal Services at Risk:	Unnumbered storm drain system

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Photo Needed

Caption:

Date Taken:

General Secondary Containment Compliance Tank LR-H-AST-05

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
LR-H-AST-05	Tank rupture	Indoor flow then south 20' to storm sewer	Inst	275	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank has a direct fuel supply from a separate supply tank.																				
	Overfill	Indoor flow then south 20' to storm sewer	50	5	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank is equipped with electronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply tank in such a manner that excess fuel will be returned to the supply tank.																				
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																				
	Transfer out (pipe seepage)	Indoor flow then south 20' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building H, Tank LR-H-AST-05

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
LR-H-AST-05	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	Yes	No[2]	Yes, double-walled tank	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes	N/A, tank located indoors

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the containe must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Tank Systems

General Information

Tank No.:	**LR-H-UST-01**	Date Installed:	4/1/1994
Building No.:	H	Tank Use:	Heating System Supply
TankType:	UST	Activity/ Operator:	Navfac Mid-Atlantic, Utilities

Tank Design Information

Capacity (gallons):	10,000
Contents:	Fuel Oil
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled FRP
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A UST -
Bunkered Tank:	N/A UST
Direct ground contact:	N/A UST

Secondary Containment

Type:	Double Walled UST
Construction Material:	Fiberglass
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction
Underground Piping:	Double Walled Fiberglass
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	No

Secondary Containment

Type:	Double walled piping
Construction Material:	Fiberglass
Capacity:	25 gallons
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	No
CRDM:	N/A
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	Spill Bucket
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☑ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Lafayette River
Municipal Services at Risk:	Unnumbered storm drain system

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: UST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**LR-H-UST-02**	Date Installed:	4/1/1994
Building No.:	H	Tank Use:	Heating System Supply
TankType:	UST	Activity/ Operator:	Navfac Mid-Atlantic, Utilities

Tank Design Information

Capacity (gallons):	10,000
Contents:	Fuel Oil
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled FRP
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A UST -
Bunkered Tank:	N/A UST
Direct ground contact:	N/A UST

Secondary Containment

Type:	Double Walled UST
Construction Material:	Fiberglass
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction
Underground Piping:	Double Walled Fiberglass
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Double walled piping
Construction Material:	Fiberglass
Capacity:	25 gallons
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	No
CRDM:	N/A
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	Spill Bucket
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☑ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Lafayette River
Municipal Services at Risk:	Unnumbered storm drain system

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: UST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**LR-H-UST-03**	Date Installed:	4/1/1994
Building No.:	H	Tank Use:	Emergency Generator Supply
TankType:	UST	Activity/ Operator:	Navfac Mid-Atlantic, Utilities

Tank Design Information

Capacity (gallons):	1,000
Contents:	Diesel
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled FRP
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A UST -
Bunkered Tank:	N/A UST
Direct ground contact:	N/A UST

Secondary Containment

Type:	Double Walled UST
Construction Material:	Fiberglass
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction
Underground Piping:	Double Walled Fiberglass
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Double walled piping
Construction Material:	Fiberglass
Capacity:	25 gallons
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	No
CRDM:	N/A
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	Spill Bucket
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☑ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Lafayette River
Municipal Services at Risk:	Unnumbered storm drain system

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: UST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank LR-H-UST-01, -02, and -03

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																						
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																	
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
LR-H-UST-01	Tank rupture	South 25' to storm sewer	Inst	10,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																					
	Tanker rupture	South 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																					
	Overfill	South 25' to storm sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																	
	Hose retrieval	South 25' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Transfer Out (pipe seepage)	South 25' to storm sewer	1	1	No	59	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																	
LR-H-UST-02	Tank rupture	South 25' to storm sewer	Inst	10,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																					
	Tanker rupture	South 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																					
	Overfill	South 25' to storm sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																	
	Hose retrieval	South 25' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Transfer Out (pipe seepage)	South 25' to storm sewer	1	1	No	59	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																	
LR-H-UST-03	Tank rupture	South 25' to storm sewer	Inst	1,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																					
	Tanker rupture	South 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																					
	Overfill	South 25' to storm sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																	
	Hose retrieval	South 25' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Transfer Out (pipe seepage)	South 25' to storm sewer	1	1	No	59	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																	

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Legend

POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

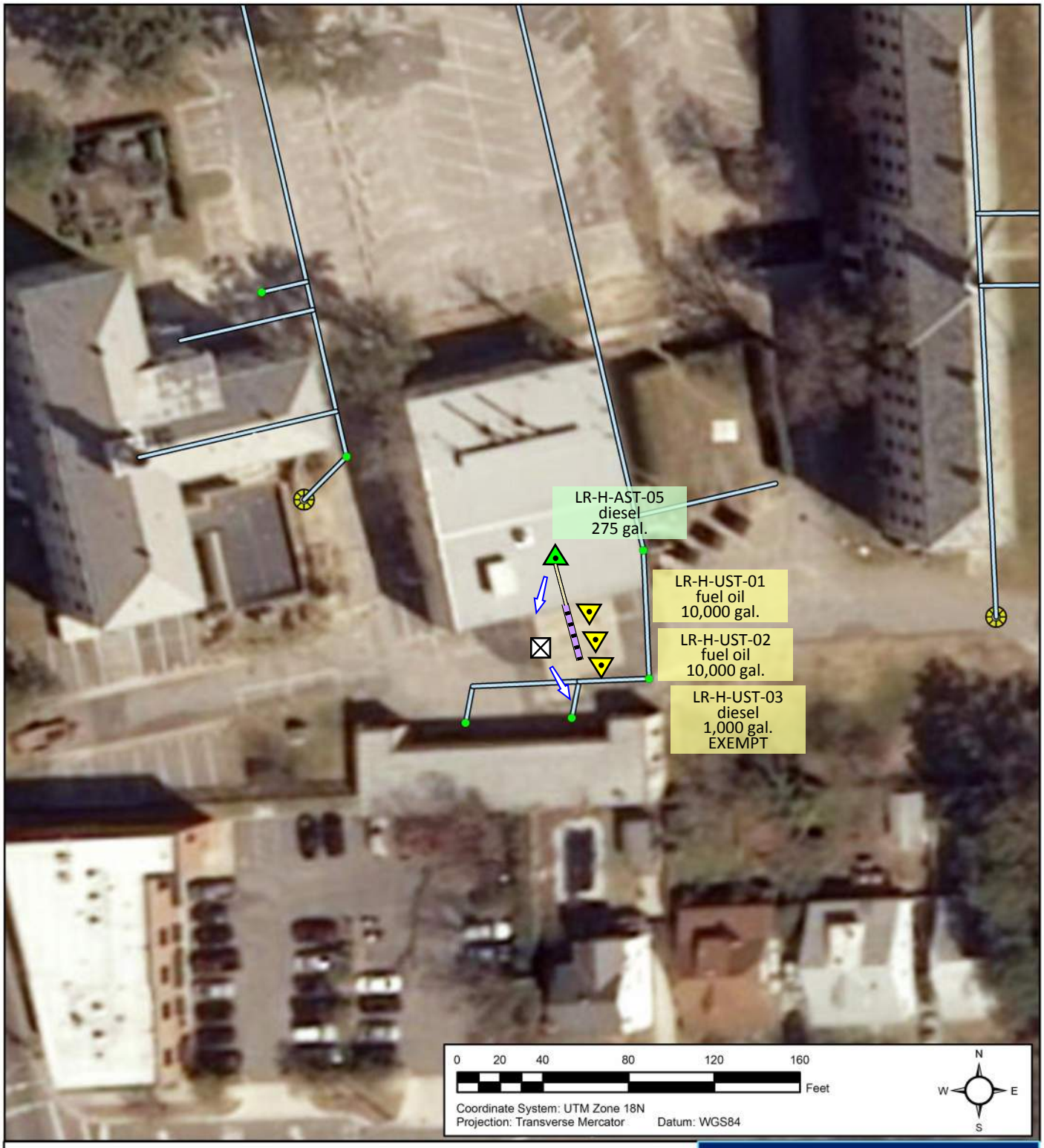
- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC
Naval Facilities Engineering Command
Environmental Business Line, Mid-Atlantic Region

H



Legend

POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC
Naval Facilities Engineering Command
Environmental Business Line, Mid-Atlantic Region

H

Tank Systems

General Information

Tank No.:	**NSA HQ-MCA612-AST-04**	Date Installed:	1/1/1998
Building No.:	MCA612	Tank Use:	Used Oil Storage
TankType:	AST	Activity/ Operator:	Marine Corps Security Forces Regiment

Tank Design Information

Capacity (gallons):	500
Contents:	Used Oil
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	N/A
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	N/A
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	N/A No Pipe Installed

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 605

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-MCA612-AST-04

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-MCA612-AST-04	Tank rupture	SE 40" to storm sewer	Inst	500	Yes	120	500	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																	
	Pumper truck tank rupture	SE 40" to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial oil collection vehicle is inspected regularly under DOT regulations.																				
	Overfill	SE 40" to storm sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used															
	Hose retrieval	SE 40" to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on site.		Visual	10	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	5	10	Yes	Collection Truck Driver	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building MCA612, Tank NSA HQ-MCA612-AST-04

Drum Storage Area/Cont-ainer ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-MCA612-AST-04	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

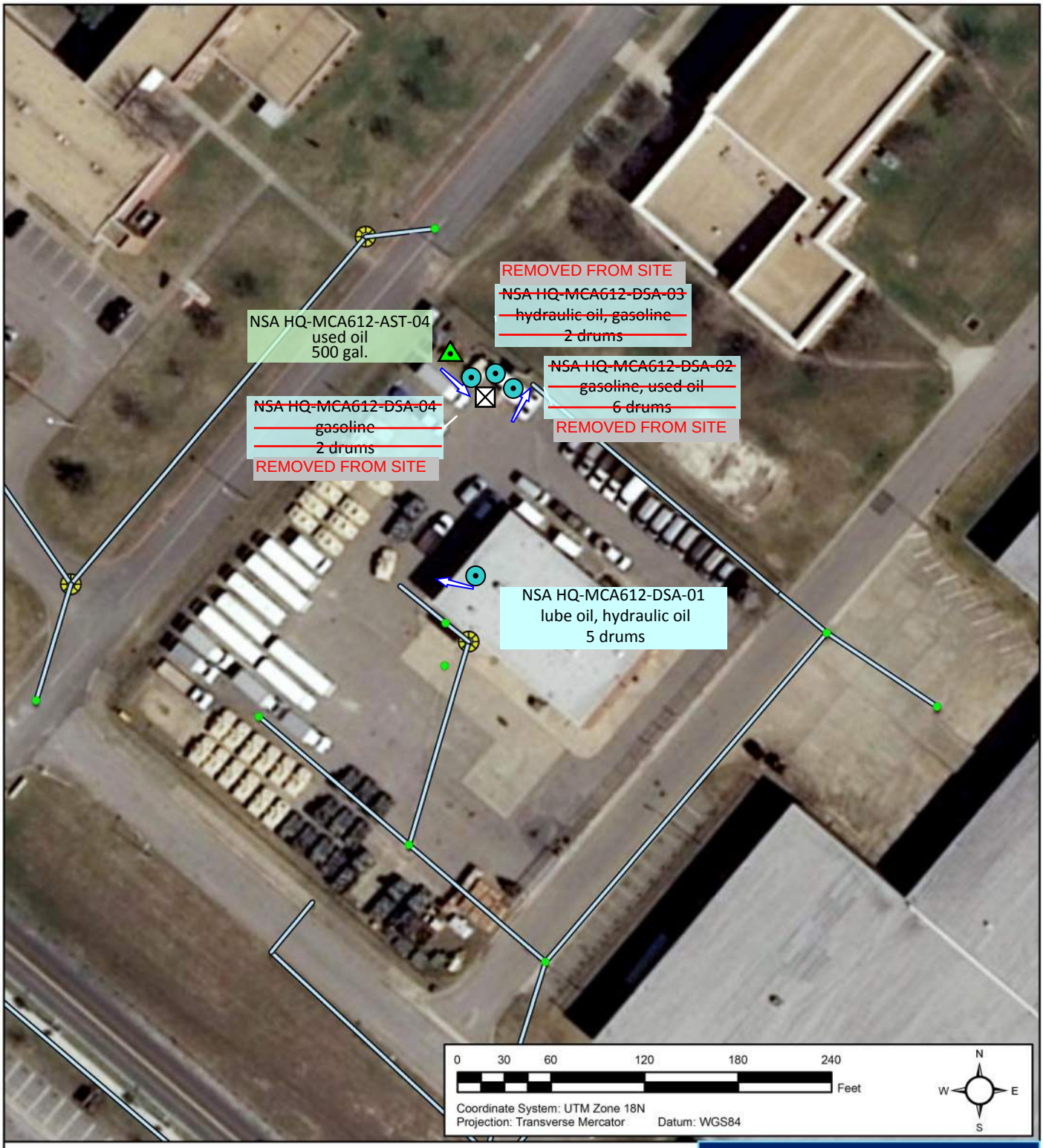
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

MCA612

Tank Systems

General Information

Tank No.:	**NSA HQ-MCE1-AST-01**	Date Installed:	Unknown
Building No.:	MCE1	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Marine Corps Exchange

Tank Design Information

Capacity (gallons):	875
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-MCE1-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																				
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)															
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-MCE1-AST-01	Tank rupture	West 35' to storm sewer	Inst	875	Yes	120	875	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																	
	Tanker rupture	West 35' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	West 35' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	1	After	1	Spill location	Grass to asphalt	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	West 35' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Grass to asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	West 35' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	20	1	5	After	1	Spill location	Grass to asphalt	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building MCE1, Tank NSA HQ-MCE1-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-MCE1-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B] requires protection from grounds-keeping equipment

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

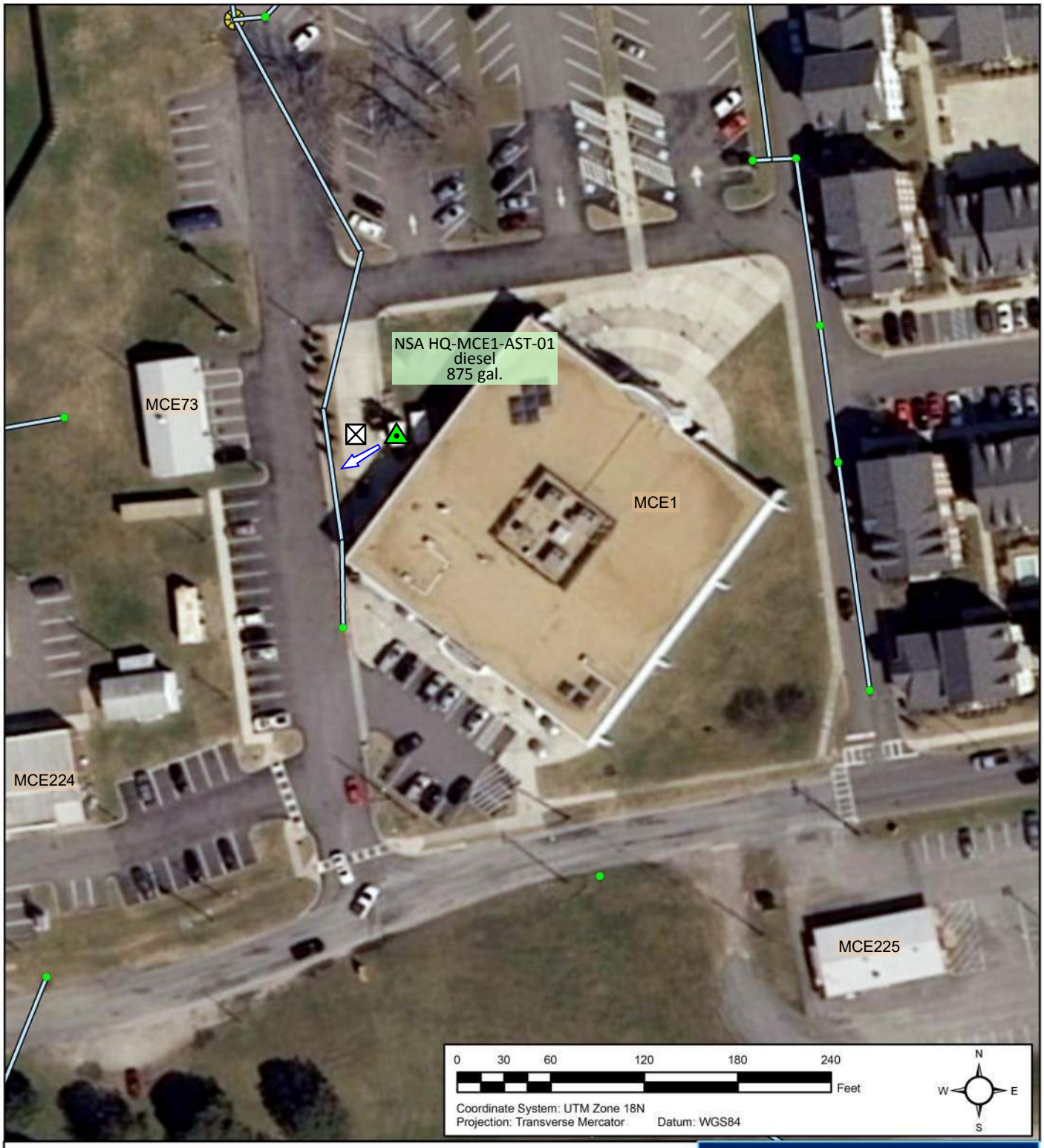
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

MCE1

Tank Systems

General Information

Tank No.:	**NSA HQ-MCE224-AST-05**	Date Installed:	1/1/1995
Building No.:	MCE224	Tank Use:	Used Oil Storage
TankType:	AST	Activity/ Operator:	Marine Corp Exchange Auto Pride Gas Station

Tank Design Information

Capacity (gallons):	250
Contents:	Used Oil
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Concrete -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Concrete
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	N/A
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	N/A
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	N/A No Pipe Installed

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- [ ] Active Measures
- [ ] Communication Link b/w Gauger and Pumper (Electronic)
- [x] Communication Link b/w Gauger and Pumper (Visual)
- [x] Level Gauge
- [ ] Overfill/High Level Alarm
- [ ] Vent Whistle
- [ ] Overfill Prevention Valve (AST)
- [ ] Automatic Restrictor/Shutoff Device (UST)
- [ ] Not Required (UST fill event < 25 gallons/event)
- [ ] None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-MCE224-AST-05

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-MCE224-AST-05	Tank rupture	North 150' to storm sewer	Inst	250	Yes	120	250	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																	
	Pumper truck tank rupture	North 150' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	North 150' to storm sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used															
	Hose retrieval	North 150' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on site.		Visual	120	1	5	After	1	Spill location	Across grassy area	Absorbent materials maintained on site	5	10	Yes	Collection Truck Driver	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building MCE224, Tank NSA HQ-MCE224-AST-05

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-MCE224-AST-05	Yes	Yes	No[A]	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No, not required for used oil tank	No, not required for used oil tank	Yes	N/A	N/A	Yes	Yes	No[B]

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Tank Systems

General Information

Tank No.:	**NSA HQ-MCE224-UST-06**	Date Installed:	1/1/1995
Building No.:	MCE224	Tank Use:	Product Dispenser
TankType:	UST	Activity/ Operator:	Marine Corp Exchange Auto Pride Gas Station

Tank Design Information

Capacity (gallons):	10,000
Contents:	Gasoline
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled FRP
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A -
Bunkered Tank:	No
Direct ground contact:	Yes

Secondary Containment

Type:	Double Walled UST
Construction Material:	Fiberglass
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Automatic Tank Gauging

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	Double Walled Plastic
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	Yes

Secondary Containment

Type:	Double walled piping
Construction Material:	Plastic
Capacity:	25 gallons
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes (ATG)
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	Yes
CRDM:	N/A
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	UST Fill port is within spill containment m
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☑ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: UST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-MCE224-UST-07**	Date Installed:	1/1/1995
Building No.:	MCE224	Tank Use:	Product Dispenser
TankType:	UST	Activity/ Operator:	Marine Corp Exchange Auto Pride Gas Station

Tank Design Information

Capacity (gallons):	10,000
Contents:	Gasoline
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled FRP
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A -
Bunkered Tank:	No
Direct ground contact:	Yes

Secondary Containment

Type:	Double Walled UST
Construction Material:	Fiberglass
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Automatic Tank Gauging

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	Double Walled Plastic
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	Yes

Secondary Containment

Type:	Double walled piping
Construction Material:	Plastic
Capacity:	25 gallons
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes (ATG)
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	No
CRDM:	N/A
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	UST Fill port is within spill containment m
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☑ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: UST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-MCE224-UST-08**	Date Installed:	1/1/1995
Building No.:	MCE224	Tank Use:	Product Dispenser
TankType:	UST	Activity/ Operator:	Marine Corp Exchange Auto Pride Gas Station

Tank Design Information

Capacity (gallons):	6,000
Contents:	Gasoline
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled FRP
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A -
Bunkered Tank:	No
Direct ground contact:	Yes

Secondary Containment

Type:	Double Walled UST
Construction Material:	Fiberglass
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Automatic Tank Gauging

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	Double Walled Plastic
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	Yes

Secondary Containment

Type:	Double walled piping
Construction Material:	Plastic
Capacity:	25 gallons
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes (ATG)
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	Yes
CRDM:	N/A
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	UST Fill port is within spill containment m
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☑ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

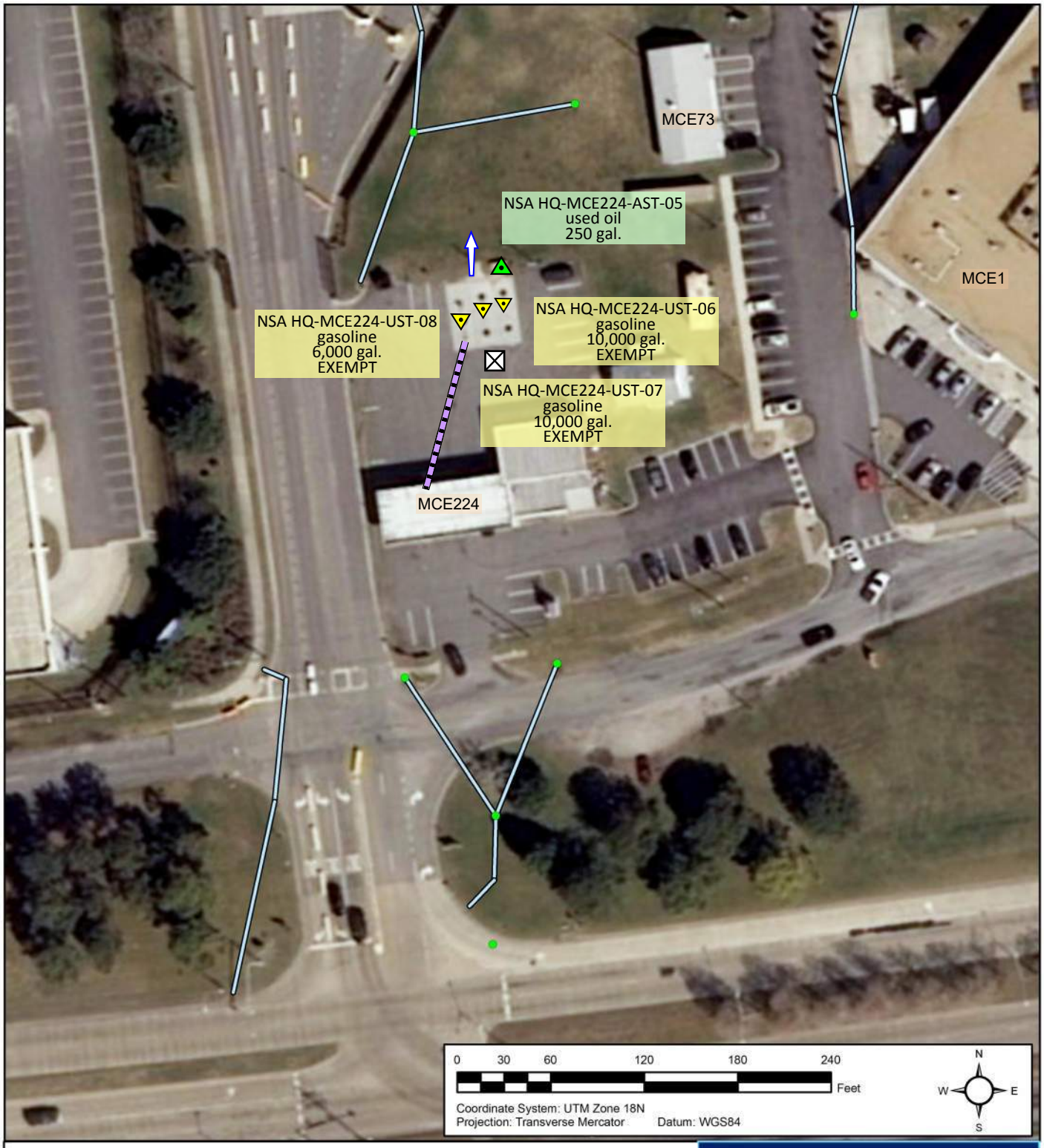
Caption: UST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-MCE224-UST-06, -07, and -08

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																							
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																	
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-MCE224-UST-06	Tank rupture	North 150' to strom sewer	Inst	10,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is routinely monitored and completely buried.																					
	Tanker rupture	North 150' to strom sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																					
	Overfill	North 150' to strom sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																	
	Hose retrieval	North 150' to strom sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across grassy area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (pipe seepage)	South 80' to storm sewer	1	1	Yes	60	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																	
NSA HQ-MCE224-UST-07	Tank rupture	North 150' to strom sewer	Inst	10,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is routinely monitored and completely buried.																					
	Tanker rupture	North 150' to strom sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																					
	Overfill	North 150' to strom sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																	
	Hose retrieval	North 150' to strom sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (pipe seepage)	South 80' to storm sewer	1	1	Yes	60	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																	
NSA HQ-MCE224-UST-08	Tank rupture	North 150' to strom sewer	Inst	6,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is routinely monitored and completely buried.																					
	Tanker rupture	North 150' to strom sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																					
	Overfill	North 150' to strom sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																	
	Hose retrieval	North 150' to strom sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (pipe seepage)	South 80' to storm sewer	1	1	Yes	60	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																	

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with



Legend

POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

MCE224

Tank Systems

General Information

Tank No.:	**NSA HQ-NH8-AST-01**	Date Installed:	Unknown
Building No.:	NH8	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters

Tank Design Information

Capacity (gallons):	100
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	None -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled F ible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suctio Return
Underground Piping:	No
Underground Piping Corrosion Protection:	
Ancillary Equipment:	nerators
Automatic Line Leak Detection:	

Secondary Contai

Type:	ve Measures
Constructio	N/A
Capacity	N/A
Drain	N/A
Rele iod:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	No
Spill Control:	None
STI Category:	STI-Cat 3
Spill Prevention:	Active Spill Preventi
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank i

on:
easures
unication Link b/w Gauger and Pumper (Electronic)
mmunication Link b/w Gauger and Pumper (Visual)
Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-At would respond should assis s described in Section 6
Worst Case Discharge:	Full T Capacity -
Probable Discharge Cause:	Ov ll -
Probable Discharge:	gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at k:	Stormwater Outfall - 612

Security

Does adequate hting exist for spill detectio during darkness:	Yes
Is Fill Port d/or Spill Bucket Secure	Yes

Caption: AST

Date Taken: 1/11/2016

REMOVED FROM SITE

Tank Systems

General Information

Tank No.:	**NSA HQ-NH8-AST-02**	Date Installed:	Unknown
Building No.:	NH8	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Altantic Fleet Headquarters

Tank Design Information

Capacity (gallons):	200
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH8-AST-03**	Date Installed:	Unknown
Building No.:	NH8	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters

Tank Design Information

Capacity (gallons):	200
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH8-AST-04**	Date Installed:	12/1/2017
Building No.:	NH8	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters

Tank Design Information

Capacity (gallons):	75
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel double bottom tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	None
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 6/26/2018

General Secondary Containment Compliance Tank NSA HQ-NH8-AST-01, -02, and -03

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																				
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)															
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH8-AST-01	Tank rupture	Indoor then north 50' to storm sewer	Inst	100	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal																			
	Tanker rupture	South 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	Indoor then north 50' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5					4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	Indoor then north 50' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.								Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe	Indoor then north 50' to storm sewer		1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH8-AST-02	Tank rupture	Indoor then north 50' to storm sewer	Inst	200	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																			
	Tanker rupture	South 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	Indoor then north 50' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	Indoor then north 50' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	Indoor then north 50' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH8-AST-03	Tank rupture	Indoor then north 50' to storm sewer	Inst	200	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																			
	Tanker rupture	South 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	Indoor then north 50' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	Indoor then north 50' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	Indoor then north 50' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

REMOVED FROM SITE

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

General Secondary Containment Compliance Tank NSA HQ-NH8-AST-04

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH8-AST-04	Tank rupture	Indoor then north 50' to storm sewer	Inst	75	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	South 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																				
	Overfill	Indoor then north 50' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	Indoor then north 50' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	Indoor then north 50' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH8, Tanks NSA HQ-NH8-AST-01, -02, and -03

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construction is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Automatic Flow Restrictor or Flow Shut-off Device	All Product Transfers are Constantly Monitored	Protectively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-NH8-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]			N/A			tank	tank	tank	N/A	N/A	Yes	Yes	N/A, tank located indoors
NSA HQ-NH8-AST-02	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, tank located indoors
NSA HQ-NH8-AST-03	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, tank located indoors

REMOVED FROM SITE

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[6] Apply required tank labels.

[8] Tank requires vehicle protection law NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH8, Tank NSA HQ-NH8-AST-04

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH8-AST-04	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, tank located indoors

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

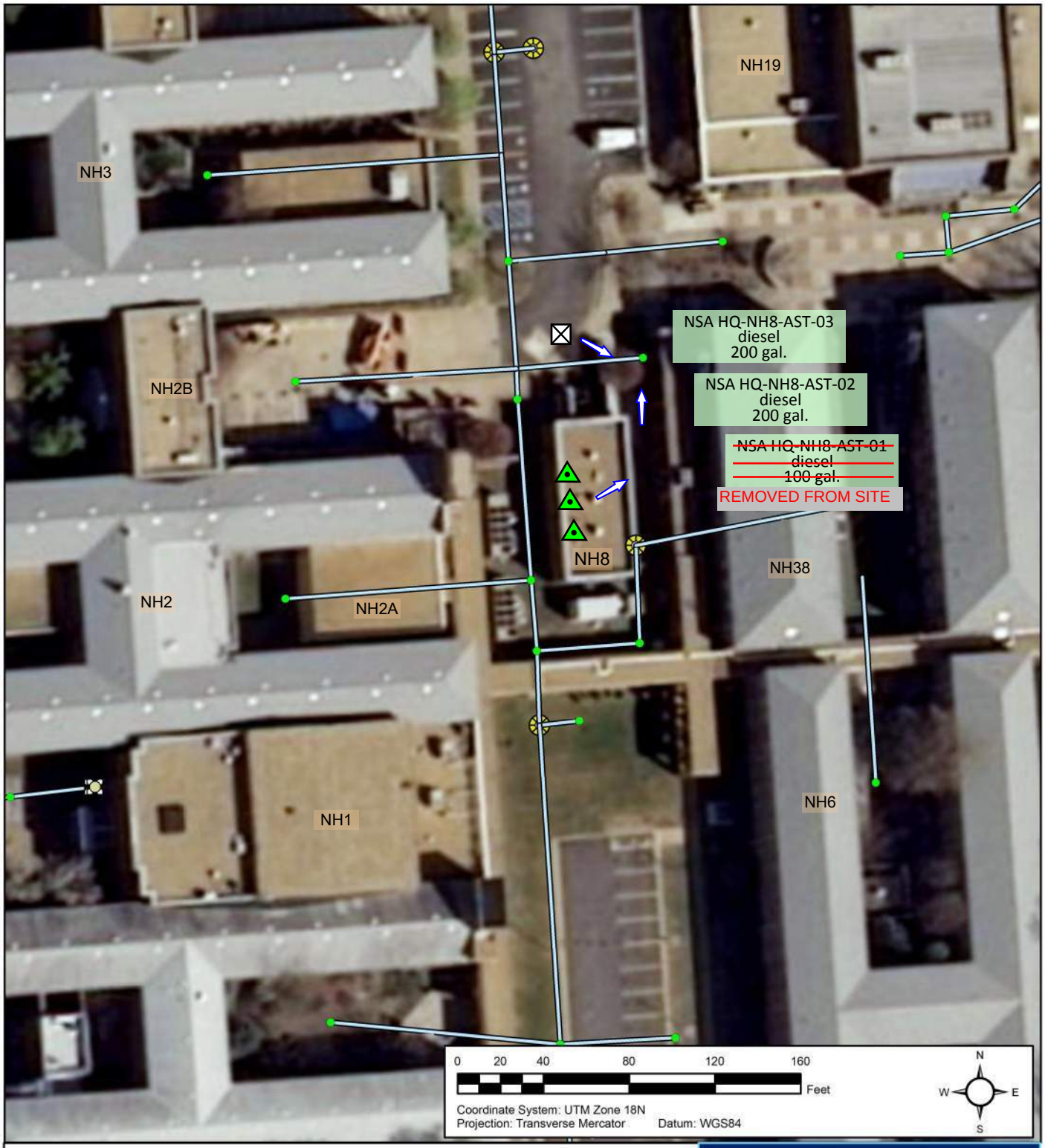
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the containe must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

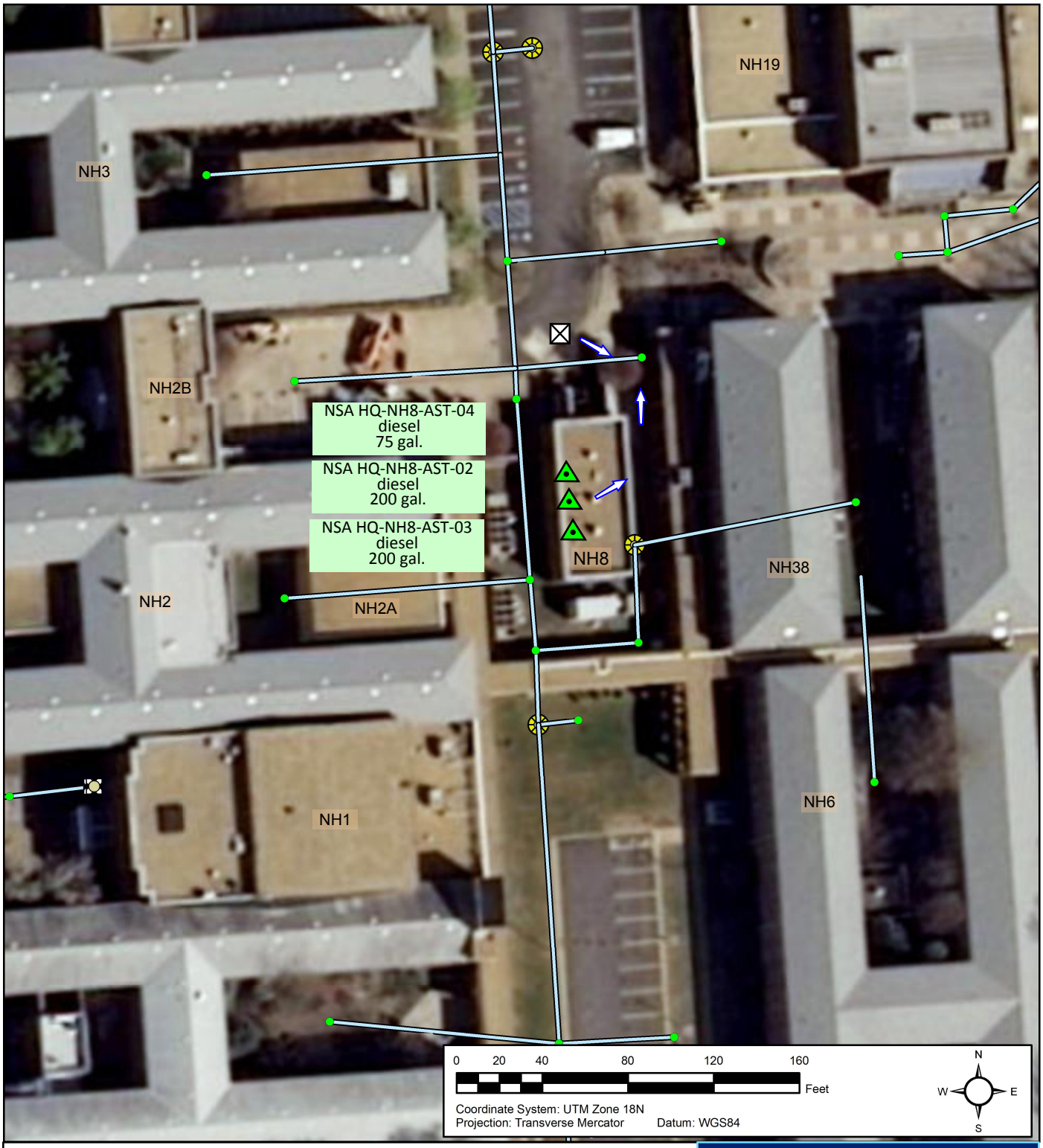
Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH8



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH8

Tank Systems

General Information

Tank No.:	**NSA HQ-NH12-AST-01**	Date Installed:	Unknown
Building No.:	NH12	Tank Use:	Emergency Generator Supply
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Concrete -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Open Top Berm
Construction Material:	Concrete
Capacity:	649 gallons
Drainage Controls:	Manual Valve
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	Painted
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment dike/berm
STI Category:	STI-Cat 1
Spill Prevention:	AST Fill port is within spill bucket.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH12-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																						
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																	
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH12-AST-01	Tank rupture	NW 50' to storm sewer	Inst	500	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																					
	Tanker rupture	South 60' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																					
	Overfill	NW 50' to storm sewer	50	5	Yes	5	4	spill bucket and diked area	5	N/A, passive measure used																	
	Hose retrieval	NW 50' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across grassy area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	NW 50' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Across grassy area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH12, Tanks NSA HQ-NH12-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH12-AST-01	Yes	Yes	No[A]	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A	N/A	Yes	Yes	N/A, not nearby vehicle traffic

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

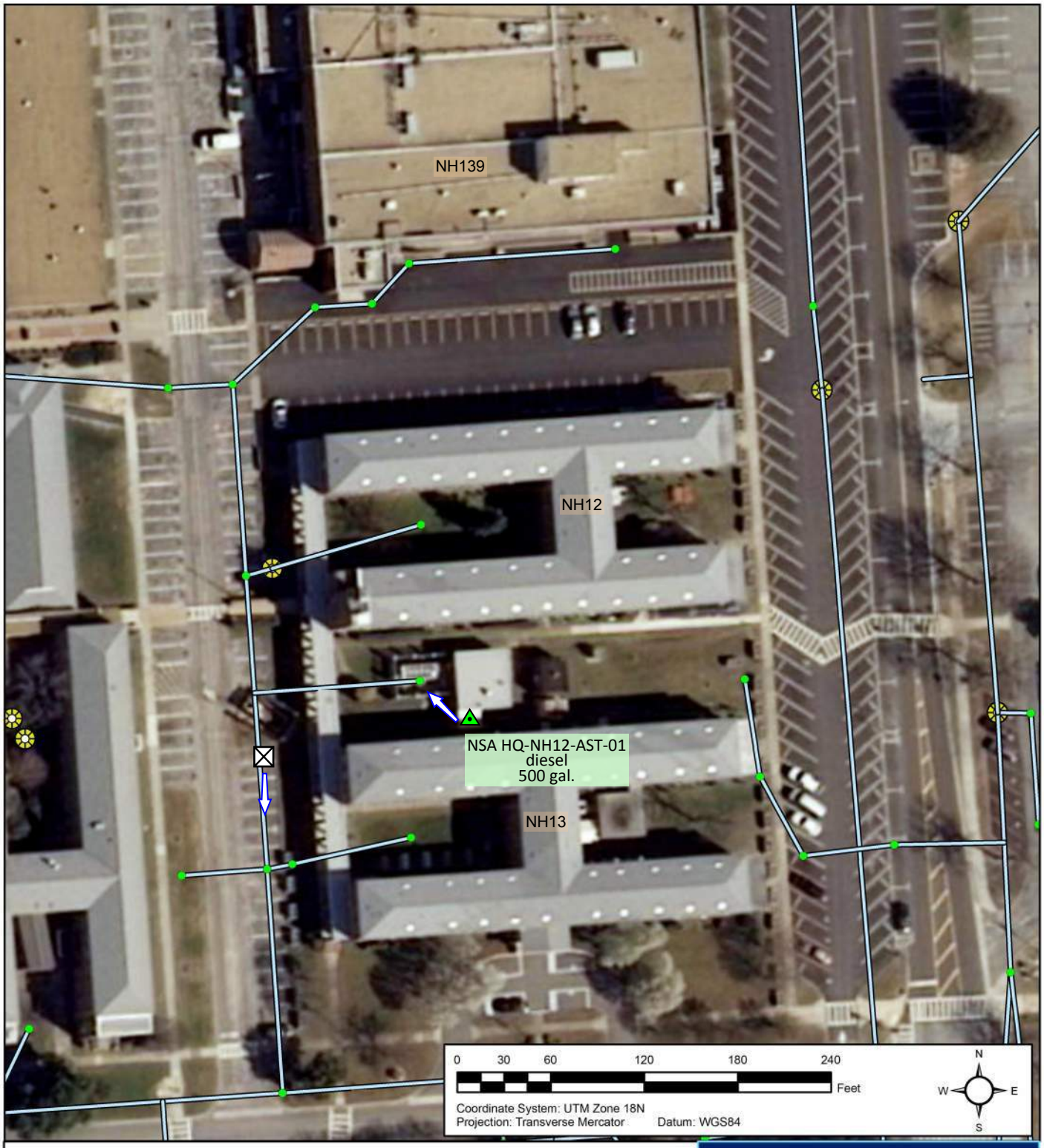
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH12

Tank Systems

General Information

Tank No.:	**NSA HQ-NH19-AST-07**	Date Installed:	9/1/2016
Building No.:	NH19	Tank Use:	Emergency Generator Supply
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel double bottom tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	Painted
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	None
Automatic Line Leak Detection:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	None
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 10/4/2016

General Secondary Containment Compliance Tank NSA HQ-NH19-AST-07

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equip-ment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Res-ponse Time (sec)	Most Likely Quantity of Oil Dis-charged (gallons)	Secondary Contain-ment Method	Secon-dary Contain-ment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Dis-cover Spill (min-utes)	Deploy-ment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deploy-ment manpower require-ment (number of people)	Deploy-ment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deploy-ment personnel trained in deploy-ment location, material storage location and drainage conditions	Appro-priateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH19-AST-07	Tank rupture	N 75' to Storm Drain	Inst	500	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	N 65' to Storm Drain	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily under DOT regulations.																				
	Overfill	N 75' to Storm Drain	50	5	Yes	5	4	Spill bucket	5	NA, passive measures are used																
	Hose retrieval	N 65' to Storm Drain	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across pave-ment	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (Above-ground pipe seepage)	N 75' to Storm Drain	1	1	Yes	60	1	Active measures will be used. Absorbent materials on work truck.		Visual	20	1	5	After	1	Spill location	Across paved area	Absorbent materials on maintenance truck	1	10	Yes	Utilities Tech	Yes	Sufficient	Yes

All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH19, Tank NSA HQ-NH19-AST-07

Drum Storage Area/Cont-ainer ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-NH19-AST-07	Yes	Yes	Yes	Yes	No [A]	No[2]	No[2]	Yes	Yes	Yes, double-walled tank	Yes	Yes	No[5]	Yes	Yes	N/A	N/A	Yes	Yes	Yes

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

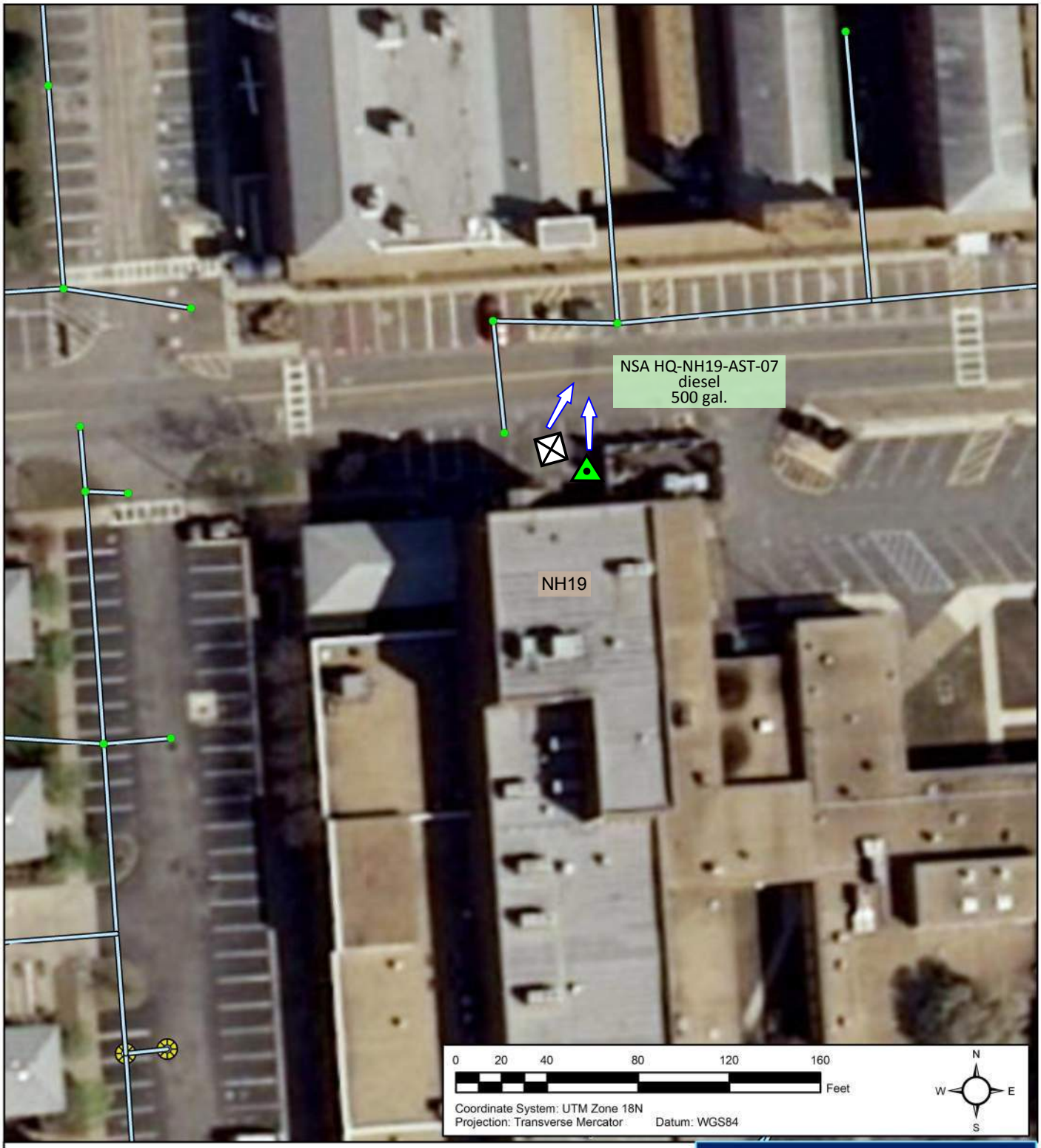
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

Naval Support Activity Hampton Roads HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH19

Tank Systems

General Information

Tank No.:	**NSA HQ-NH26-AST-01**	Date Installed:	Unknown
Building No.:	NH26	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	350
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH26-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH26-AST-01	Tank rupture	Indoor then west 25' to storm sewer	Inst	350	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	South 60' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																				
	Overfill	Indoor then west 25' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	Indoor then west 25' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	Indoor then west 25' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	20	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH26, Tanks NSA HQ-NH26-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH26-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, tank located indoors

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH26

Tank Systems

General Information

Tank No.:	**NSA HQ-NH31-AST-02**	Date Installed:	Unknown
Building No.:	NH31	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	NATO

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	None
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH31-AST-03**	Date Installed:	Unknown
Building No.:	NH31	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	NATO

Tank Design Information

Capacity (gallons):	150
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH31-AST-04**	Date Installed:	Unknown
Building No.:	NH31	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	NATO

Tank Design Information

Capacity (gallons):	150
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH31-AST-05**	Date Installed:	Unknown
Building No.:	NH31	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	NATO

Tank Design Information

Capacity (gallons):	1,000
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 512

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH31-AST-02, -03, -04, and -05

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH31-AST-02	Tank rupture	NE 25' to storm sewer	Inst	500	Yes	120	500	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																	
	Tanker rupture	NE 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																				
	Overfill	NE 25' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	NE 25' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	NE 25' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH31-AST-03	Tank rupture	NE 25' to storm sewer	Inst	150	Yes	120	150	Tanks are located in an area without adequate vehicle protection. See Appendix XX Deficiency list for recommended corrective action.																	
	Tanker rupture	NE 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																				
	Overfill	NE 25' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	NE 25' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	NE 25' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH31-AST-04	Tank rupture	NE 25' to storm sewer	Inst	150	Yes	120	150	Tanks are located in an area without adequate vehicle protection. See Appendix XX Deficiency list for recommended corrective action.																	
	Tanker rupture	NE 25' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																				
	Overfill	NE 25' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	NE 25' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	NE 25' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	20	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH31-AST-05	Tank rupture	South 100' to storm sewer	Inst	1,000	Yes	120	1,000	Tanks are located in an area without adequate vehicle protection. See Appendix XX Deficiency list for recommended corrective action.																	
	Tanker rupture	South 100' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																				
	Overfill	South 100' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across grassy and dirt area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	South 100' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across grassy and dirt area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	South 100' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Across grassy and dirt area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH31, Tanks NSA HQ-NH31-AST-02, -03, -04, and -05

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility	Lighting	Vehicle Prot.[8]
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construction is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Restrictor or Flow Shut-off Device	All Product Transfers are Constantly Monitored	Protectively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH31-AST-02	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]
NSA HQ-NH31-AST-03	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]
NSA HQ-NH31-AST-04	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]
NSA HQ-NH31-AST-05	No[A]	Yes	Yes	No[A]	No[A]	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B] requires protection from grounds-keeping equipment

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance
[A] Apply required tank labels.
[B] Tank requires vehicle protection law NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)
No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids
NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.
Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances
Capacity marking is a primary means to protect against overfill.
"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

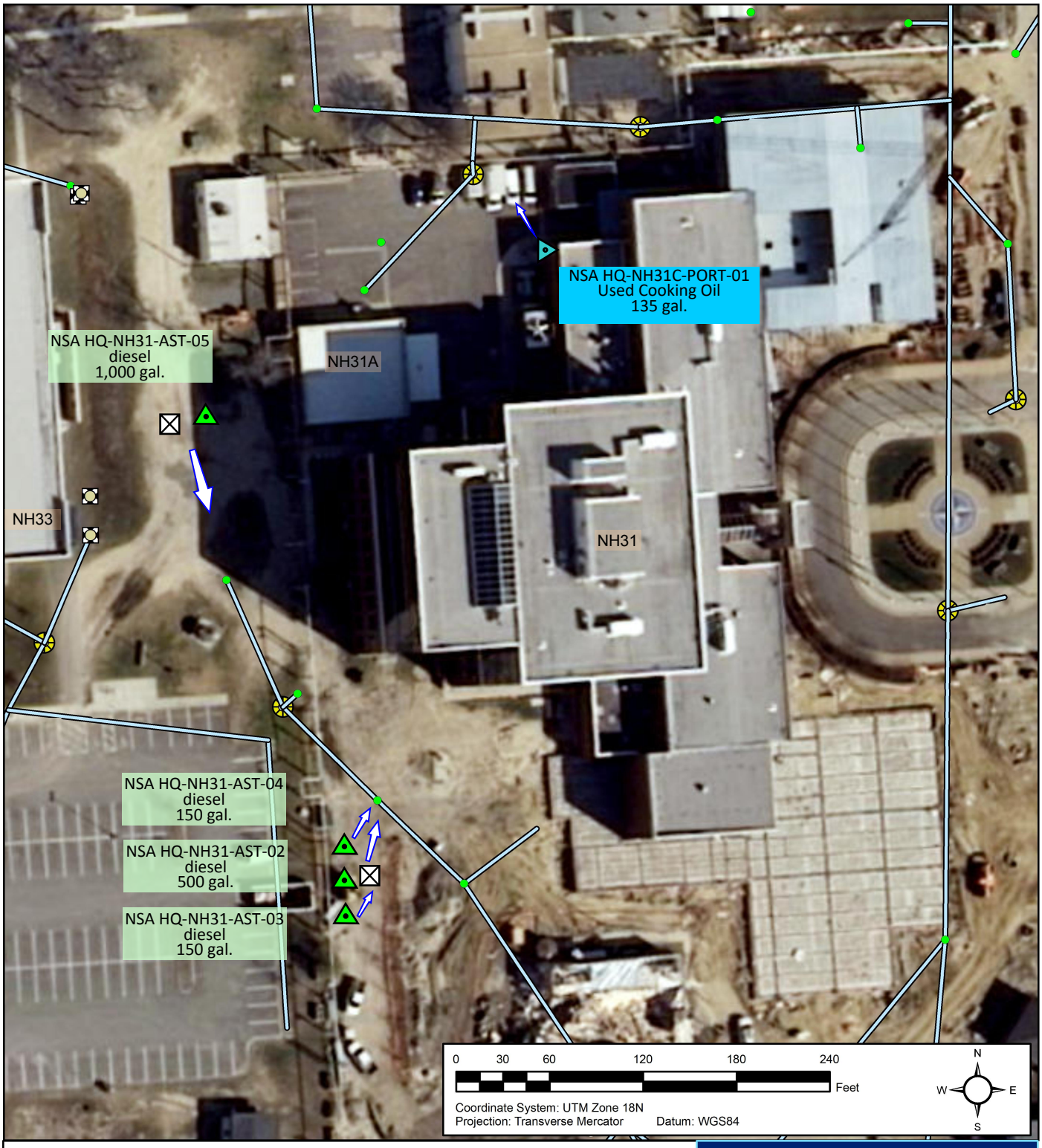
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program polic

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Other Storage Facility

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH31

Tank Systems

General Information

Tank No.: **NSA HQ-NH32-AST-01**
Building No.: NH32
TankType: AST

Date Installed: 6/1/2010
Tank Use: Emergency Generator Base Tank
Activity/ Operator: Unknown

Tank Design Information

Capacity (gallons): 898
Contents: Diesel
Tank Corrosion Protection: Painted
Tank Construction: Double Walled Steel
Tank Fabrication: Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier: Steel DW tank -
Bunkered Tank: No
Direct ground contact: No

Secondary Containment

Type: Double Walled AST
Construction Material: Steel
Capacity: 100%
Drainage Controls: Threaded Plug
Release Detection Method: Interstitial Monitoring

Piping Design Information

Aboveground Piping: Single Walled Flexible Hose
Aboveground Piping Corrosion Protection: N/A
Pipe Pressurization: Suction/Return
Underground Piping: None
Underground Piping Corrosion Protection: N/A
Ancillary Equipment: Flex Hose-Generators
Automatic Line Leak Detection: N/A

Secondary Containment

Type: Active Measures
Construction Material: N/A
Capacity: N/A
Drainage Controls: N/A
Release Detection Method: Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge: Yes
High level Alarm: None
Comm. link b/w gauger & pumper: Visual
Level Gauge Linked to Computer: No
CRDM: Yes
Spill Control: Secondary containment AST
STI Category: STI-Cat 1
Spill Prevention: Active Spill Prevention measures
Auto Pump Shutoff: No
Is Tank Portable: No
Positioned to prevent spill from reaching navigable waters? N/A, tank is not portable

Overfill Prevention:

- [ ] Active Measures
- [ ] Communication Link b/w Gauger and Pumper (Electronic)
- [x] Communication Link b/w Gauger and Pumper (Visual)
- [x] Level Gauge
- [ ] Overfill/High Level Alarm
- [ ] Vent Whistle
- [ ] Overfill Prevention Valve (AST)
- [ ] Automatic Restrictor/Shutoff Device (UST)
- [ ] Not Required (UST fill event < 25 gallons/event)
- [ ] None

Potential Discharge Information

Spill Response Procedures: Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge: Full Tank Capacity -
Probable Discharge Cause: Overfill -
Probable Discharge: <5 gal
Natural Resources at Risk: Bousch Creek
Municipal Services at Risk: Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness: Yes
Is Fill Port and/or Spill Bucket Secured: Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH32-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH32-AST-01	Tank rupture	SW 35' to storm sewer	Inst	898	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	West 35' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	SW 35' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	10	1	1	After	1	Spill location	Concrete and asphalt	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	SW 35' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	10	1	5	After	1	Spill location	Concrete and asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	SW 35' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	10	1	5	After	1	Spill location	Concrete and asphalt	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH32, Tank NSA HQ-NH32-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH32-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, not nearby vehicle traffic

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

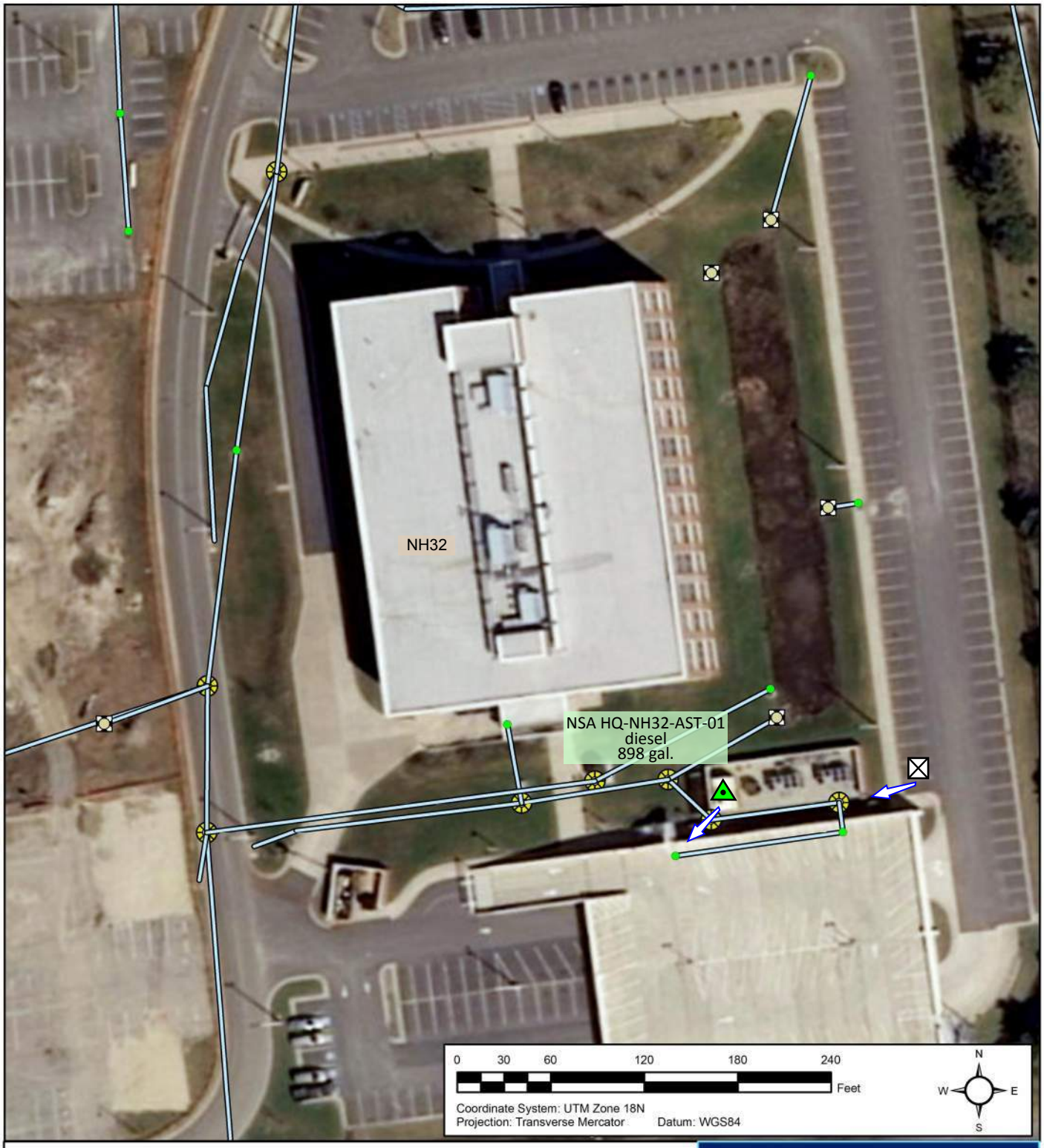
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH32

Tank Systems

General Information

Tank No.: **NSA HQ-NH33-AST-01**
Building No.: NH33
TankType: AST

Date Installed: 10/1/2006
Tank Use: Emergency Generator Base Tank
Activity/ Operator: NSA

Tank Design Information

Capacity (gallons): 1,250
Contents: Diesel
Tank Corrosion Protection: Painted
Tank Construction: Double Walled Steel
Tank Fabrication: Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier: Steel DW tank -
Bunkered Tank: No
Direct ground contact: No

Secondary Containment

Type: Double Walled AST
Construction Material: Steel
Capacity: 100%
Drainage Controls: Threaded Plug
Release Detection Method: Interstitial Monitoring

Piping Design Information

Aboveground Piping: Single Walled Flexible Hose
Aboveground Piping Corrosion Protection: N/A
Pipe Pressurization: Suction/Return
Underground Piping: None
Underground Piping Corrosion Protection: N/A
Ancillary Equipment: Flex Hose-Generators
Automatic Line Leak Detection: N/A

Secondary Containment

Type: Active Measures
Construction Material: N/A
Capacity: N/A
Drainage Controls: N/A
Release Detection Method: Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge: Yes
High level Alarm: None
Comm. link b/w gauger & pumper: Visual
Level Gauge Linked to Computer: No
CRDM: Yes
Spill Control: Secondary containment AST
STI Category: STI-Cat 1
Spill Prevention: Active Spill Prevention measures
Auto Pump Shutoff: No
Is Tank Portable: No
Positioned to prevent spill from reaching navigable waters? N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures: Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge: Full Tank Capacity -
Probable Discharge Cause: Overfill -
Probable Discharge: <5 gal
Natural Resources at Risk: Elizabeth River
Municipal Services at Risk: Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness: Yes
Is Fill Port and/or Spill Bucket Secured: Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH33-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH33-AST-01	Tank rupture	North 100' to storm sewer	Inst	1,250	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	North 100' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	North 100' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	90	1	1	After	1	Spill location	Grassy swale to storm drain	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	North 100' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	90	1	5	After	1	Spill location	Grassy swale to storm drain	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	North 100' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	90	1	5	After	1	Spill location	Grassy swale to storm drain	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH33, Tank NSA HQ-NH33-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH33-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, not nearby vehicle traffic

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

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[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

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Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

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2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

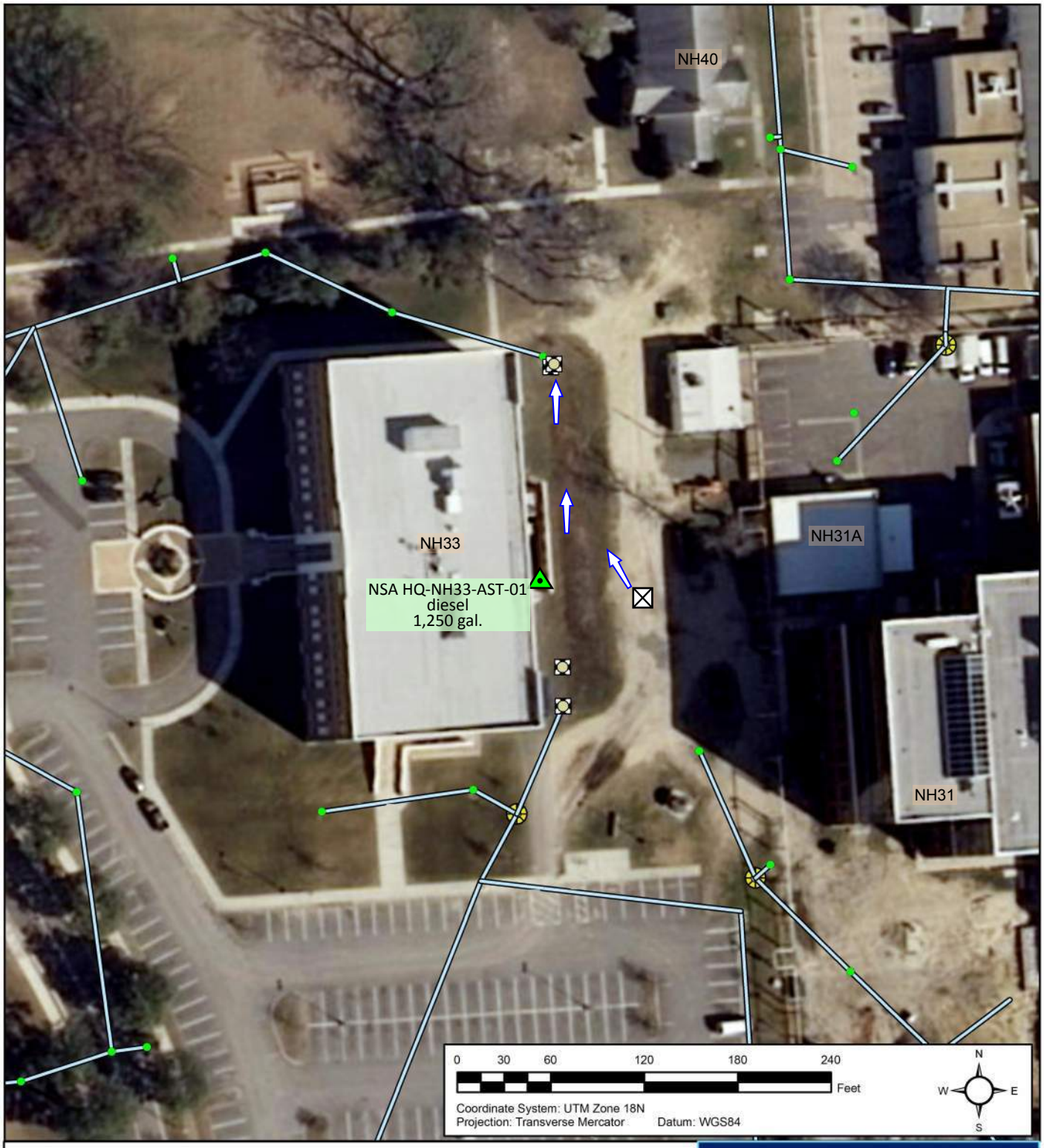
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH33

Tank Systems

General Information

Tank No.:	**NSA HQ-NH36-AST-01**	Date Installed:	Unknown
Building No.:	NH36	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Headquarters Support Activity

Tank Design Information

Capacity (gallons):	100
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 611

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH36-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH36-AST-01	Tank rupture	East 50' to storm sewer	Inst	100	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	East 50' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	East 50' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	1	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	East 50' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	East 50' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	20	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH36, Tank NSA HQ-NH36-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH36-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, not neaby vehicle traffic

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

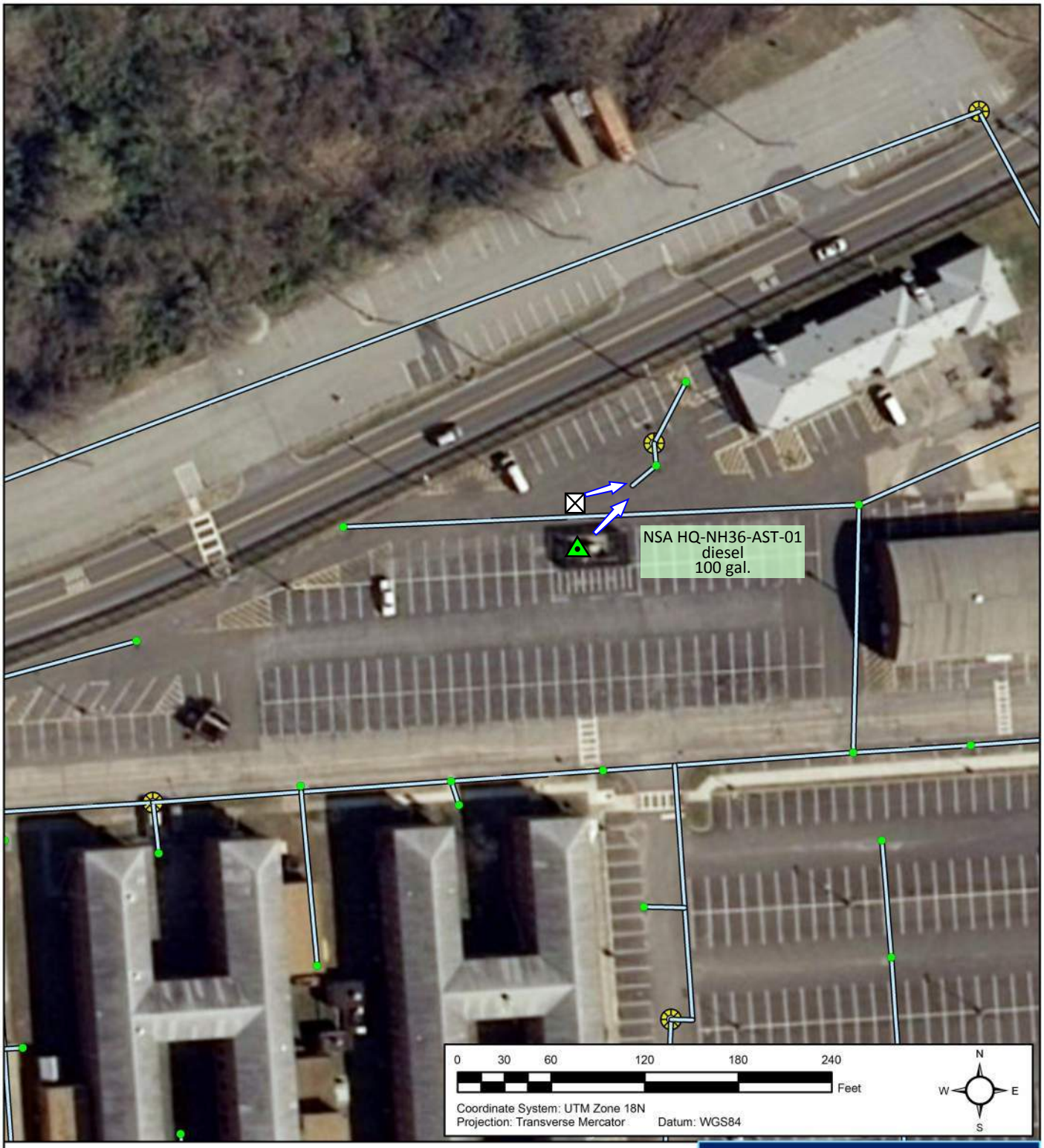
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH36

Tank Systems

General Information

Tank No.:	**NSA HQ-NH41-AST-01**	Date Installed:	Unknown
Building No.:	NH41	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Headquarters Support Activity

Tank Design Information

Capacity (gallons):	245
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	None -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Fl ble Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction eturn
Underground Piping:	Non
Underground Piping Corrosion Protection:	
Ancillary Equipment:	erators
Automatic Line Leak Detection:	

Secondary Contain

Type:	e Measures
Construction	/A
Capacity:	N/A
Draina	N//A
Relea od:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	No
CRDM:	No
Spill Control:	None
STI Category:	STI-Cat 3
Spill Prevention:	Active Spill Preventio
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is

n:
asures
nication Link b/w Gauger and Pumper (Electronic)
unication Link b/w Gauger and Pumper (Visual)
vel Gauge
Overfill/High Level Alarm
☐ Vent Whistle
☐ Overfill Prevention Valve (AST)
☐ Automatic Restrictor/Shutoff Device (UST)
☐ Not Required (UST fill event < 25 gallons/event)
☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atla ould respond should assist described in Section 6.
Worst Case Discharge:	Full Ta Capacity -
Probable Discharge Cause:	Ove -
Probable Discharge:	< gal
Natural Resources at Risk:	ousch Creek
Municipal Services at Ri	Stormwater Outfall - 611

Security

Does adequate ting exist for spill detection uring darkness:	Yes
Is Fill Port a /or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

REMOVED FROM SITE

Tank Systems

General Information

Tank No.:	**NSA HQ-NH41-AST-02**	Date Installed:	Unknown
Building No.:	NH41	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Headquarters Support Activity

Tank Design Information

Capacity (gallons):	75
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 611

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH41-AST-03**	Date Installed:	Unknown
Building No.:	NH41	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Headquarters Support Activity

Tank Design Information

Capacity (gallons):	408
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel double bottom tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 611

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 6/26/2018

General Secondary Containment Compliance Tank NSA HQ-NH41-AST-01 and -02

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																				
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)															
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH41-AST-01	Tank rupture	North 10' to storm sewer	Inst	245	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																			
	Tanker rupture	South 5' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	North 10' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	1	After	1	Spill location	Across grass	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Hose retrieval	South 5' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	1	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Transfer out (pipe seepage)	North 10' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	5	1	5	After	1	Spill location	Across grass	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Insufficient	Yes
NSA HQ-NH41-AST-02	Tank rupture	South 10' to storm sewer	Inst	75	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																			
	Tanker rupture	South 5' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	South 10' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	1	After	1	Spill location	Across grass	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Hose retrieval	South 5' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	1	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Transfer out (pipe seepage)	South 10' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	5	1	5	After	1	Spill location	Across grass	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Insufficient	Yes

REMOVED FROM SITE

Notes:
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IAW = in accordance with

General Secondary Containment Compliance Tank NSA HQ-NH41-AST-03

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH41-AST-03	Tank rupture	North 10' to storm sewer	Inst	408	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	South 5' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	North 10' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	5	After	1	Spill location	Across grass	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Hose retrieval	South 5' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Transfer out (pipe seepage)	North 10' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	5	1	5	After	1	Spill location	Across grass	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Insufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH41, Tanks NSA HQ-NH41-AST-01 and -02

Drum Storage Area/Cont-ainer ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-NH41-AST-01	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	Y	No[4], Single-walled tank	N/A			single-walled tank	N/A, single-walled tank	N/A	N/A	Yes	Yes	No[B] requires protection from grounds-keeping equipment
NSA HQ-NH41-AST-02	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B] requires protection from grounds-keeping equipment

REMOVED FROM SITE

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance
[A] Apply required tank labels.
[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements
Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)
No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids
NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.
Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances
Capacity marking is a primary means to protect against overfill.
"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]
1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH41, Tank NSA HQ-NH41-AST-03

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construction is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Automatic Flow Restrictor or Flow Shut-off Device	All Product Transfers are Constantly Monitored	Protectively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-NH41-AST-03	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	Yes	Yes, double-walled tank	Yes	Yes	Yes	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, not nearby vehicle traffic

Notes:
Indicates non-compliance item that must be resolved

Footnotes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements
Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)
No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids
NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.
Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances
Capacity marking is a primary means to protect against overfill.
"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]
1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

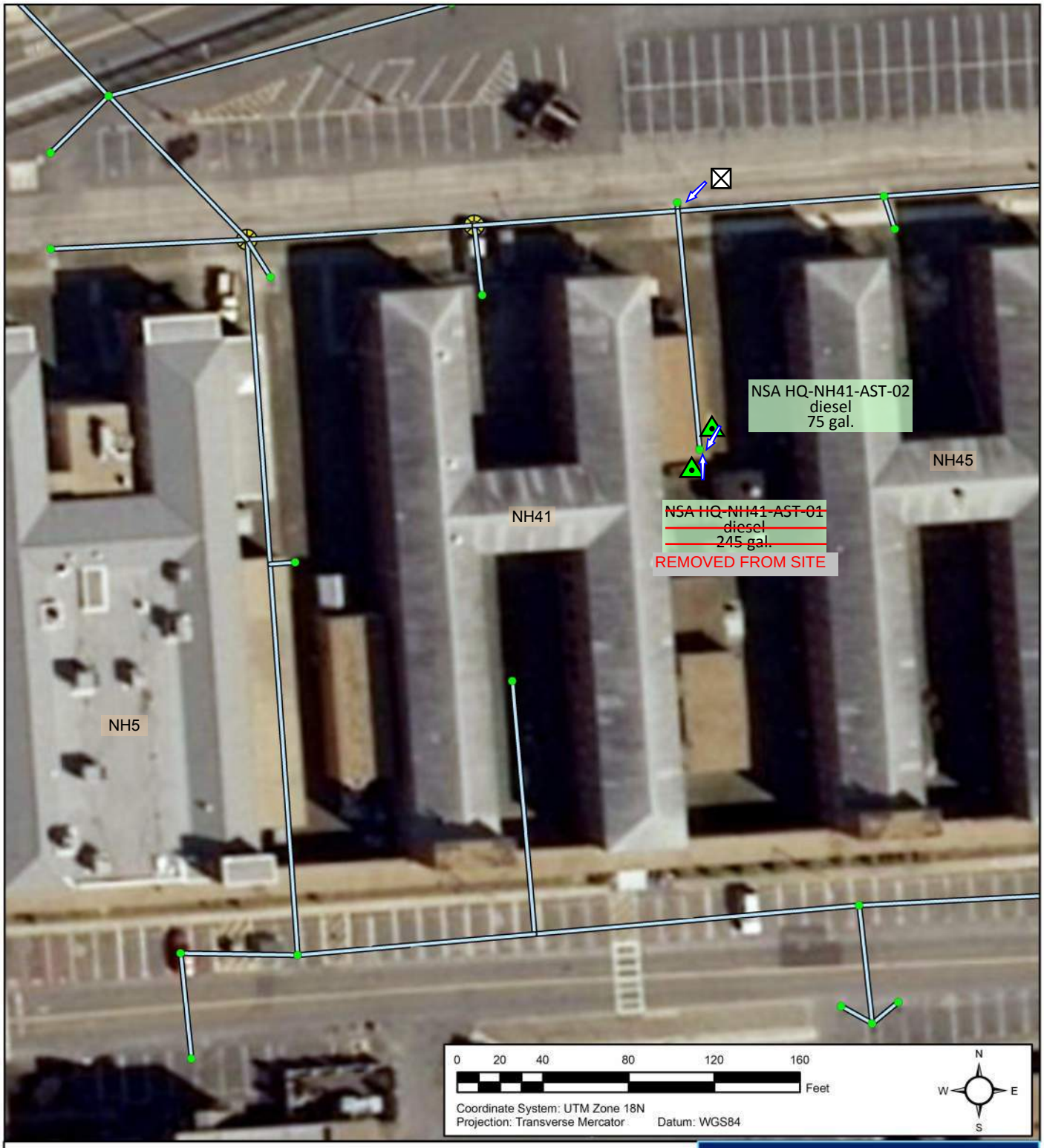
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

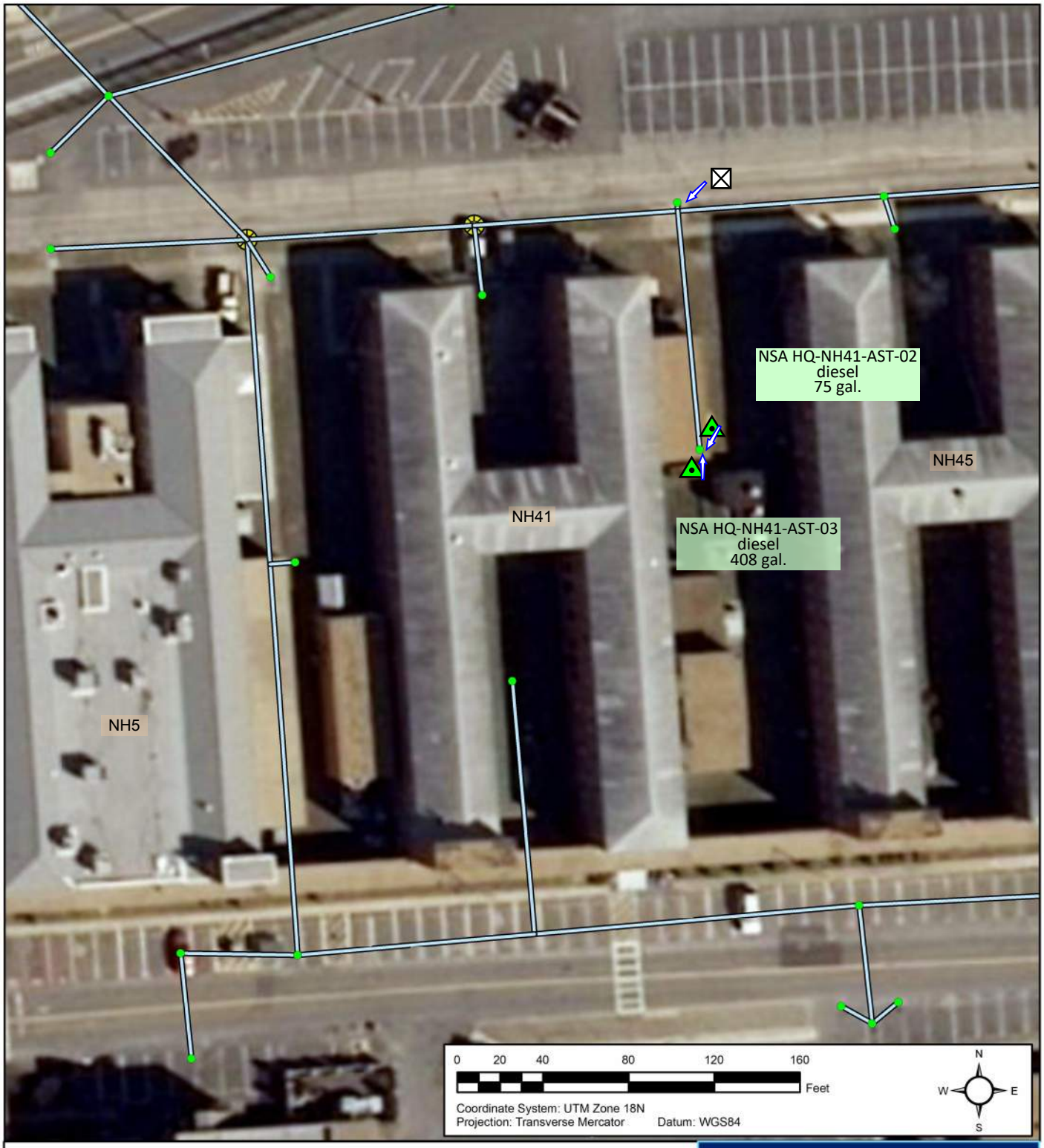
Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH41



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH41

Tank Systems

General Information

Tank No.:	**NSA HQ-NH46-AST-01**	Date Installed:	Unknown
Building No.:	NH46	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Unknown

Tank Design Information

Capacity (gallons):	4,400
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH46-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																				
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)															
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH46-AST-01	Tank rupture	South 30' to storm sewer	Inst	4,400	No	120	4,400	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																	
	Tanker rupture	South 30' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	South 30' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	15	1	1	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	South 30' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	15	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	South 30' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	15	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH46, Tank NSA HQ-NH46-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-NH46-AST-01	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	Yes	Yes, double-walled tank	Yes	Yes	Yes	No[5]	Yes	N/A	N/A	Yes	Yes	No[B] requires protection from grounds-keeping equipment

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

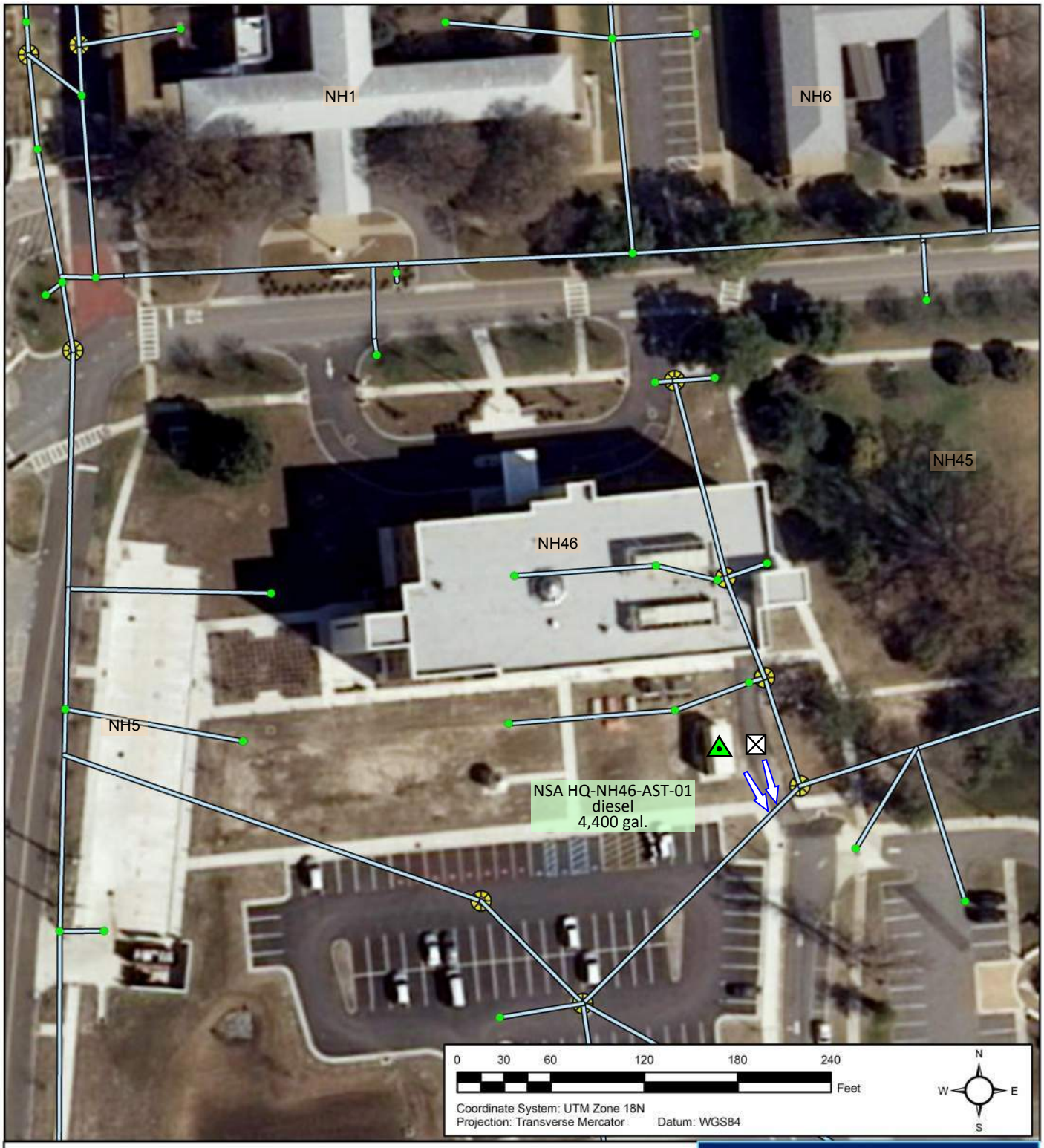
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH46

Tank Systems

General Information

Tank No.:	**NSA HQ-NH74-AST-01**	Date Installed:	Unknown
Building No.:	NH74	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	100
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH74-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH74-AST-01	Tank rupture	SW 150' to storm sewer	Inst	100	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	SW 150' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	SW 150' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	SW 150' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	SW 150' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	120	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH74, Tank NSA HQ-NH74-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH74-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	Yes

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

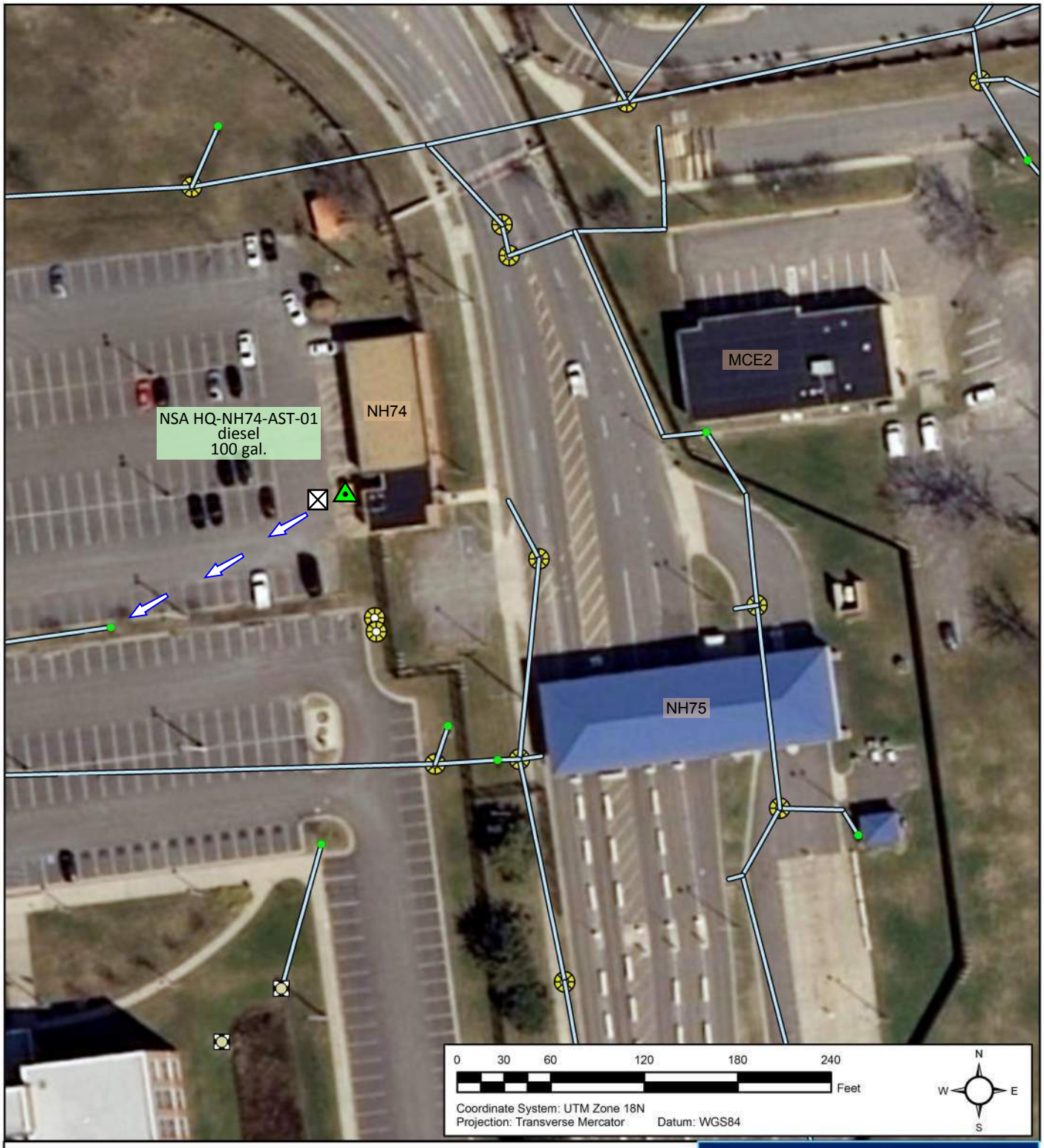
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH74

Tank Systems

General Information

Tank No.:	**NSA HQ-NH75-AST-02**	Date Installed:	Unknown
Building No.:	NH75	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	255
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	None
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH75-AST-02

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH75-AST-02	Tank rupture	NW 150' to storm sewer	Inst	255	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	NW 150' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	NW 150' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Grass and asphalt	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	NW 150' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Grass and asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	NW 150' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	120	1	5	After	1	Spill location	Grass and asphalt	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH75, Tank NSA HQ-NH75-AST-02

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH75-AST-02	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	Yes

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

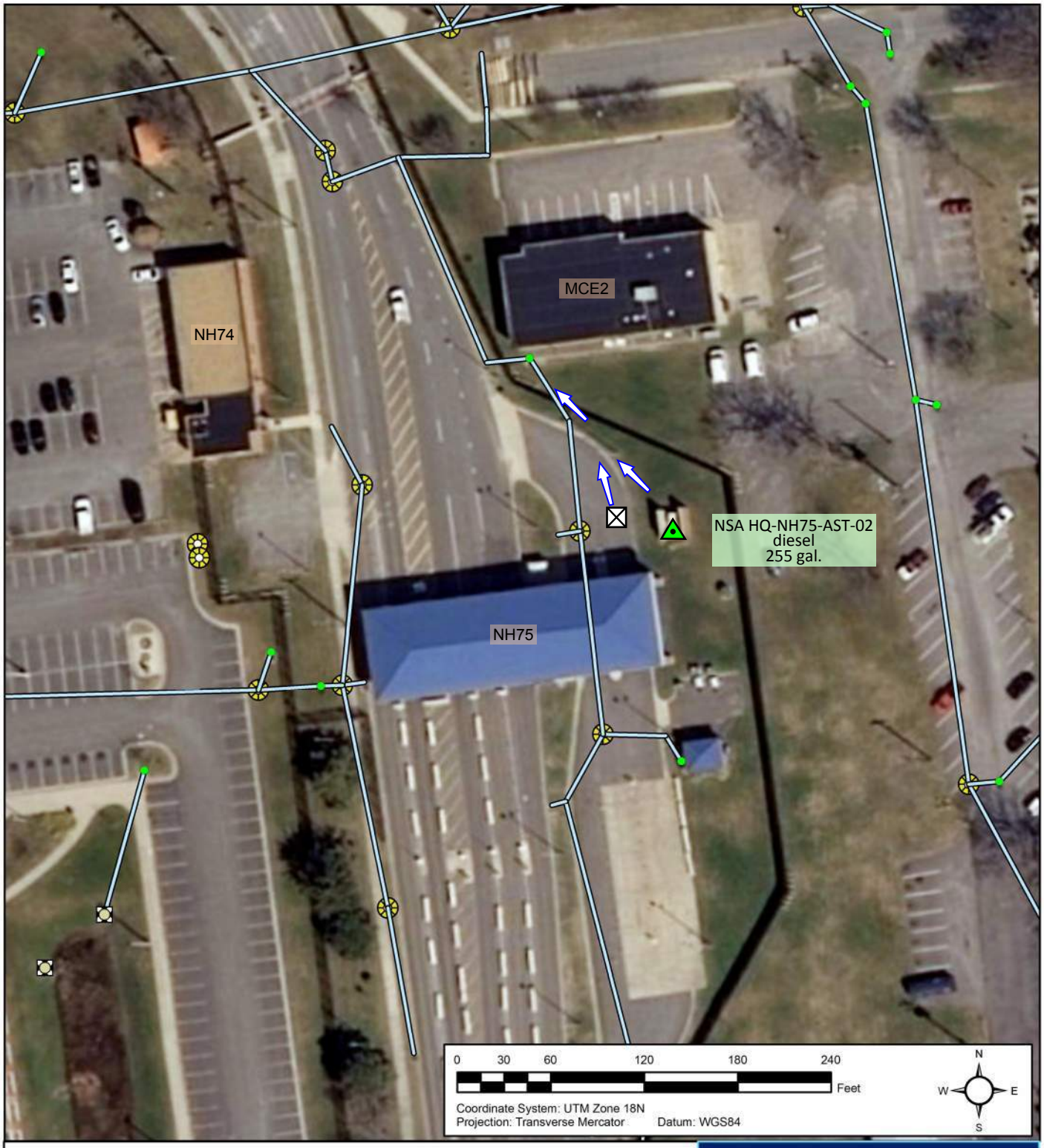
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH75

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-AST-06**	Date Installed:	Unknown
Building No.:	NH94	Tank Use:	Emergency Generator Day Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	Yes
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Direct connection to supply tank.
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☑ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Piping Failures/Breaking Lines -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-AST-07**	Date Installed:	Unknown
Building No.:	NH94	Tank Use:	Emergency Generator Day Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	Yes
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Direct connection to supply tank.
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☑ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Piping Failures/Breaking Lines -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-AST-08**	Date Installed:	Unknown
Building No.:	NH94	Tank Use:	Emergency Generator Day Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	Yes
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Direct connection to supply tank.
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☑ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Piping Failures/Breaking Lines -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-AST-09**	Date Installed:	Unknown
Building No.:	NH94	Tank Use:	Emergency Generator Day Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Bottomed AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	Yes
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Direct connection to supply tank.
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☑ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Piping Failures/Breaking Lines -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-AST-10**	Date Installed:	1/1/2004
Building No.:	NH94	Tank Use:	Used Oil Storage
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	1,000
Contents:	Used Oil
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	Painted
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	N/A
Level Gauge Linked to Computer:	Yes
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Direct connection to supply tank.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-AST-11**	Date Installed:	10/1/2004
Building No.:	NH94	Tank Use:	Used Oil Storage
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	1,000
Contents:	Used Oil
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled Steel in Concrete
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Elastomeric liner -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	Painted
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	N/A
Level Gauge Linked to Computer:	Yes
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Direct connection to supply tank.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH94-AST-06, -07, and -08

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																							
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																		
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel						
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH94-AST-06	Tank rupture	Indoor flow then east 20' to storm sewer	Inst	500	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																						
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank has a direct fuel supply from a separate supply tank.																						
	Overfill	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank is equipped with electronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply tank in such a manner that excess fuel will be returned to the supply tank.																						
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																						
	Transfer out (pipe seepage)	Indoor flow then east 20' to storm drain	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	10	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH94-AST-07	Tank rupture	Indoor flow then south 20' to storm sewer	Inst	500	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																						
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank has a direct fuel supply from a separate supply tank.																						
	Overfill	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank is equipped with electronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply tank in such a manner that excess fuel will be returned to the supply tank.																						
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																						
	Transfer out (pipe seepage)	Indoor flow then east 20' to storm drain	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	10	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH94-AST-08	Tank rupture	Indoor flow then south 20' to storm sewer	Inst	500	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																						
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank has a direct fuel supply from a separate supply tank.																						
	Overfill	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank is equipped with electronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply tank in such a manner that excess fuel will be returned to the supply tank.																						
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																						
	Transfer out (pipe seepage)	Indoor flow then east 20' to storm drain	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	10	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

General Secondary Containment Compliance Tank NSA HQ-NH94-AST-09, -10, and -11

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																						
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																	
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH94-AST-09	Tank rupture	Indoor flow then east 20' to storm sewer	Inst	500	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																					
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank has a direct fuel supply from a separate supply tank.																					
	Overfill	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank is equipped with electronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply tank in such a manner that excess fuel will be returned to the supply tank.																				
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																					
	Transfer out (pipe seepage)	Indoor flow then east 20' to storm drain	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	10	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH94-AST-10	Tank rupture	North 20' to storm sewer	Inst	1,000	Yes	120	1,000	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																			
	Tanker rupture	North 20' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial oil collection vehicle is inspected regularly under DOT regulations.																					
	Overfill	North 20' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on site.		Visual	10	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Operator	Yes	Sufficient	Yes
	Hose retrieval	North 20' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on site.		Visual	10	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Collection Truck Driver	Yes	Sufficient	Yes
NSA HQ-NH94-AST-11	Tank rupture	North 40' to storm sewer	Inst	1,000	Yes	120	1,000	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																			
	Tanker rupture	North 40' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial oil collection vehicle is inspected regularly under DOT regulations.																					
	Overfill	North 40' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on site.		Visual	10	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Tank Operator	Yes	Sufficient	Yes
	Hose retrieval	North 40' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on site.		Visual	10	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on site	1	10	Yes	Collection Truck Driver	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH94, Tanks NSA HQ-NH94-AST-06, -07, and -08

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construction is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Automatic Flow Restrictor or Flow Shut-off Device	All Product Transfers are Constantly Monitored	Protectively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-NH94-AST-06	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes, double-walled tank	Yes	Yes	Yes	Yes	Yes, fuel called for by computer/level switch	N/A	N/A	Yes	Yes	N/A, tank located indoors
NSA-HQ-NH94-AST-07	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes, double-walled tank	Yes	Yes	Yes	Yes	Yes, fuel called for by computer/level switch	N/A	N/A	Yes	Yes	N/A, tank located indoors
NSA HQ-NH94-AST-08	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes, double-walled tank	Yes	Yes	Yes	Yes	Yes, fuel called for by computer/level switch	N/A	N/A	Yes	Yes	N/A, tank located indoors

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance
[5] Apply required tank labels.
[6] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements
Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)
No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids
NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.
Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances
Capacity marking is a primary means to protect against overfill.
"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]
1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH94, Tanks NSA HQ-NH94-AST-09, -10, and -11

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construction is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Automatic Flow Restrictor or Flow Shut-off Device	All Product Transfers are Constantly Monitored	Protectively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-NH94-AST-09	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes, double-walled tank	Yes	Yes	Yes	Yes	Yes, fuel called for by computer /level switch	N/A	N/A	Yes	Yes	N/A, tank located indoors
NSA HQ-NH94-AST-10	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes, double-walled tank	Yes	Yes	Yes	No[5]	No[5]	N/A	N/A	Yes	Yes	No[B]
NSA HQ-NH94-AST-11	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes, double-walled tank	Yes	Yes	Yes	No[5]	No[5]	N/A	N/A	Yes	Yes	No[B]

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection law NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-UST-01**	Date Installed:	1/1/1988
Building No.:	NH94	Tank Use:	Emergency Generator Supply
TankType:	UST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	25,000
Contents:	Diesel
Tank Corrosion Protection:	Cathodic Protection
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A -
Bunkered Tank:	N/A UST
Direct ground contact:	N/A UST

Secondary Containment

Type:	Double Walled UST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure and Return
Underground Piping:	Double Walled Plastic
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	Yes

Secondary Containment

Type:	Double walled piping
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring and Line Leak Detectors

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes (ATG)
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	None
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	Spill Bucket
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☑ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: UST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-UST-02**	Date Installed:	1/1/1988
Building No.:	NH94	Tank Use:	Emergency Generator Supply
TankType:	UST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	25,000
Contents:	Diesel
Tank Corrosion Protection:	Cathodic Protection
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A -
Bunkered Tank:	N/A UST
Direct ground contact:	N/A UST

Secondary Containment

Type:	Double Walled UST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure and Return
Underground Piping:	Double Walled Plastic
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	Yes

Secondary Containment

Type:	Double walled piping
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring and Line Leak Detectors

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes (ATG)
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	None
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	Spill Bucket
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☑ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: UST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH94-UST-03**	Date Installed:	1/1/1988
Building No.:	NH94	Tank Use:	Emergency Generator Supply
TankType:	UST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	25,000
Contents:	Diesel
Tank Corrosion Protection:	Cathodic Protection
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A -
Bunkered Tank:	N/A UST
Direct ground contact:	N/A UST

Secondary Containment

Type:	Double Walled UST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure and Return
Underground Piping:	Double Walled Plastic
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	Yes

Secondary Containment

Type:	Double walled piping
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	IInterstitial Monitoring and Line Leak Detectors

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes (ATG)
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	None
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	Spill Bucket
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☑ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

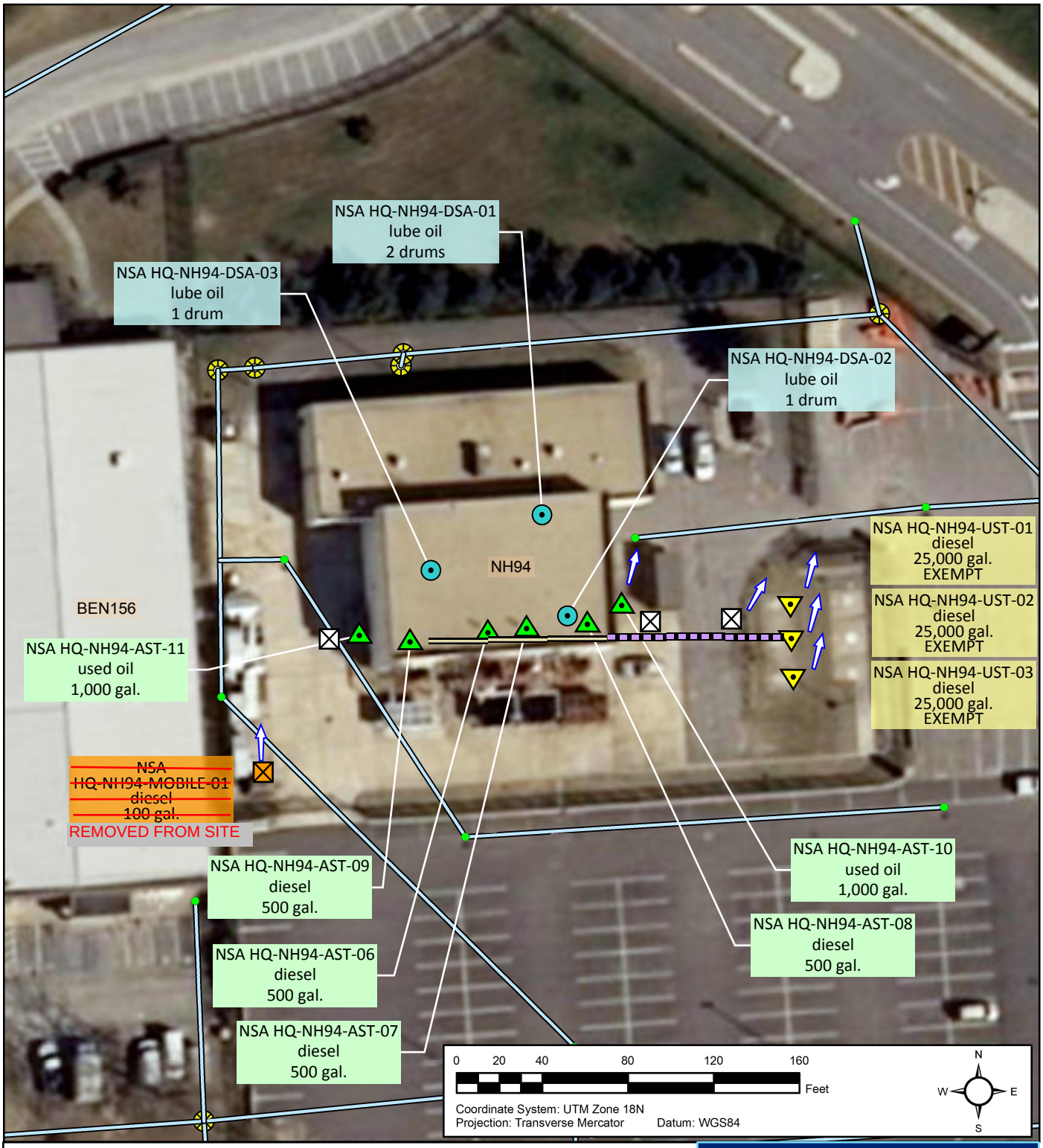
Caption: UST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH94-UST-01, -02, and -03

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																							
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																		
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel					
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH94-UST-01	Tank rupture	Northeast 80' to strom sewer	Inst	25,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is routinely monitored and completely buried.																						
	Tanker rupture	Northeast 80' to strom sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																						
	Overfill	Northeast 80' to strom sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																		
	Hose retrieval	Northeast 80' to strom sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	90	1	5	After	1	Spill location	Across grassy area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (pipe seepage)	South 80' to storm sewer	1	1	Yes	60	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																		
NSA HQ-NH94-UST-02	Tank rupture	Northeast 80' to strom sewer	Inst	25,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is routinely monitored and completely buried.																						
	Tanker rupture	Northeast 80' to strom sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																						
	Overfill	Northeast 80' to strom sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																		
	Hose retrieval	Northeast 80' to strom sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	90	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (pipe seepage)	South 80' to storm sewer	1	1	Yes	60	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																		
NSA HQ-NH94-UST-03	Tank rupture	Northeast 80' to strom sewer	Inst	25,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is routinely monitored and completely buried.																						
	Tanker rupture	Northeast 80' to strom sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																						
	Overfill	Northeast 80' to strom sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																		
	Hose retrieval	Northeast 80' to strom sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	90	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (pipe seepage)	South 80' to storm sewer	1	1	Yes	60	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																		

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with



Legend

POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH94

Tank Systems

General Information

Tank No.:	**NSA HQ-NH95-AST-01**	Date Installed:	Unknown
Building No.:	NH95	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	200
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	None -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	None
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	No
High level Alarm:	None
Comm. link b/w gauger & pumper:	No
Level Gauge Linked to Computer:	No
CRDM:	No
Spill Control:	None
STI Category:	STI-Cat 3
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☑ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH95-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH95-AST-01	Tank rupture	Indoor then west 40' to storm sewer	Inst	200	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	South 35' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																				
	Overfill	Indoor then west 40' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across concrete and paved area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	Indoor then west 40' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across concrete and paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	Indoor then west 40' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	20	1	5	After	1	Spill location	Across concrete and paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH95, Tank NSA HQ-NH95-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH95-AST-01	Yes	No[A]	Yes	Yes	Yes	No[2]	No[2]	No[2]	No[2]	No[4], Single-walled tank with no containment	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A	N/A	Yes	Yes	N/A, tank located indoors

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

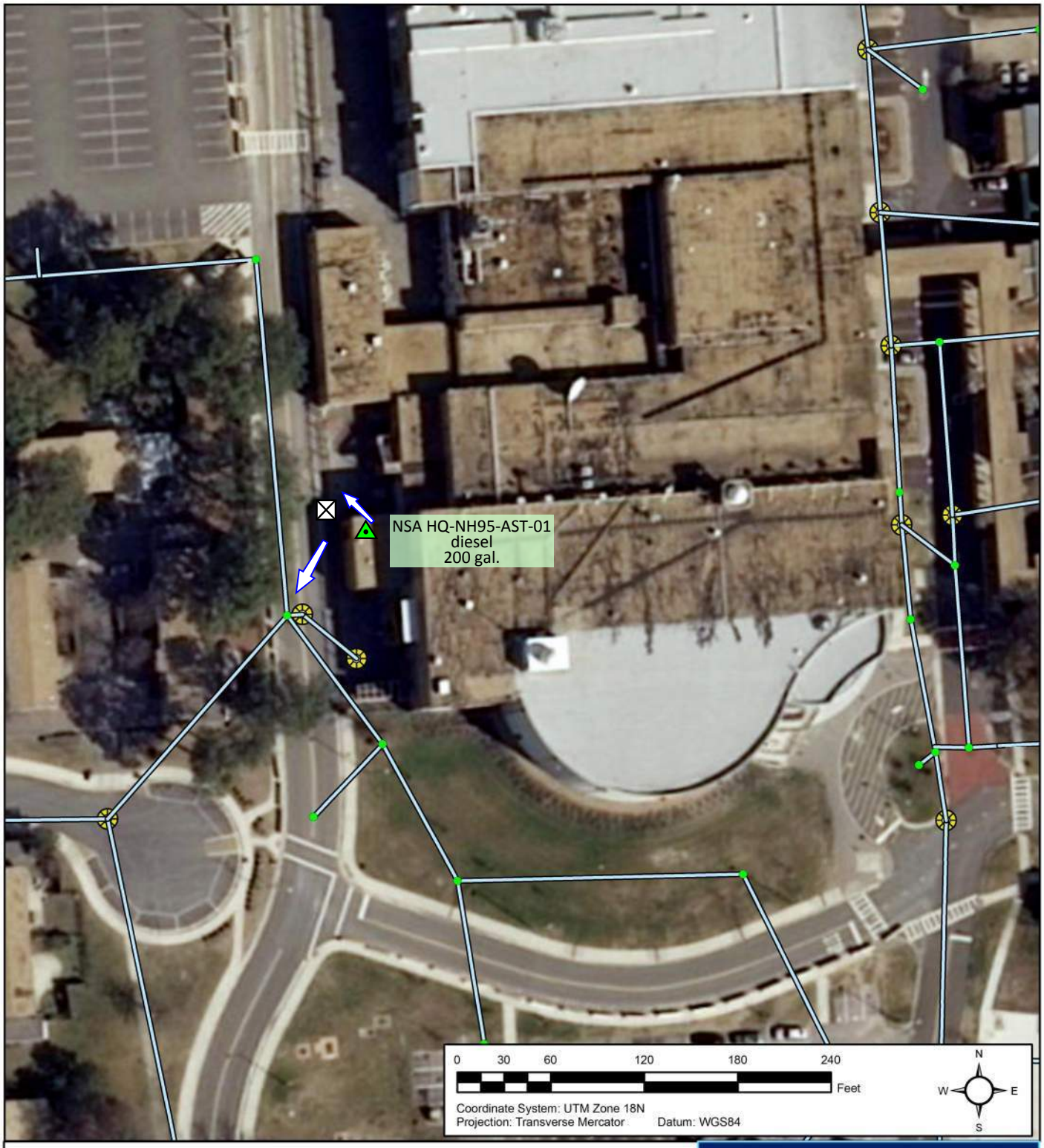
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH95

Tank Systems

General Information

Tank No.:	**NSA HQ-NH139-AST-01**	Date Installed:	Unknown
Building No.:	NH139	Tank Use:	Emergency Generator Day Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	75
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	None -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	None
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	Yes
CRDM:	No
Spill Control:	None
STI Category:	STI-Cat 3
Spill Prevention:	Direct connection to supply tank
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☑ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 611

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH139-AST-02**	Date Installed:	Unknown
Building No.:	NH139	Tank Use:	Emergency Generator Day Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	75
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	None -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Steel
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	Yes
CRDM:	No
Spill Control:	None
STI Category:	STI-Cat 3
Spill Prevention:	Direct connection to supply tank.
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☑ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 611

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH139-AST-03**	Date Installed:	Unknown
Building No.:	NH139	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	200
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	None -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	None
Pipe Pressurization:	Suction/Return
Underground Piping:	None N/A
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	Yes
CRDM:	No
Spill Control:	None
STI Category:	STI-Cat 3
Spill Prevention:	Direct connection to supply tank.
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☑ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Piping Failures/Breaking Lines -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH139-AST-01, -02, and -03

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																							
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																	
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH139-AST-01	Tank rupture	Indoor flow then north 50' to storm sewer	Inst	75	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																					
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank has a direct fuel supply from a separate supply tank.																					
	Overfill	Indoor flow then north 50' to storm sewer	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank is equipped with electronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply tank in such a manner that excess fuel will be returned to the supply tank.																					
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																					
	Transfer out (pipe seepage)	Indoor flow then north 50' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	45	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH139-AST-02	Tank rupture	Indoor flow then north 50' to storm sewer	Inst	75	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																					
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank has a direct fuel supply from a separate supply tank.																					
	Overfill	Indoor flow then north 50' to storm sewer	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank is equipped with electronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply tank in such a manner that excess fuel will be returned to the supply tank.																					
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																					
	Transfer out (pipe seepage)	Indoor flow then north 50' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes
NSA HQ-NH139-AST-03	Tank rupture	Indoor flow then south 75' to storm sewer	Inst	200	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																					
	Tanker rupture	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank has a direct fuel supply from a separate supply tank.																					
	Overfill	Indoor flow then south 75' to storm sewer	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because this tank is equipped with electronic switches that call for fuel from the supply tank. If a malfunction in a switch were to occur, then this tank is piped back to the supply tank in such a manner that excess fuel will be returned to the supply tank.																					
	Hose retrieval	N/A, filled by another tank	N/A	N/A	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is hard-pipe connected to a supply tank.																					
	Transfer out (pipe seepage)	Indoor flow then south 75' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	60	1	5	After	1	Spill location	Indoor concrete floor to outdoor paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH139, Tanks NSA HQ-NH139-AST-01, -02, and -03

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construction is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Automatic Flow Restrictor or Flow Shut-off Device	All Product Transfers are Constantly Monitored	Protectively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-NH139-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	Yes	No[2]	No[4], Single-walled tank with no containment	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A	N/A	Yes	Yes	N/A, tank located indoors
NSA HQ-NH139-AST-02	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	Yes	No[2]	No[4], Single-walled tank with no containment	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A	N/A	Yes	Yes	N/A, tank located indoors
NSA HQ-NH139-AST-03	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	Yes	No[2]	No[4], Single-walled tank with no containment	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A	N/A	Yes	Yes	N/A, tank located indoors

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[5] Apply required tank labels.

[8] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Tank Systems

General Information

Tank No.:	**NSA HQ-NH139-UST-02**	Date Installed:	1/1/1989
Building No.:	NH139	Tank Use:	Emergency Generator Supply
TankType:	UST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	2,000
Contents:	Diesel
Tank Corrosion Protection:	N/A
Tank Construction:	Single Walled FRP
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A -
Bunkered Tank:	No
Direct ground contact:	Yes

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Automatic Tank Gauging

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction: valve at tank
Underground Piping:	Single Walled Copper
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	None

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes (ATG)
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	None
Level Gauge Linked to Computer:	No
CRDM:	N/A
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	Spill Bucket
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☑ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 612

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: UST

Date Taken: 1/11/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-NH139-UST-03**	Date Installed:	8/3/1995
Building No.:	NH139	Tank Use:	Emergency Generator Supply
TankType:	UST	Activity/ Operator:	Atlantic Fleet Headquarters Support Activity

Tank Design Information

Capacity (gallons):	4,000
Contents:	Diesel
Tank Corrosion Protection:	N/A
Tank Construction:	Double Walled FRP
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	N/A -
Bunkered Tank:	No
Direct ground contact:	Yes

Secondary Containment

Type:	Double Walled UST
Construction Material:	Plastic
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction: no valve at tank
Underground Piping:	Double Walled Plastic
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	N/A
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Double walled piping
Construction Material:	Plastic
Capacity:	25 gallons
Drainage Controls:	None
Release Detection Method:	None

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes (ATG)
High level Alarm:	Audible & Visual
Comm. link b/w gauger & pumper:	Audible & Visual
Level Gauge Linked to Computer:	Yes
CRDM:	N/A
Spill Control:	N/A
STI Category:	N/A (UST)
Spill Prevention:	UST Fill port is within spill containment m
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☑ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☑ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 611

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

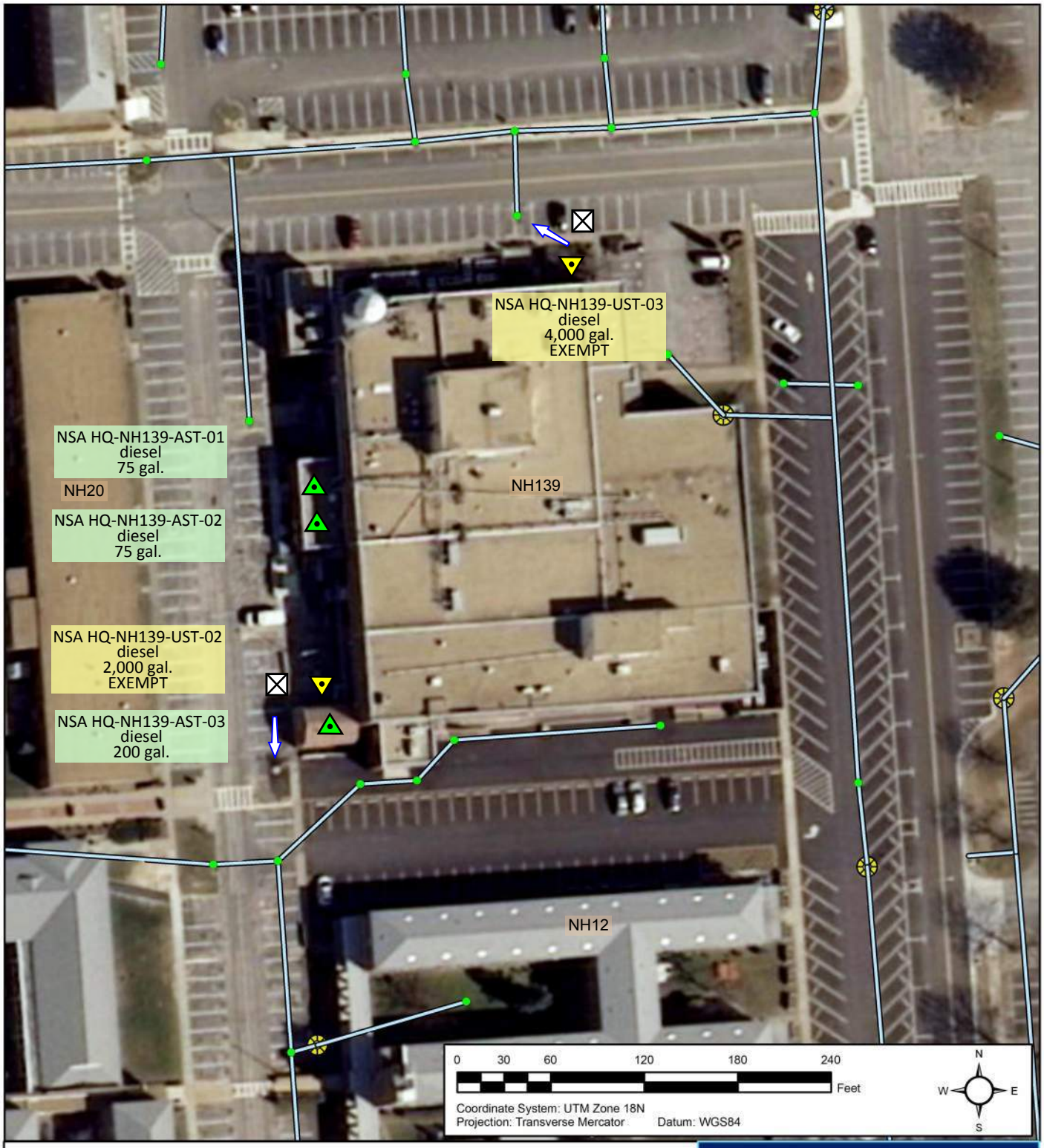
Caption: UST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH139-UST-02 and -03

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																							
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																		
										Appropriateness				Deployment Procedure				Necessary Materials					Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH139-UST-02	Tank rupture	South 80' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is routinely monitored and completely buried.																						
	Tanker rupture	South 80' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																						
	Overfill	South 80' to storm sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																		
	Hose retrieval	South 80' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	60	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (pipe seepage)	South 80' to storm sewer	1	1	Yes	60	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																		
NSA HQ-NH139-UST-03	Tank rupture	NW 30' to storm sewer	Inst	4,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is routinely monitored and completely buried.																						
	Tanker rupture	NW 30' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularily IAW DOT regulations.																						
	Overfill	NW 30' to storm sewer	50	5	Yes	5	4	Spill Bucket	5	N/A, passive measure used																		
	Hose retrieval	NW 30' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	20	1	5	After	1	Spill location	Across paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (pipe seepage)	NW 30' to storm sewer	1	1	Yes	60	1	A secondary containment sump will contain a pipe seepage.	25	N/A, passive measure used																		

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with



Legend

POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH139

Tank Systems

General Information

Tank No.: **NSA HQ-NH154-AST-01**
Building No.: NH154
TankType: AST

Date Installed: 4/6/2006
Tank Use: Emergency Generator Supply
Activity/ Operator: BEQ

Tank Design Information

Capacity (gallons): 500
Contents: Diesel
Tank Corrosion Protection: Fiberglass Coated
Tank Construction: Double Walled Steel
Tank Fabrication: Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier: Fiberglass DW tank -
Bunkered Tank: No
Direct ground contact: No

Secondary Containment

Type: Double Walled AST
Construction Material: Fiberglass
Capacity: 100%
Drainage Controls: N/A
Release Detection Method: Visual Monitoring

Piping Design Information

Aboveground Piping: Single Walled Steel
Aboveground Piping Corrosion Protection: Painted
Pipe Pressurization: Suction/Return
Underground Piping: None
Underground Piping Corrosion Protection: N/A
Ancillary Equipment: N/A
Automatic Line Leak Detection: N/A

Secondary Containment

Type: Active Measures
Construction Material: N/A
Capacity: N/A
Drainage Controls: N/A
Release Detection Method: Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge: Yes
High level Alarm: Audible
Comm. link b/w gauger & pumper: Visual
Level Gauge Linked to Computer: No
CRDM: Yes
Spill Control: Secondary containment AST
STI Category: STI-Cat 1
Spill Prevention: AST Fill port is within spill bucket.
Auto Pump Shutoff: No
Is Tank Portable: No
Positioned to prevent spill from reaching navigable waters? N/A, tank is not portable.

Overfill Prevention:

- [ ] Active Measures
- [ ] Communication Link b/w Gauger and Pumper (Electronic)
- [x] Communication Link b/w Gauger and Pumper (Visual)
- [x] Level Gauge
- [ ] Overfill/High Level Alarm
- [x] Vent Whistle
- [ ] Overfill Prevention Valve (AST)
- [ ] Automatic Restrictor/Shutoff Device (UST)
- [ ] Not Required (UST fill event < 25 gallons/event)
- [ ] None

Potential Discharge Information

Spill Response Procedures: Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge: Full Tank Capacity -
Probable Discharge Cause: Overfill -
Probable Discharge: <5 gal
Natural Resources at Risk: Bousch Creek
Municipal Services at Risk: Stormwater Outfall - 610

Security

Does adequate lighting exist for spill detection during darkness: Yes
Is Fill Port and/or Spill Bucket Secured: Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tanks NSA HQ-NH154-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH154-AST-01	Tank rupture	NE 150' to storm sewer	Inst	500	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	NE 80' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	NE 150' to storm sewer	50	5	Yes	5	4	Spill bucket	5	N/A, passive measure used																
	Hose retrieval	NE 150' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	> 180	1	5	After	1	Spill location	Across grass then paved area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	NE 150' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	> 180	1	5	After	1	Spill location	Across grass then paved area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH154, Tank NSA HQ-NH154-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH154-AST-01	Yes	Yes	Yes	Yes	Yes	Yes	No[2]	Yes	Yes	Yes, double-walled tank	Yes	Yes	Yes	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, not nearby vehicle traffic

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH154

Tank Systems

General Information

Tank No.:	**NSA HQ-NH200-AST-01**	Date Installed:	Unknown
Building No.:	NH200	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Atlantic Fleet HQ Support Activity

Tank Design Information

Capacity (gallons):	194
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-NH200-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-NH200-AST-01	Tank rupture	SE 30' to storm sewer	Inst	194	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																				
	Tanker rupture	North 70' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	SE 30' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	15	1	1	After	1	Spill location	Across grass area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	SE 30' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	15	1	5	After	1	Spill location	Across grass area	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	SE 30' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	15	1	5	After	1	Spill location	Across grass area	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building NH200, Tank NSA HQ-NH200-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-NH200-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[6]	Yes	N/A	N/A	Yes	Yes	N/A, not nearby vehicle traffic

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

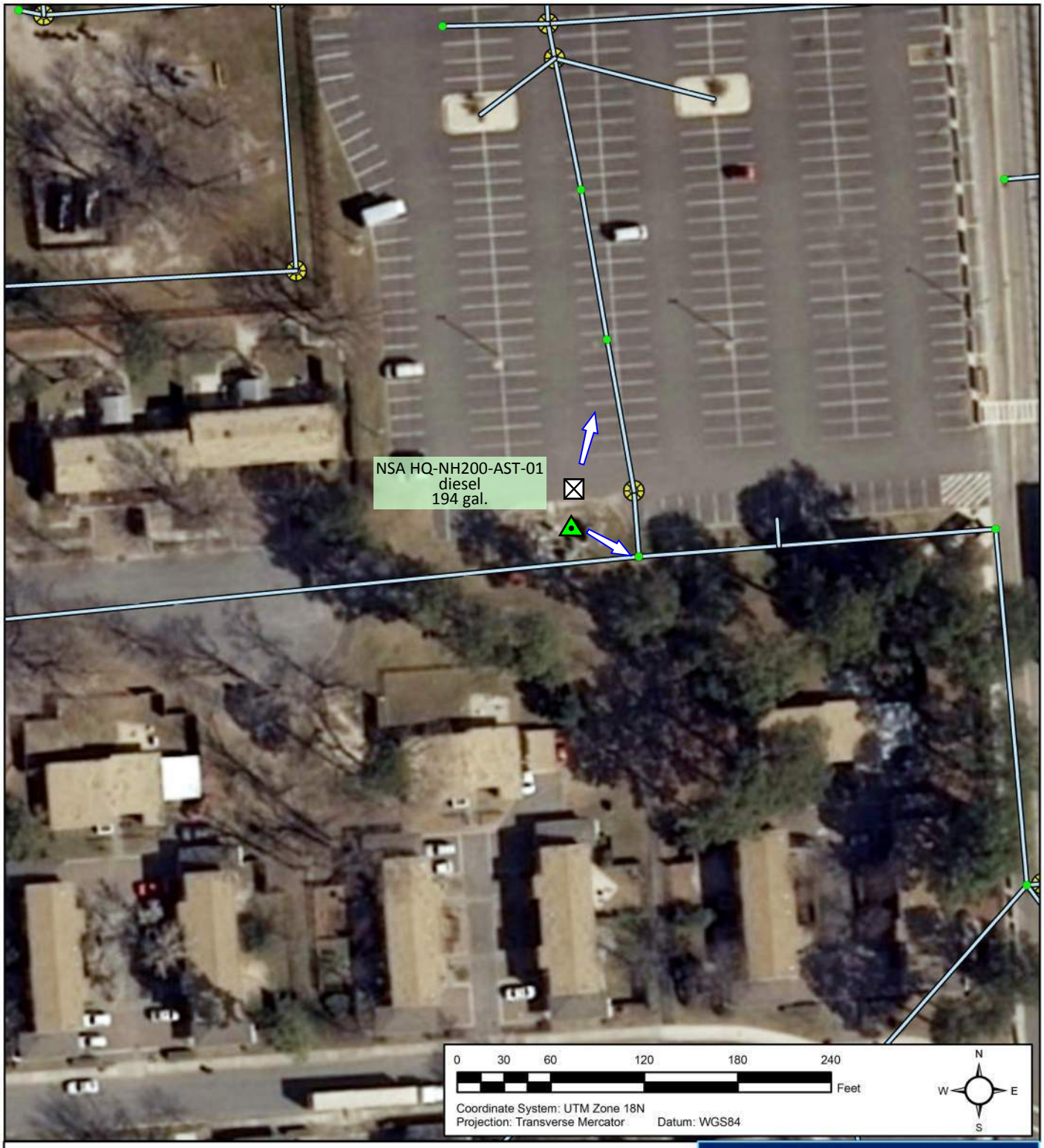
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH200

Tank Systems

General Information

Tank No.:	**NSA HQ-SC1-AST-01**	Date Installed:	Unknown
Building No.:	SC1	Tank Use:	Emergency Generator Base Tank
TankType:	AST	Activity/ Operator:	Joint Forces Staff College

Tank Design Information

Capacity (gallons):	382
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel double bottom tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	None
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Bousch Creek
Municipal Services at Risk:	Stormwater Outfall - 613

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 6/26/2018

General Secondary Containment Compliance Tank NSA HQ-SC1-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																			
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)														
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-SC1-AST-01	Tank rupture	South 15' to storm sewer	Inst	382	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																		
	Tanker rupture	South 15' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																		
	Overfill	South 15' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	5	After	1	Spill location	Across grass	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Hose retrieval	South 15' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	5	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Transfer out (pipe seepage)	South 15' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	5	1	5	After	1	Spill location	Across grass	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Insufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building SC1, Tank NSA HQ-SC1-AST-01

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-SC1-AST-01	Yes	Yes	Yes	Yes	No[A]	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	Yes

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.
[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements
Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)
No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids
NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.
Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances
Capacity marking is a primary means to protect against overfill.
"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]
1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the containe must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation
  192

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

SC1

Tank Systems

General Information

Tank No.:	**NSA HQ-SDA218-AST-01**	Date Installed:	Unknown
Building No.:	SDA218	Tank Use:	Product Dispenser
TankType:	AST	Activity/ Operator:	Didlake

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel double bottom tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	No

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Elizabeth River
Municipal Services at Risk:	Stormwater Outfall - 207

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 10/4/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-SDA218-AST-02**	Date Installed:	Unknown
Building No.:	SDA218	Tank Use:	Product Dispenser
TankType:	AST	Activity/ Operator:	Didlake

Tank Design Information

Capacity (gallons):	500
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel double bottom tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	Double Walled AST
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Dispensers
Automatic Line Leak Detection:	No

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Yes
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Fueling -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Elizabeth River
Municipal Services at Risk:	Stormwater Outfall - 207

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 10/4/2016

Tank Systems

General Information

Tank No.:	**NSA HQ-SDA218-AST-03**	Date Installed:	Unknown
Building No.:	SDA218	Tank Use:	Used Oil Storage
TankType:	AST	Activity/ Operator:	Didlake

Tank Design Information

Capacity (gallons):	500
Contents:	Used Oil
Tank Corrosion Protection:	Painted
Tank Construction:	Single Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	None -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	N/A
Capacity:	0
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Piping Design Information

Aboveground Piping:	None None
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Pressure
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	None
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	N/A
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	N/A

Equipment and Spill/Overfill Prevention

Level Gauge:	No
High level Alarm:	None
Comm. link b/w gauger & pumper:	None
Level Gauge Linked to Computer:	No
CRDM:	No
Spill Control:	None
STI Category:	STI-Cat 3
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	Yes
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☐ Communication Link b/w Gauger and Pumper (Visual)
- ☐ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☑ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Elizabeth River
Municipal Services at Risk:	Stormwater Outfall - 207

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 10/4/2016

General Secondary Containment Compliance Tanks NSA HQ-SDA218-AST-01, -02, and -03

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																			
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)														
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equip-ment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Res-ponse Time (sec)	Most Likely Quantity of Oil Dis-charged (gallons)	Secondary Contain-ment Method	Secon-dary Contain-ment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Dis-cover Spill (min-utes)	Deploy-ment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deploy-ment manpower require-ment (number of people)	Deploy-ment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deploy-ment personnel trained in deploy-ment location, material storage location and drainage conditions	Appro-priateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-SDA218-AST-01	Tank rupture	W 20' to Low Area	Inst	500 each	Yes	120	500	Tanks are located in an area without adequate vehicle protection. See Appendix XX Deficiency list for recommended corrective action.																	
	Tanker rupture	W 20' to Low Area	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly under DOT regulations.																			
	Overfill	W 20' to Low Area	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	W 20' to Low Area	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across pave-ment	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (Dispensing)	W 20' to Low Area	10	1	Yes	5	1	Active measures will be used. Absorbent materials maintained on site.		Visual	120	1	5	After	1	Spill location	Across pave-ment	Absorbent materials maintained on site	1	10	Yes	Dispenser Operator	Yes	Sufficient	Yes
NSA HQ-SDA218-AST-02	Tank rupture	W 20' to Low Area	Inst	500 each	Yes	120	500	Tanks are located in an area without adequate vehicle protection. See Appendix XX Deficiency list for recommended corrective action.																	
	Tanker rupture	W 20' to Low Area	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly under DOT regulations.																			
	Overfill	W 20' to Low Area	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across gravel area	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	W 20' to Low Area	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	120	1	5	After	1	Spill location	Across pave-ment	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer Out (Dispensing)	W 20' to Low Area	10	1	Yes	5	1	Active measures will be used. Absorbent materials maintained on site.		Visual	120	1	5	After	1	Spill location	Across pave-ment	Absorbent materials maintained on site	1	10	Yes	Dispenser Operator	Yes	Sufficient	Yes
NSA HQ-SDA218-AST-03	Tank rupture	W 20' to Low Area	Inst	10,000	Yes	120	500	Tank is located in an area without adequate vehicle protection. See Appendix XX Deficiency list for recommended corrective action.																	
	Tanker rupture	W 20' to Low Area	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial oil collection vehicle is inspected regularly under DOT regulations.																			
	Overfill	W 20' to Low Area	50	5	Yes	5	4	Tank has no level gauge or other means for overfill protection. The liquid free surface is not visible while filling tank. See Appendix XX Deficiency list for recommended corrective action.																	
	Hose retrieval	W 20' to Low Area	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on site.		Visual	120	1	5	After	1	Spill location	Across pave-ment	Absorbent materials maintained on site	5	10	Yes	Collection Truck Driver	Yes	Sufficient	Yes

All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building SDA218, Tanks NSA HQ-SDA218-AST-01, -02, and -03

Drum Storage Area/Container ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construction is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Automatic Flow Restrictor or Flow Shut-off Device	All Product Transfers are Constantly Monitored	Protectively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-SDA218-AST-01	No [A]	Yes	Yes	Yes	No [A]	No[2]	No[2]	Yes	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]
NSA HQ-SDA218-AST-02	No [A]	Yes	Yes	Yes	No [A]	No[2]	No[2]	Yes	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B]
NSA HQ-SDA218-AST-03	No [A]	No [A]	No [A]	No [A]	Yes	No[2]	No[2]	No[2]	No[2]	No[4], Single-walled tank with no containment	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A, single-walled tank	N/A	N/A	Yes	Yes	No[B]

Notes:

Indicates non-compliance item that must be resolved

Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1] Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2] As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

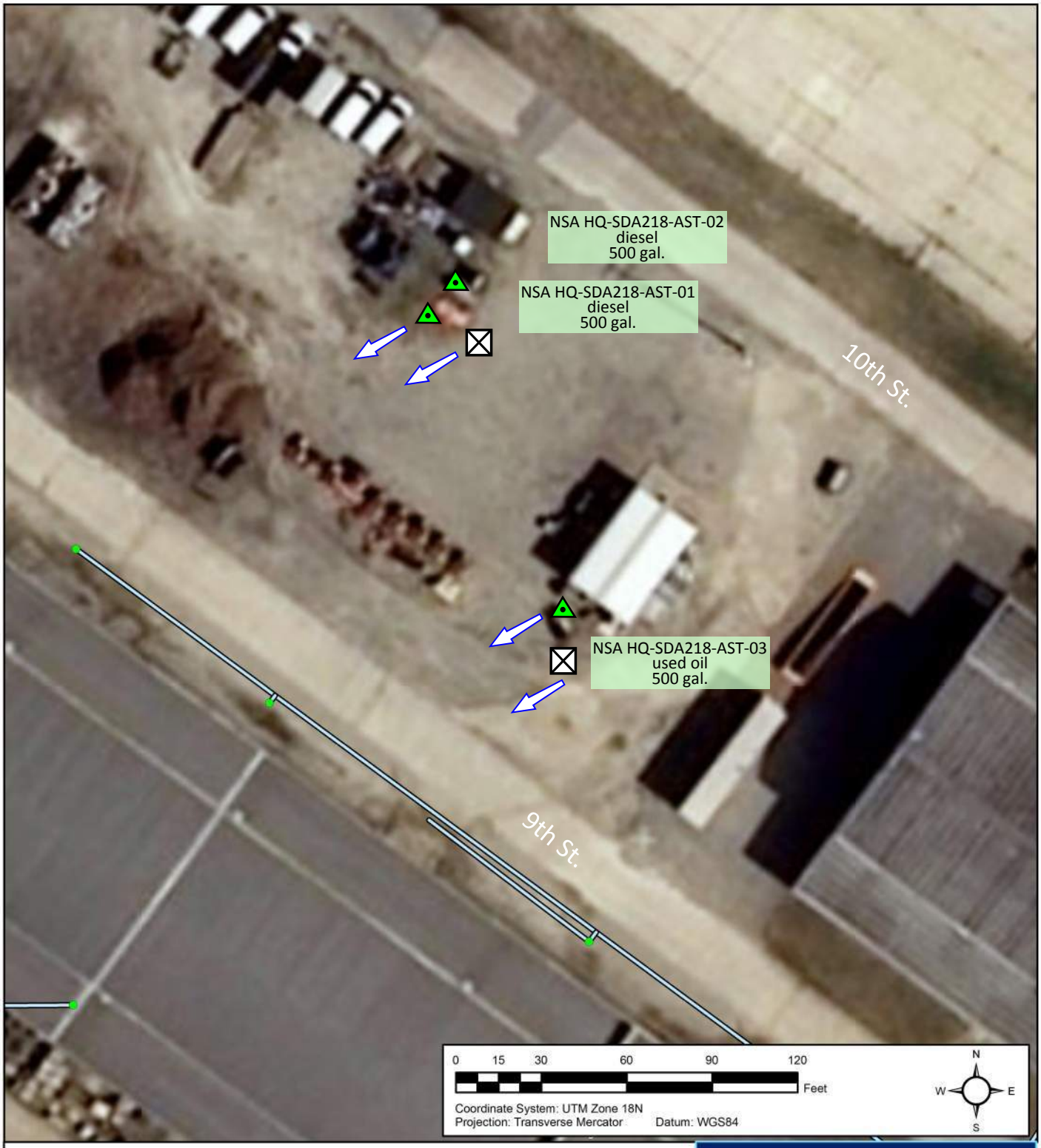
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

Naval Support Activity Hampton Roads HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

SDA218

Tank Systems

General Information

Tank No.:	**NSA HQ-SDA313A-AST-01**	Date Installed:	Unknown
Building No.:	SDA313A	Tank Use:	Emergency Generator Supply
TankType:	AST	Activity/ Operator:	Navy Lodge

Tank Design Information

Capacity (gallons):	278
Contents:	Diesel
Tank Corrosion Protection:	Painted
Tank Construction:	Double Walled Steel
Tank Fabrication:	Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier:	Steel DW tank -
Bunkered Tank:	No
Direct ground contact:	No

Secondary Containment

Type:	None
Construction Material:	Steel
Capacity:	100%
Drainage Controls:	Threaded Plug
Release Detection Method:	Interstitial Monitoring

Piping Design Information

Aboveground Piping:	Single Walled Flexible Hose
Aboveground Piping Corrosion Protection:	N/A
Pipe Pressurization:	Suction/Return
Underground Piping:	None
Underground Piping Corrosion Protection:	N/A
Ancillary Equipment:	Flex Hose-Generators
Automatic Line Leak Detection:	N/A

Secondary Containment

Type:	Active Measures
Construction Material:	N/A
Capacity:	N/A
Drainage Controls:	N/A
Release Detection Method:	Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge:	Yes
High level Alarm:	None
Comm. link b/w gauger & pumper:	Visual
Level Gauge Linked to Computer:	No
CRDM:	Yes
Spill Control:	Secondary containment AST
STI Category:	STI-Cat 1
Spill Prevention:	Active Spill Prevention measures
Auto Pump Shutoff:	No
Is Tank Portable:	No
Positioned to prevent spill from reaching navigable waters?	N/A, tank is not portable.

Overfill Prevention:

- ☐ Active Measures
- ☐ Communication Link b/w Gauger and Pumper (Electronic)
- ☑ Communication Link b/w Gauger and Pumper (Visual)
- ☑ Level Gauge
- ☐ Overfill/High Level Alarm
- ☐ Vent Whistle
- ☐ Overfill Prevention Valve (AST)
- ☐ Automatic Restrictor/Shutoff Device (UST)
- ☐ Not Required (UST fill event < 25 gallons/event)
- ☐ None

Potential Discharge Information

Spill Response Procedures:	Navfac Mid-Atlantic Oil Recovery would respond should assistance be required as described in Section 6.
Worst Case Discharge:	Full Tank Capacity -
Probable Discharge Cause:	Overfill -
Probable Discharge:	<5 gal
Natural Resources at Risk:	Elizabeth River
Municipal Services at Risk:	Stormwater Outfall - 205

Security

Does adequate lighting exist for spill detection during darkness:	Yes
Is Fill Port and/or Spill Bucket Secured:	Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-SDA313A-AST-01

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																					
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)																
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-SDA313A-AST-01	Tank rupture	South 50' to storm sewer	Inst	278	Yes	120	278	Tanks are located in an area without adequate vehicle protection. See Appendix C deficiency list for recommended corrective action.																		
	Tanker rupture	West 5' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																				
	Overfill	South 50' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	30	1	1	After	1	Spill location	Across grass	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	West 5' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	1	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Insufficient	Yes
	Transfer out (pipe seepage)	South 50' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	30	1	5	After	1	Spill location	Across grass	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building SDA313A, Tank NSA HQ-SDA313A-AST-01

Drum Storage Area/Cont-ainer ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]		Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]			
NSA HQ-SDA313A-AST-01	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	No[B] requires protection from grounds-keeping equipment

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

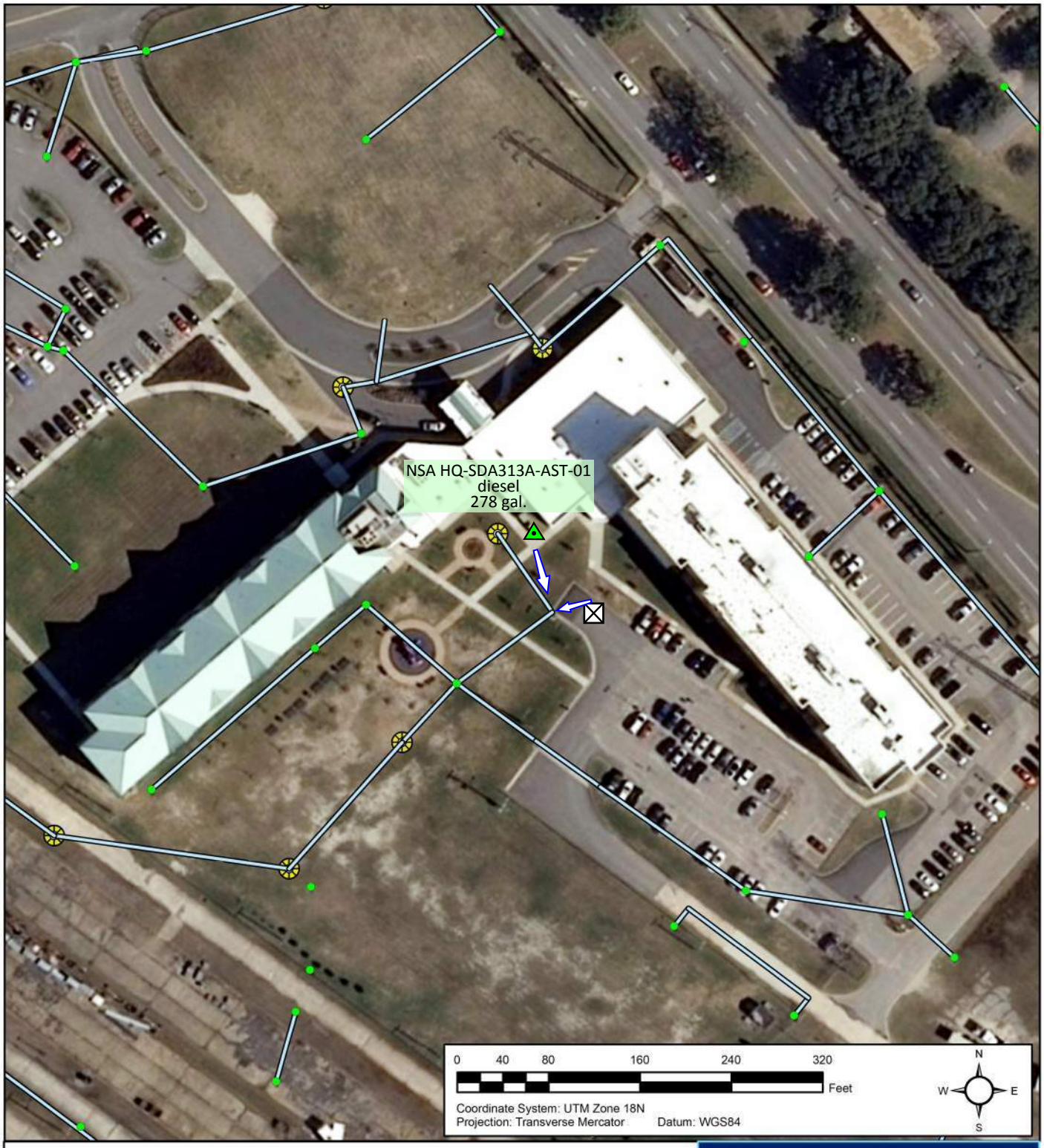
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

SDA313A

Tank Systems

General Information

Tank No.: **NSA HQ-SDA332-AST-02**
Building No.: SDA332
TankType: AST

Date Installed: Unknown
Tank Use: Emergency Generator Base Tank
Activity/ Operator: Child Development Center

Tank Design Information

Capacity (gallons): 196
Contents: Diesel
Tank Corrosion Protection: Painted
Tank Construction: Double Walled Steel
Tank Fabrication: Shop-Fabricated

Ancillary AST Information

Release Prevention Barrier: Steel DW tank -
Bunkered Tank: No
Direct ground contact: No

Secondary Containment

Type: Double Walled AST
Construction Material: Steel
Capacity: 100%
Drainage Controls: Threaded Plug
Release Detection Method: Interstitial Monitoring

Piping Design Information

Aboveground Piping: Single Walled Flexible Hose
Aboveground Piping Corrosion Protection: None
Pipe Pressurization: Suction/Return
Underground Piping: None
Underground Piping Corrosion Protection: N/A
Ancillary Equipment: Flex Hose-Generators
Automatic Line Leak Detection: N/A

Secondary Containment

Type: Active Measures
Construction Material: N/A
Capacity: N/A
Drainage Controls: N/A
Release Detection Method: Visual Monitoring

Equipment and Spill/Overfill Prevention

Level Gauge: Yes
High level Alarm: None
Comm. link b/w gauger & pumper: Visual
Level Gauge Linked to Computer: No
CRDM: Yes
Spill Control: Secondary containment AST
STI Category: STI-Cat 1
Spill Prevention: Active Spill Prevention measures
Auto Pump Shutoff: No
Is Tank Portable: No
Positioned to prevent spill from reaching navigable waters? N/A, tank is not portable.

Overfill Prevention:

- [ ] Active Measures
- [ ] Communication Link b/w Gauger and Pumper (Electronic)
- [x] Communication Link b/w Gauger and Pumper (Visual)
- [x] Level Gauge
- [ ] Overfill/High Level Alarm
- [ ] Vent Whistle
- [ ] Overfill Prevention Valve (AST)
- [ ] Automatic Restrictor/Shutoff Device (UST)
- [ ] Not Required (UST fill event < 25 gallons/event)
- [ ] None

Potential Discharge Information

Spill Response Procedures: Fire Department would respond should assistance be required as described in Section 6.
Worst Case Discharge: Full Tank Capacity -
Probable Discharge Cause: Overfill -
Probable Discharge: <5 gal
Natural Resources at Risk: Elizabeth River
Municipal Services at Risk: Stormwater Outfall - 207

Security

Does adequate lighting exist for spill detection during darkness: Yes
Is Fill Port and/or Spill Bucket Secured: Yes

Caption: AST

Date Taken: 1/11/2016

General Secondary Containment Compliance Tank NSA HQ-SDA332-AST-02

Container ID	Predicted Uncontained Oil Discharge Information [112.7(b)]				Discharge Prevention System Information [112.7(c) and 112.7(a)(3)(iv)]																				
								Passive (most effective according to EPA)		**Active** (2013 GRI, pp. 4-24 through 4-28)															
										Appropriateness				Deployment Procedure				Necessary Materials				Deployment Personnel			
	Major Equipment Failure (discharge scenario)	Direction of Flow (e.g., east 50' to storm sewer)	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Dis-charged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Capacity (gallons)	Discharge Detection Method	Time for spill material to reach navigable waters or adjoining shorelines (minutes)	Time to Discover Spill (minutes)	Deployment Time (minutes)	Installed before an activity involving the handling of oil starts, or after a discharge	Deployment manpower requirement (number of people)	Deployment location	Drainage pathways	Storage Location of Discharge Prevention Materials	Amount of Discharge Prevention Materials Required (capacity in gallons)	Amount of Discharge Prevention Materials Available (capacity in gallons)	Material and equipment accessible (not locked, or responder always has key), and located close enough to the potential source of discharge	Title(s) of personnel responsible for deploying active measures	Deployment personnel trained in deployment location, material storage location and drainage conditions	Appropriateness of Method	Deployment personnel present at all times to effectively deploy the measures in the event of a discharge
NSA HQ-SDA332-AST-02	Tank rupture	South 100' to storm sewer	Inst	196	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the container is inspected regularly and the container is not located near normal vehicle traffic.																			
	Tanker rupture	South 100' to storm sewer	Inst	2,000	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the commercial fuel delivery vehicle is inspected regularly IAW DOT regulations.																			
	Overfill	South 100' to storm sewer	50	5	Yes	5	4	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	90	1	1	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	4	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Hose retrieval	South 100' to storm sewer	60	60	Yes	5	5	Active measures will be used. Absorbent materials maintained on delivery vehicle.		Visual	90	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on delivery vehicle	5	10	Yes	Delivery Driver	Yes	Sufficient	Yes
	Transfer out (pipe seepage)	South 100' to storm sewer	1	1	Yes	60	1	Active measures will be used. Absorbent materials are available to the tank inspector.		Visual	90	1	5	After	1	Spill location	Across asphalt	Absorbent materials maintained on site	1	10	Yes	Tank Inspector	Yes	Sufficient	Yes

Notes:
All entries are based solely on external visual observations unless otherwise noted
All regulatory references included in this table are to 40 CFR 112 unless otherwise noted
IAW = in accordance with

Signage/Markings, Overfill Protection, Secondary Containment, Corrosion Protection and Compatibility Compliance Summary
Building SDA332, Tank NSA HQ-SDA332-AST-02

Drum Storage Area/Cont-ainer ID	Signage[1]					Overfill Protection				Secondary Containment						Buried Pipe Corrosion Protection		Container Compatibility		
						At Least One of the Following is Required in Accordance with 112.8(c)(8)/112.12(c)(8)[2]				Bulk Storage Tank Installations [112.8(c)(2)/ 112.12(c)(2)] or Mobile or Portable Oil Storage Containers [112.8(c)(11)/ 112.12(c)(11)]	Double-Wall AST **112.7(c)** Protective Measures Option (all of the following are required)					Buried Piping [112.8(d)(1)/ 112.12(d)(1)]				
	ID Number	No Smoking	NFPA Diamond	Contents	Capacity	Audible or Visual High Liquid Level Alarm	High Liquid Level **Pump** Cutoff Device	Direct Audible or Code Signal Comm btwn Container Gauger and Pumper	Fast Response System (e.g. Vision Gauge w/ Monitor Present)	Sec. Cont. Capacity Sufficient to Contain Largest Container Plus Freeboard[3,4]	Primary Tank UL Listed Steel	Outer wall construct-tion is per nationally accepted industry standards (e.g., API, STI)	Overfill Alarm	Auto-matic Flow Re-strictor or Flow Shut-off Device	All Product Trans-fers are Con-stantly Mon-itored	Protect-ively Wrap and Coat[6]	Cathodically Protect or Satisfy the Corrosion Protection Standards for Piping in §280 or State Program Approved under §281[6]	Material and Construction are Compatible with Material Stored and Conditions of Storage such as Temp. and Pressure[7]	Lighting	Vehicle Prot.[8]
NSA HQ-SDA332-AST-02	Yes	Yes	Yes	Yes	Yes	No[2]	No[2]	No[2]	Yes	Yes, double-walled tank	Yes	Yes	No[5]	No[5]	Yes	N/A	N/A	Yes	Yes	N/A, tank located indoors

Notes:
Indicates non-compliance item that must be resolved
Indicates issue that must be resolved to prevent noncompliance

[A] Apply required tank labels.

[B] Tank requires vehicle protection iaw NFPA 30 Chapters 22.11.4.7 and 22.15.

Footnotes:

All entries are based solely on external visual observations unless otherwise noted

All regulatory references included in this table are to 40 CFR 112 unless otherwise noted

[1]Signage Requirements

Container identification number required by OPNAVINST M-5090.1 and required to develop container testing and inspection program required by 112.8(c)(6)

No Smoking sign required by OSHA Rule 29 CFR 1910.106(f)(6) on any container storing flammable or combustible liquids

NFPA Diamond required by Code 704 for all fixed ASTs containing OHS liquids. Gasoline is flammable with flash point < 100 degrees F and requires 1,3,0. Diesel is combustible with flash point > 100 and requires 1,2,0.

Contents marking required by 29 CFR 1910.1200(f)(5) for all containers that store hazardous substances

Capacity marking is a primary means to protect against overfill.

"Used Oil" label is required by 40 CFR 279 for any oil which is used, spent, or wasted. This does not apply to off-spec, discarded or reclaimed fuels.

[2]As required by 112.8(c)(8), the Owner must engineer or update each container installation in accordance with good engineering practice to avoid discharges. Owner must provide at least one of the following four devices: [112.8(c)(8)]

1. High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. [112.8(c)(8)(i)]
2. High liquid level pump cutoff device set to stop flow at a predetermined container content level. [112.8(c)(8)(ii)]
3. Direct audible or code signal communication between the container gauger and the pumping station. [112.8(c)(8)(iii)]
4. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. [112.8(c)(8)(iv)]

[3] Position or locate mobile or portable oil storage containers to prevent a discharge as described in §112.1(b). Except for mobile refuelers and other non-transportation-related tank trucks, you must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation. [112.8(c)(11)/112.12(c)(11)]

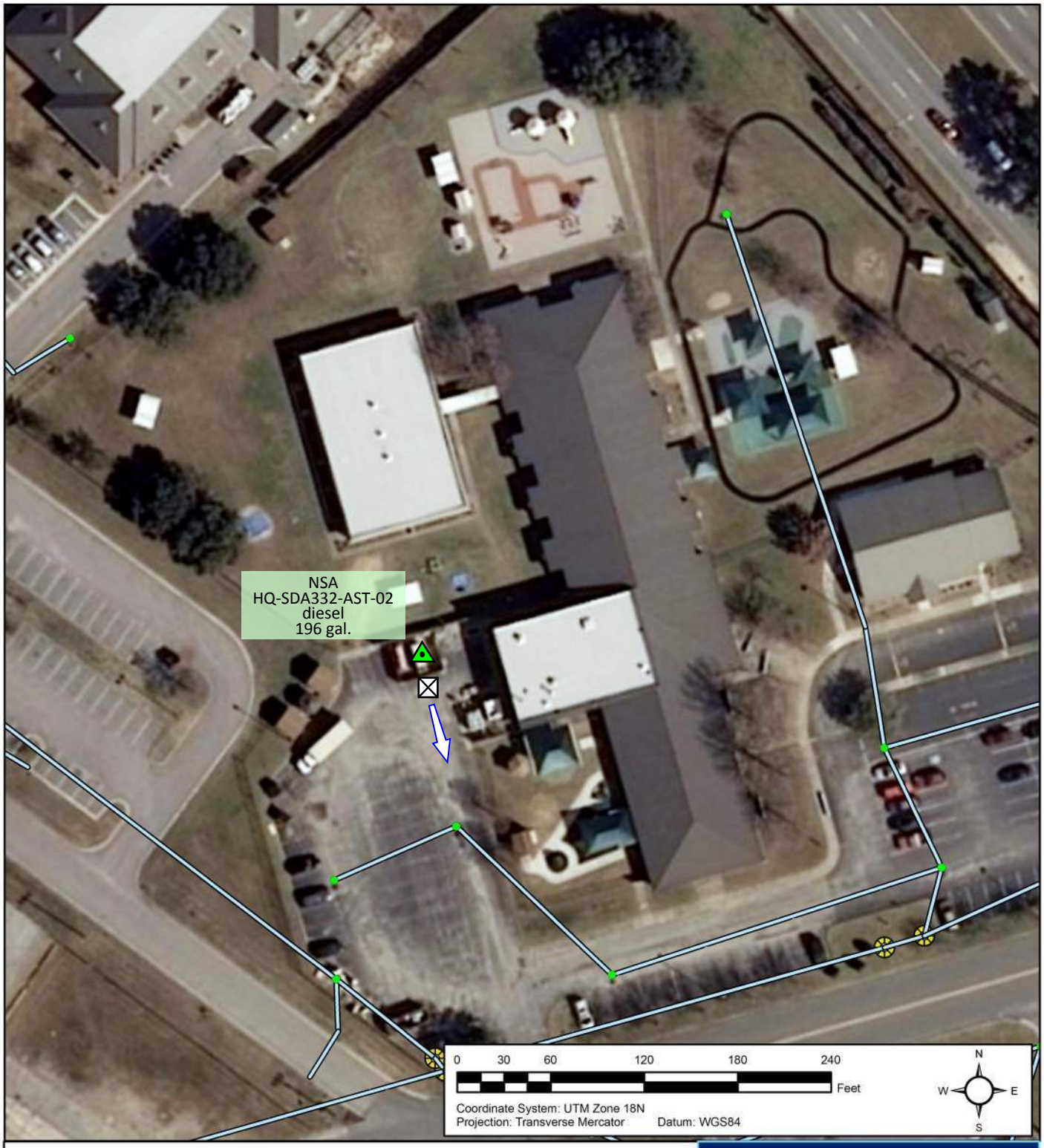
[4] Construct all bulk storage tank installations (except mobile refuelers and other non-transportation related tank trucks) so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. [112.8(c)(2)/112.12(c)(2)]

[5] Required in NFPA 30 Chapter 22.11.4 and NAVFAC MidAtlantic Environmental Program policy

[6] Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage. [112.8(b)(5)/112.12(b)(5)]

[7] Container may not be used for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature. [112.8(c)(1)/112.12(c)(1)] To comply with this requirement, the container must be constructed to an industry standard like UL 142, UL 2085 or be part of an engineered system.

[8] In accordance with NFPA 30 Chapter 22.15, all AST must be able to withstand vehicle impact if installed in areas with potential for vehicle collisions. UL2085 protected tanks meet this requirement except in extreme cases.



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

SDA332

5.2.2 Drum Storage Area Data Sheets and Maps

Information sheets have been prepared for drum storage areas. Information presented in this section is intended to provide owners, operators, and inspectors a quick reference which indicates the typical number of oil storage containers, the usual type of oil stored, the expected failure scenarios and associated general secondary containment compliance measures required under §112.7(b) and §112.7(c), the sized secondary containment requirements under §112.8(c), and associated drainage controls.

The information presented has been reviewed for compliance with §112 and industry standards. All deficiencies, specific regulatory citations, and recommended corrective actions are presented in Appendix B.

Secondary Containment Compliance Status Site NSA HQ-BEN154-DSA-01

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-BEN154-DSA-01
Building / Area: BEN154
Contents: Oil
Activity: Fire Station

Average Number of Containers: 2
Notes:

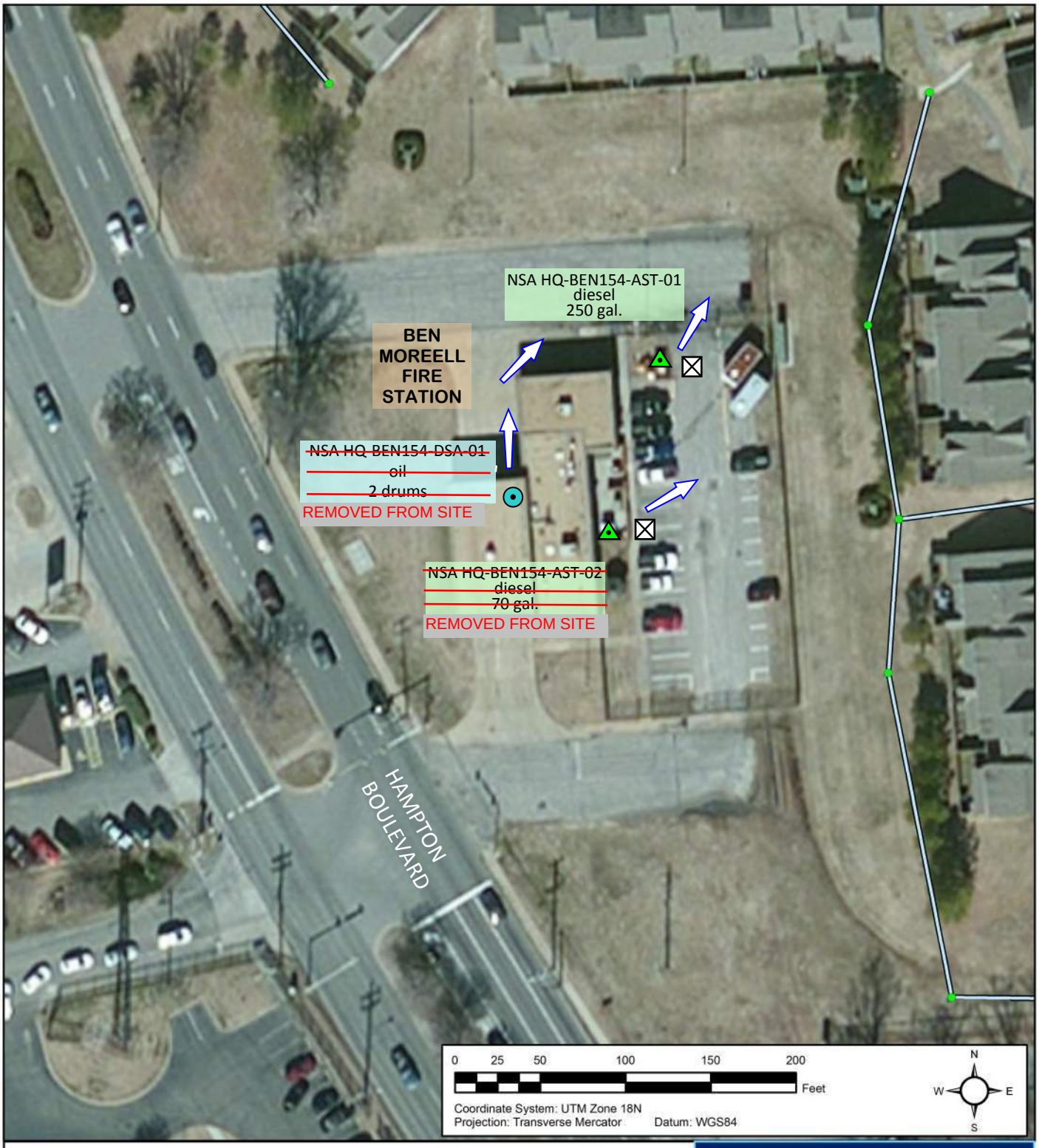
Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	Northeast	Inst	55	Yes	60	55	Spill basin		34	Yes
Filling Drum	Northeast	5	1	No	40 CFR 112.7(c) does not requir… atypical failure modes. The potential for occurrence is not reasonable b… re not filled while stored on site.					
Emptying Drum	Northeast	10	1	Yes	60	1		26.25"x51.5"x6.5"	34	Yes

Sized Secondary Containment 112.8(c)

Type: Spill basin
Containment Material: Plastic
Drainage Controls: None
Containment Capacity: 34 gallons
Spill Control Equipment: None
Compliant? No

REMOVED FROM SITE



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

Naval Station Norfolk

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

BEN154

Secondary Containment Compliance Status Site NSA HQ-CA477-DSA-01

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-CA477-DSA-01
Building / Area: CA477
Contents: Oil
Activity: Golf Course Maintenance Shop
Average Number of Containers: 3
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	Southwest	Inst	55	Yes	60	55	Spill basin	130.5"x26.25"x6.5"	60.5	Yes
Filling Drum	Southwest	5	1	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not filled while stored on site.					
Emptying Drum	Southwest	10	1	Yes	60	1	Spill Pallet	130.5"x26.25"x6.5"	60.5	Yes

Sized Secondary Containment 112.8(c)

Type: Spill Pallet
Containment Material: Plastic
Drainage Controls: Plug
Containment Capacity: 60.5 gallons
Spill Control Equipment: N/A
Compliant? Yes

Secondary Containment Compliance Status Site NSA HQ-CA501-DSA-01

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-CA501-DSA-01
Building / Area: CA501
Contents: Used Cooking Oil
Activity: Golf Course Club House

Average Number of Containers: 1
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Container Failure	South	Inst	275	Yes	60	275	None		N/A	N/A
Filling Container	South	5	1	Yes	60	1	Active Meas		5.0	N/A
Emptying Container	South	10	1	Yes	60	1		N/A	5.0	N/A

Sized Secondary Containment 112.12(c)

Type: None
Containment Material: N/A
Drainage Controls: N/A
Containment Capacity: N/A
Spill Control Equipment: N/A
Compliant? No

RENAMED TO NSA HQ-CA501-PORT-01

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC
Naval Facilities Engineering Command
Environmental Business Line, Mid-Atlantic Region

CA501

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active
- Other Storage Facility

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

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CA501

Secondary Containment Compliance Status Site NSA HQ-MCA602-DSA-01

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-MCA602-DSA-01
Building / Area: MCA 602
Contents: Used Cooking Oil
Activity: Mess Hall 602 Camp Allen Base Food Services

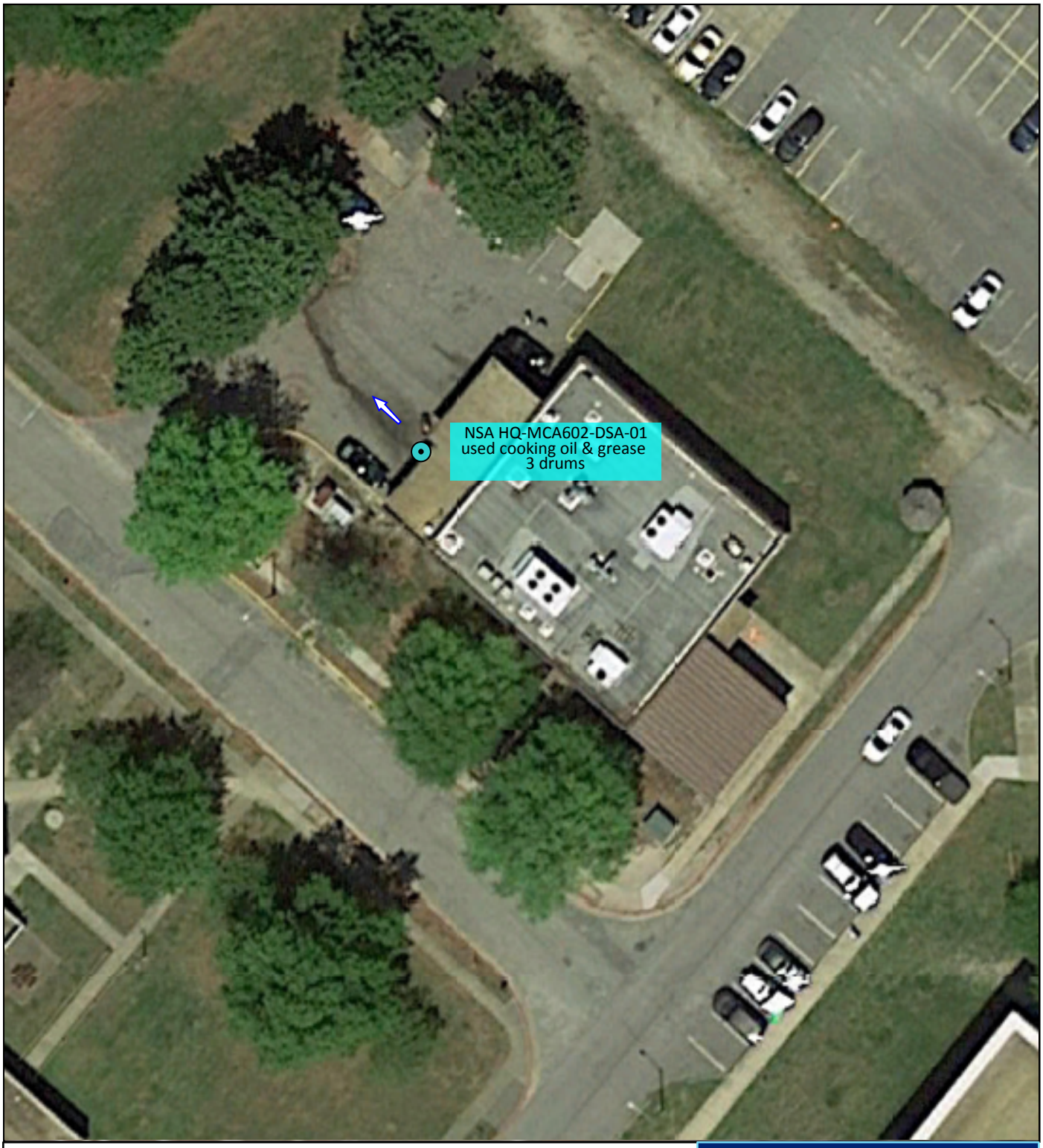
Average Number of Containers: 3
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	West to Storm Drain	Inst	55	Yes	60	55	None	N/A	N/A	N/A
Filling Drum	West to Storm Drain	5	1	Yes	60	1	Active Measures	Active measures are available to the tank operator filling the container.		
Emptying Drum	West to Storm Drain	10	1	Yes	60	1	Active Measures	Active measures are maintained by the pumper truck operator emptying the container.		

Sized Secondary Containment 112.12(c)

Type: None
Containment Material: N/A
Drainage Controls: N/A
Containment Capacity: N/A
Spill Control Equipment: N/A
Compliant? No



Legend

POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

Installation
214

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

MCA602

Secondary Containment Compliance Status Site NSA HQ-MCA612-DSA-01

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-MCA612-DSA-01
Building / Area: MCA612
Contents: Lube Oil, Hydraulic Oil
Activity: Marine Corps Vehicle Maintenance

Average Number of Containers: 5
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimension (LxWx	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	North west to bay door then parking lot	Inst	55	Yes	60	55	Spill basin		60.5	Yes
Filling Drum	North west to bay door then parking lot	5	1	No	40 CFR 112.7(c) does not require … occurrence is not reasonable be…				ypical failure modes. The potential for not filled while stored on site.	
Emptying Drum	North west to bay door then parking lot	10	1	Yes	60	1		130.5"x26.25"x6 .5"	60.5	Yes

Sized Secondary Containment 112.8(c)

Type: Spill Pallet
Containment Material: Plastic
Drainage Controls: None
Containment Capacity: 60.5 gallons
Spill Control Equipment: None
Compliant? Yes

UPDATED AT SITE

Secondary Containment Compliance Status Site NSA HQ-MCA612-DSA-01

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-MCA612-DSA-01
Building / Area: MCA612
Contents: Lube Oil, Hydraulic Oil
Activity: Marine Corps Vehicle Maintenance

Average Number of Containers: 5
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	North west to bay door then parking lot	Inst	55	Yes	60	55	Spill Pallet	76"x52"x6'	102.7	Yes
Filling Drum	North west to bay door then parking lot	5	1	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not filled while stored on site.					
Emptying Drum	North west to bay door then parking lot	10	1	Yes	60	1	Spill Pallet	76"x52"x6'	102.7	Yes

Sized Secondary Containment 112.8(c)

Type: Spill Pallet
Containment Material: Plastic
Drainage Controls: Plug
Containment Capacity: 102.7 gallons
Spill Control Equipment: None
Compliant? Yes

Secondary Containment Compliance Status Site NSA HQ-MCA612-DSA-02

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-MCA612-DSA-02
Building / Area: MCA612
Contents: Gasoline, Used oil
Activity: Marine Corps Vehicle Maintenance

Average Number of Containers: 6
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	Southeast to storm sewer	Inst	55	No	40 CFR 112.7(c) does not require owners to ad… modes. The potential for occurrence is not reasonable because the dr… ear vehicle traffic, do not stay outside long enough for corrosion to h… id are unlikely to be damaged during handling.					
Filling Drum	Southeast to storm sewer	5	1	Yes	60	1	Ha… P…	…"x7"	250	Yes
Emptying Drum	Southeast to storm sewer	10	1	Yes	60	1		96"x86"x7"	250	Yes

Sized Secondary Containment 112.8(c)

Type: Hazmat Building
Containment Material: Steel
Drainage Controls: None
Containment Capacity: 250 gallons
Spill Control Equipment: None
Compliant? Yes

REMOVED FROM SITE

Secondary Containment Compliance Status Site NSA HQ-MCA612-DSA-03

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-MCA612-DSA-03
Building / Area: MCA612
Contents: Hydraulic Oil, Gasoline
Activity: Marine Corps Vehicle Maintenance

Average Number of Containers: 2
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	Southeast to storm sewer	Inst	55	No	40 CFR 112.7(c) does not require owners to a… modes. The potential for occurrence is not reasonable because the d… ear vehicle traffic, do not stay outside long enough for corrosion to h… nd are unlikely to be damaged during handling.					
Filling Drum	Southeast to storm sewer	5	1	Yes	60	1	H…	…x1/2'	216	N/A
Emptying Drum	Southeast to storm sewer	10	1	Yes	60	1		6'x10'x1/2'	216	N/A

Sized Secondary Containment 112.8(c)

Type: Hazmat Building
Containment Material: Steel
Drainage Controls: None
Containment Capacity: 216 gallons
Spill Control Equipment: None
Compliant? Yes

REMOVED FROM SITE

Secondary Containment Compliance Status Site NSA HQ-MCA612-DSA-04

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-MCA612-DSA-04
Building / Area: MCA612
Contents: Gasoline
Activity: Marine Corps Vehicle Maintenance

Average Number of Containers: 2
Notes:

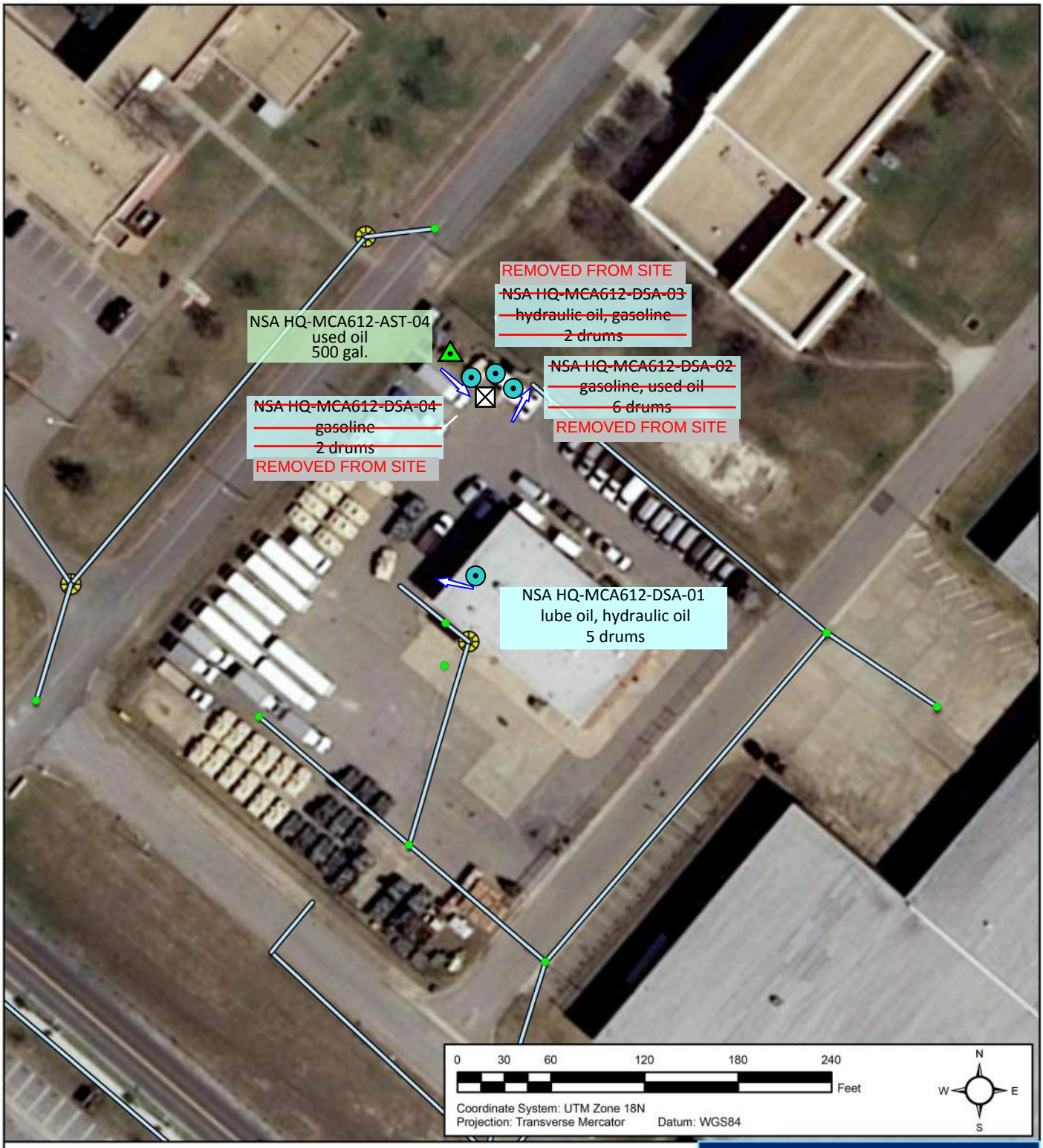
Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimension (LxWx	econdary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	Southeast to storm sewer	Inst	55	Yes	60	55	2-Drum Worksta		220	Yes
Filling Drum	Southeast to storm sewer	5	1	Yes	60	1		x60"'x30"	220	N/A
Emptying Drum	Southeast to storm sewer	10	1	No	40 CFR 112.7(c) does … o address atypical failure modes. The potential for occurrence is not rea… e drums are stored for removal and are not emptied at this site.					

Sized Secondary Containment 112.8(c)

Type: 2-Drum Workstation
Containment Material: Plastic
Drainage Controls: None
Containment Capacity: 220 gallons
Spill Control Equipment: None
Compliant? Yes

REMOVED FROM SITE



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

MCA612

Secondary Containment Compliance Status Site NSA HQ-NH94-DSA-01

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-NH94-DSA-01
Building / Area: NH94
Contents: Lube oil
Activity: Power Plant

Average Number of Containers: 2
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	Indoor Flow	Inst	55	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not stored near vehicle traffic, do not stay outside long enough for corrosion to become significant, and are unlikely to be damaged during handling.					
Filling Drum	Indoor Flow	5	1	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not filled while stored on site.					
Emptying Drum	Indoor Flow	10	1	Yes	60	1	Spill Pallet	24"x48"x3"	15	Yes

Sized Secondary Containment 112.8(c)

Type: Spill Pallet
Containment Material: Industrial Fabric
Drainage Controls: None
Containment Capacity: 15
Spill Control Equipment: None
Compliant? No

Secondary Containment Compliance Status Site NSA HQ-NH94-DSA-02

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-NH94-DSA-02
Building / Area: NH94
Contents: Lube oil
Activity: Power Plant

Average Number of Containers: 1
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	Indoor flow	Inst	55	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not stored near vehicle traffic, do not stay outside long enough for corrosion to become significant, and are unlikely to be damaged during handling.					
Filling Drum	Indoor flow	5	1	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not filled while stored on site.					
Emptying Drum	Indoor flow	10	1	Yes	60	1	Spill Pallets	26.25"x26"x 6.5"	15	Yes

Sized Secondary Containment 112.8(c)

Type: Spill Pallet
Containment Material: Plastic
Drainage Controls: None
Containment Capacity: 15
Spill Control Equipment: None
Compliant? No

Secondary Containment Compliance Status Site NSA HQ-NH94-DSA-03

Drum Storage Areas

General Information

Storage Area ID: NSA HQ-NH94-DSA-03
Building / Area: NH94
Contents: Lube oil
Activity: Power Plant

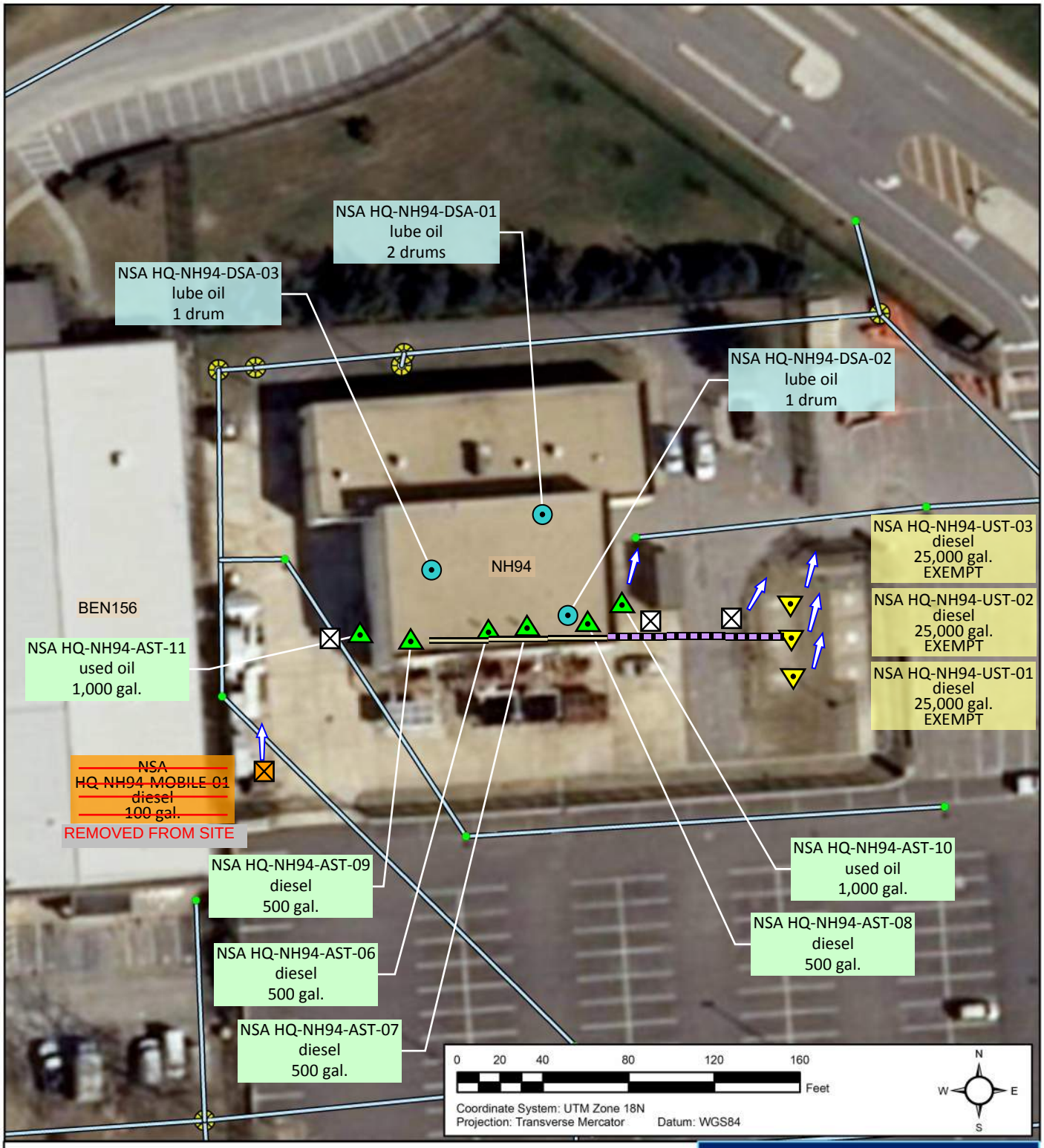
Average Number of Containers: 1
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Drum Failure	Indoor flow	Inst	55	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not stored near vehicle traffic, do not stay outside long enough for corrosion to become significant, and are unlikely to be damaged during handling.					
Filling Drum	Indoor flow	5	1	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not filled while stored on site.					
Emptying Drum	Indoor flow	10	1	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are stored for relocation and are not emptied at this site.					

Sized Secondary Containment 112.8(c)

Type: None
Containment Material: N/A
Drainage Controls: N/A
Containment Capacity: N/A
Spill Control Equipment: N/A
Compliant? No



Legend

POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH94

5.2.3. Mobile Equipment/Container Storage and Operating Area Information Sheets and Maps

Information sheets have been prepared for mobile equipment which has an internal oil storage capacity of greater than or equal to 55 gallons of non-motive power oil.

Information presented in this section is intended to provide owners, operators, and inspectors a quick reference by indicating the typical number and location of mobile equipment having 55 gallons or more of oil, the type of oil stored, the expected failure scenarios, and associated general secondary containment compliance measures required under §112.7(b) and §112.7(c). The sized secondary containment requirements under §112.8(c) are analyzed and presented for both the storage sites of the equipment when not in use and the deployment site when in operation mode. Associated drainage controls are also presented.

The information presented has been reviewed for compliance with deficiencies, specific regulatory citations, and recommended corrective actions ed in Appendix B.

REMOVED FROM SITE

Secondary Containment Compliance Status NSA HQ-NH94-MOBILE-01

General Information

Equipment ID:	NSA HQ-NH94-MOBILE-01	Average Number of Units:	1
Building / Area:	NH94	Fuel Tank Size:	100
Contents:	Diesel	Largest Tank Size:	100
Activity:	Public Works Utilities		

General Secondary Containment 112.7(c)

Equipment Failure Scenario	Max Expected Volume	Likely Release	Secondary Containment Method	Adequate
Rupture In Transit	Entire Tank Volume	No	Not Required by 112.7(c)	N/A
Filling	1 gal from spill / overfill	Yes	Active: A spill kit is maintained with the fu delivery truck to clean up minor fuelin spills.	Yes
Transfer out (line leakage)	1 gal from line leakage	Yes	No spill kit available for the mobil	No

Sized Secondary Containment 112.8(c)(11)

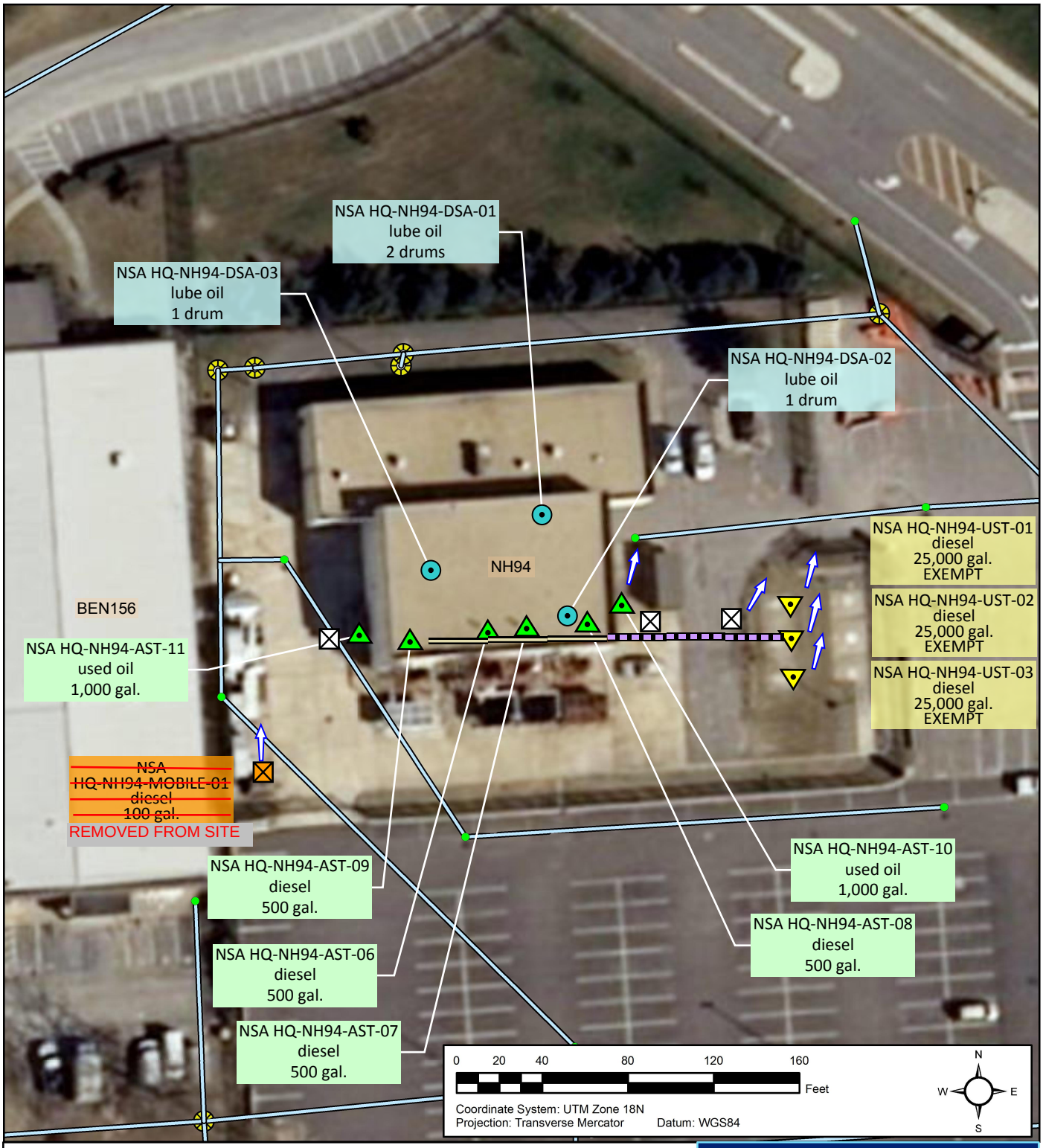
Containment While In Storage

Type:	None
Containment Material:	N/A
Drainage Controls:	N/A
Containment Capacity:	N/A
Spill Control Equipment:	N/A
Compliant?	No

Containment In Operational Mode

Type:	None
Containment Material:	N/A
Drainage Controls:	N/A
Containment Capacity:	N/A
Spill Control Equipment:	N/A
Compliant?	N

REMOVED FROM SITE



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POL Tank Type and Status
- Aboveground Storage Tank, active
- Underground Storage Tank, active
- Drum Storage Area, active

POL Line Type
- aboveground
- underground

Line Type
- Storm Sewer Main Line

POL Vehicle Activity Site
- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH94

5.2.3 Portable Container Storage Area Data Sheets and Maps

Information sheets have been prepared for portable container storage areas. Information presented in this section is intended to provide owners, operators, and inspectors a quick reference which indicates the typical number of oil storage containers, the usual type of oil stored, the expected failure scenarios and associated general secondary containment compliance measures required under §112.7(b) and §112.7(c), the sized secondary containment requirements under §112.8(c), and associated drainage controls.

The information presented has been reviewed for compliance with §112 and industry standards. All deficiencies, specific regulatory citations, and recommended corrective actions are presented in Appendix B.

Secondary Containment Compliance Status Site NSA HQ-CA501-PORT-01

Portable Container Storage Areas

General Information

Storage Area ID: NSA HQ-CA501-PORT-01
Building / Area: CA501
Contents: Used Cooking Oil
Activity: Golf Course Club House

Average Number of Containers: 1
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Container Failure	South	Inst	275	Yes	60	275	None	N/A	N/A	N/A
Filling Container	South	5	1	Yes	60	1	Active Measures	Active measures are available to the tank operator filling the container.		
Emptying Container	South	10	1	Yes	60	1	Active Measures	Active measures are maintained by the pumper truck operator emptying the container.		

Sized Secondary Containment 112.12(c)

Type: None
Containment Material: N/A
Drainage Controls: N/A
Containment Capacity: N/A
Spill Control Equipment: N/A
Compliant? No

Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active
- Other Storage Facility

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC
Naval Facilities Engineering Command
Environmental Business Line, Mid-Atlantic Region

CA501

Secondary Containment Compliance Status Site NSA HQ-NH31C-PORT-01

Portable Container Storage Areas

General Information

Storage Area ID: NSA HQ-NH31C-PORT-01
Building / Area: NH31C
Contents: Used Cooking Oil
Activity: NATO HQ

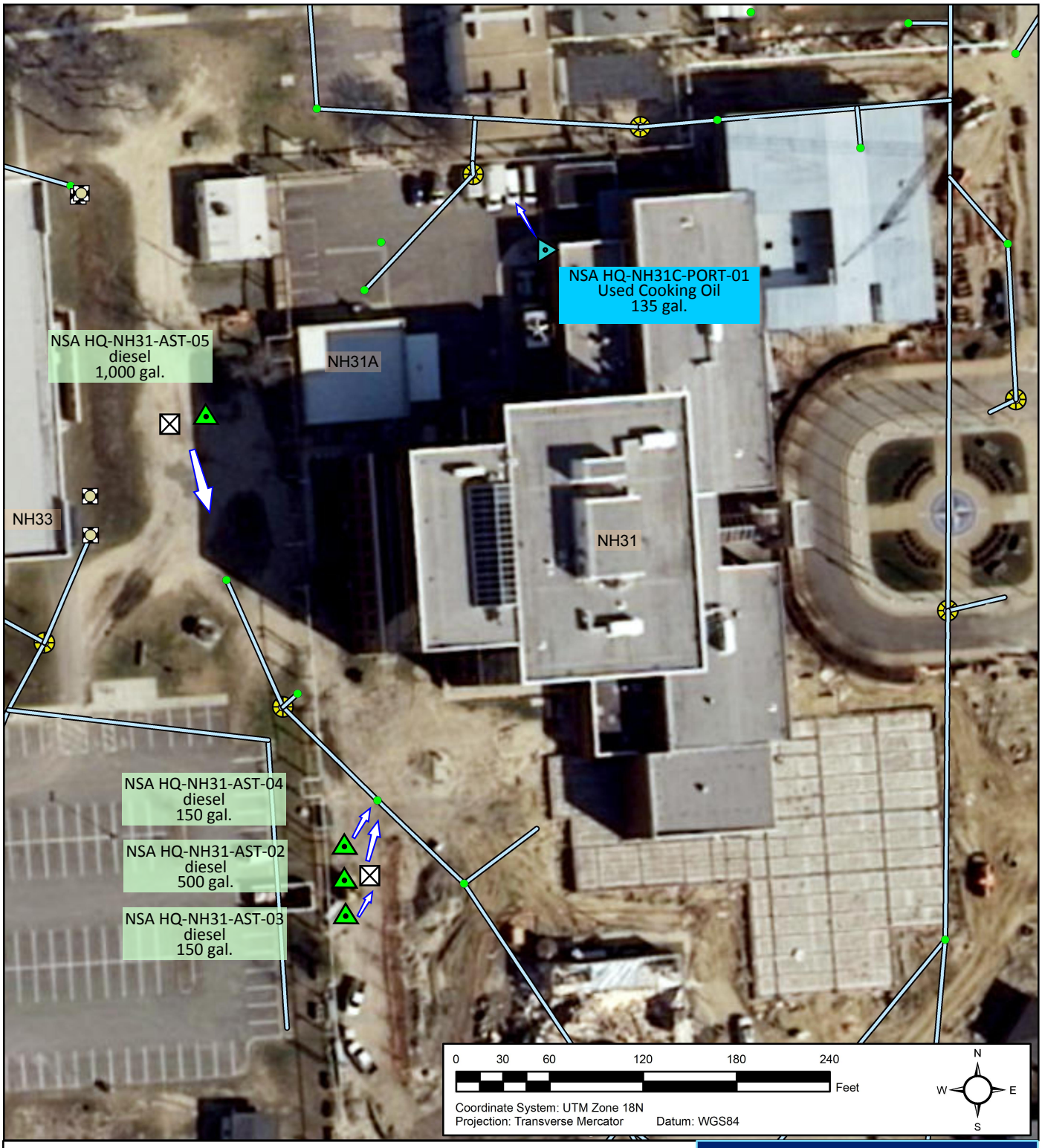
Average Number of Containers: 1
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Container Failure	North to Parking Lot	Inst	135	No	40 CFR 112.7(c) does not require owners to address atypical failure modes. The potential for occurrence is not reasonable because the drums are not stored near vehicle traffic, do not stay outside long enough for corrosion to become significant, and are unlikely to be damaged during handling.					
Filling Container	North to Parking Lot	5	1	Yes	60	1	None	N/A	N/A	N/A
Emptying Container	North to Parking Lot	10	1	Yes	60	1	None	N/A	N/A	N/A

Sized Secondary Containment 112.8(c)

Type: None
Containment Material: N/A
Drainage Controls: N/A
Containment Capacity: N/A
Spill Control Equipment: N/A
Compliant? No



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POL Tank Type and Status

- Aboveground Storage Tank, active
- Other Storage Facility

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation

Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

NH31

Secondary Containment Compliance Status Site NSA HQ-SC404-PORT-01

Portable Container Storage Areas

General Information

Storage Area ID: NSA HQ-SC404-PORT-01
Building / Area: SC404
Contents: Used Cooking Oil
Activity: Pub One

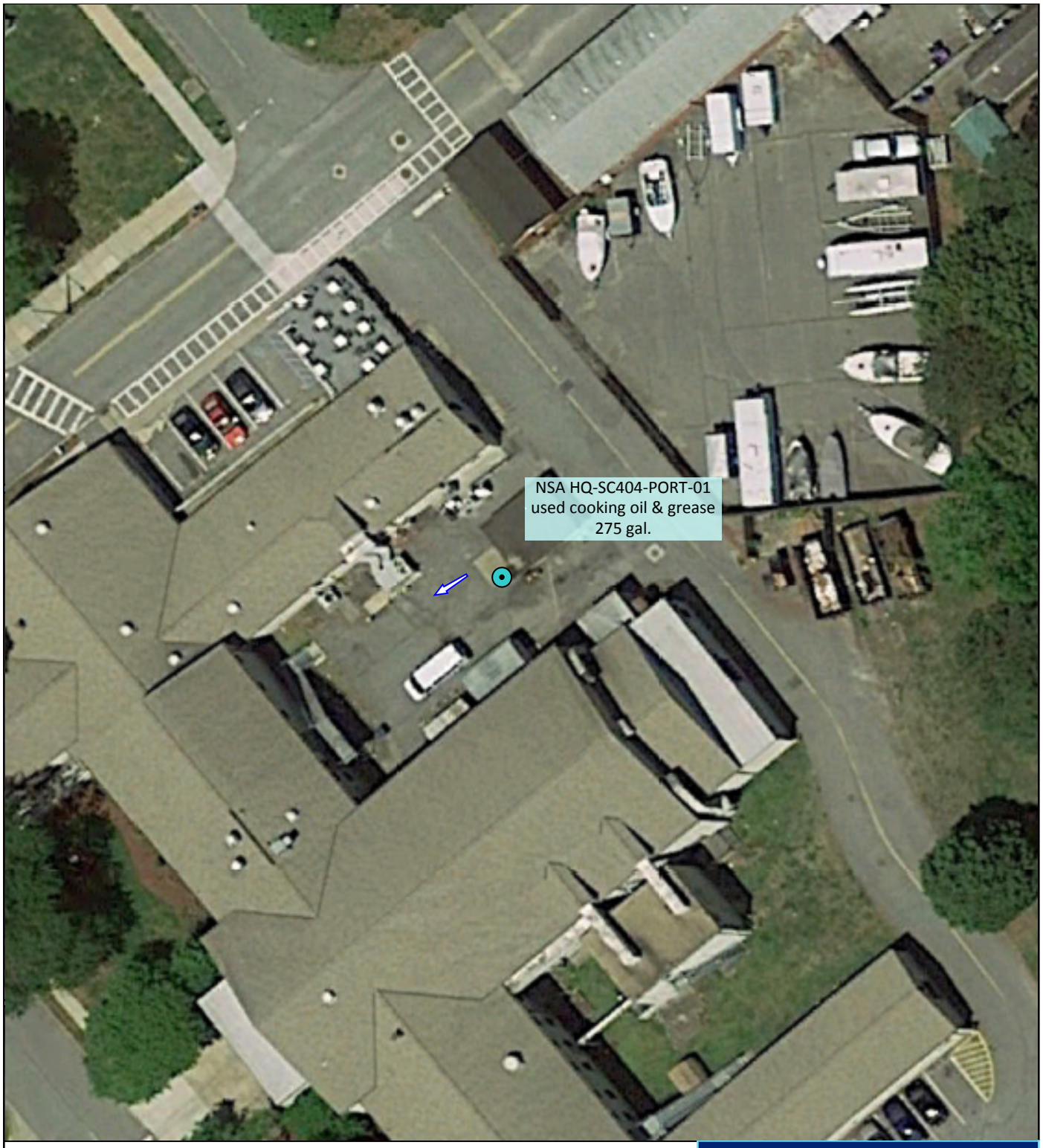
Average Number of Containers: 1
Notes:

Discharge Predictions 112.7(b) and General Secondary Containment 112.7(c)

Major Equipment Failure (discharge scenario)	Direction of Flow	Rate of Flow (gpm)	Total Quantity of Oil Which Could be Discharged (gallons)	Typical Equipment Failure Mode with Reasonable Potential for Occurrence (Yes or No)	Response Time (sec)	Most Likely Quantity of Oil Discharged (gallons)	Secondary Containment Method	Secondary Containment Dimensions (LxWxH)	Secondary Containment Capacity (gallons)	Entire Secondary Containment System (inc. walls and floors) is Capable of Containing Oil
Container Failure	West 25' to storm drain	Inst	275	Yes	600	275	None	N/A	N/A	N/A
Filling Container	West 25' to storm drain	5	1	Yes	600	1	None	N/A	N/A	N/A
Emptying Container	West 25' to storm drain	10	1	Yes	600	1	None	N/A	N/A	N/A

Sized Secondary Containment 112.8(c)

Type: None
Containment Material: N/A
Drainage Controls: N/A
Containment Capacity: N/A
Spill Control Equipment: N/A
Compliant? No



Legend

POL Tank Type and Status

- Aboveground Storage Tank, active
- Drum Storage Area, active

POL Line Type

- aboveground
- underground

Line Type

- Storm Sewer Main Line

POL Vehicle Activity Site

- Fuel OffloadSite
- Mobile Equipment Site
- Mobile Refueler

POL Compliance Site Flow Direction

- Installation
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Spill Prevention, Control, and Countermeasures Plan

NAVAL SUPPORT ACTIVITY HAMPTON ROADS HQ

NAVFAC Naval Facilities Engineering Command

Environmental Business Line, Mid-Atlantic Region

SC404

5.2.4 Oil-Filled Operational Equipment

OFOE is equipment that includes an oil storage container in which the oil is present solely to support the function of the apparatus or device. Types of OFOE include electrical equipment such as transformers, electrical switches, and circuit breakers, as well as hydraulic systems, lubricating systems, gear boxes, machining coolant systems, heat transfer systems, certain aviation ground support maintenance equipment, and elevator hydraulic reservoirs.

OFOE at NSA HR Headquarters includes electrical transformers, circuit breakers, switches, and hydraulic elevators. Average capacity of the elevator hydraulic reservoirs is estimated to be 150 gallons. A complete inventory and selected information for OFOE in use by NSA HR Headquarters is provided in Section 5.1 of this SPCC Plan. All deficiencies, specific regulatory citations, and recommended corrective actions are presented in Appendix B.

40 CFR 112.2 specifically excludes OFOE from the definition of bulk storage container. The effect of this distinction is that OFOE is not subject to the sized secondary containment requirements of 112.8(c)(2). However, OFOE is subject to the general secondary containment requirements of 112.7 (b) and (c) which is calculated based on volume and flow rate of the most likely release of oil from the OFOE. 40 CFR 112.7 (c) requires that general secondary containment be provided for the most likely quantity of oil that would be released from OFOE unless the facility meets the qualification criteria and chooses to implement alternate requirements for qualified OFOE in lieu of general secondary containment.

NSA HR Headquarters meets the qualification criteria as defined in §112.7(k)(1) and elects to employ the alternate requirements to secondary containment for all OFOE as defined by §112.7(k)(2). The alternate requirements are: (i) establish and document the facility procedures for inspections or a monitoring program to detect equipment failure and/or a discharge; and (ii) unless you have submitted a response plan under §112.20, provide in your SPCC Plan the following: (A) An oil spill contingency plan following the provisions of part 109 of this chapter; (B) A written commitment of manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful.

As part of the alternate requirements to secondary containment, OFOE must be covered by an inspection plan or monitoring program as defined by §112.7(k)(2)(i). The OFOE inspection procedure used by NSA HR Headquarters is included as Appendix H. Any discharges noted during inspections or during routine maintenance by NSA HR PWD Utilities personnel would be immediately addressed in accordance with the discharge response instructions in Section 6 of this SPCC Plan.

NSA HR Headquarters is not required to have an FRP. NSA HR Headquarters operations are located in very close proximity to Naval Station Norfolk, and spill response personnel, equipment, and procedures will be consistent with those described in the Consolidated Regional FRP. The same resources will be used at NSA HR Headquarters. A written commitment of resources required to expeditiously control and remove any quantity of oil discharged that may be harmful is provided by the Management Approval signature on page vii of this SPCC Plan.

Any OFOE owned, operated, and maintained by a public utility company at all contiguous and noncontiguous areas covered by this NSA HR Headquarters SPCC Plan is not included in this SPCC Plan. Public utility companies are responsible for any response and clean-up actions of their equipment, to include notification of federal, state, and local authorities in the event of an

incident involving their equipment. In the event of an emergency involving public utility company equipment, immediately notify the Emergency Communications Center (ECC) / Emergency Dispatch at (757) 444-3333. The ECC will notify the public utility company for response and will deploy Navy response assets for immediate response if required.

6.0 DISCHARGE RESPONSE

This section describes the response and cleanup procedures in the event of an oil discharge.

Table 2 contains basic response contacts and phone numbers.

Table 2. Emergency Contacts

Navy Emergency Contacts	**Phone Number**
Naval Station Norfolk (NSN) ECC / Emergency Dispatch	(757) 444-3333 (24 hr)
NSN Command Duty Officer	(757) 322-2366
NSA HR Command Duty Officer	(757) 438-3402
NSN Port Operations	(757) 444-1121/1756
NSN Safety Manager	(757) 433-2538
NSN Public Affairs Officer	(757) 836-1484
Navy On-Scene Coordinator (NOSC)	(757) 341-0449
NAVFAC Facility Response Team	(757) 444-7528 / 650-4147/8
NAVFAC HW Regional Spill Manager	(757) 341-0390
Technical Support Department Tank Program Manager Director	 (757) 341-0391 (Day) (757) 341-0381 (Day)
Naval Support Activity Hampton Roads Headquarters (IEPD	(757) 836-1862
NSA HR PWD Oil Recovery Office	(757) 341-0460 or (757) 341-1909 (757) 650-4148 after hours Duty Foreman
Non-Navy Emergency Contacts	**Phone Number**
National Response Center	(800) 424-8802 (24 hr)
EPA Region 3	(800) 438-2474 (215) 814-5122
USCG Sector Hampton Roads	(757) 668-5571 (24 hr)
Hampton Roads Sanitation District	(757) 460-3200 (24 hr)
Virginia Department of Environmental Quality Tidewater Regional Office	(757) 518-2000 (M-F 0830-1700)
Virginia Department of Emergency Management	1-800-468-8892 (24 hr)
Norfolk Department of Emergency Services	(757) 441-5600
Norfolk Fire Department HAZMAT Team	(757) 441-2536
Norfolk Utilities Department Emergency	(757) 823-1000 (24 hr)

Commercial response contractors are activated by contacting the NOSC at (757) 636-4378. The NOSC is called by the Command Duty Officer as warranted.

6.1 Discharge Prevention Measures

§112.7(a)(3) Describe in your Plan …

(ii) Discharge prevention measures including procedures for routine handling of products (loading, unloading, and facility transfers, etc.);

NSA HR Headquarters personnel follow written procedures for routine transfer of products as a key element of discharge prevention. These procedures are periodically reviewed and updated as needed to reflect best management practices, equipment changes, or other aspects that may contribute to spill prevention. Appendix E provides the Fuel Handling Standard Operating Procedure, which describes discharge prevention measures associated with routine product handling procedures.

6.2 Discharge or Drainage Controls

§112.7(a)(3) Describe in your Plan …

(iii) Discharge or drainage controls such as secondary containment around containers and other structures, equipment, and procedures for the control of a discharge;

Refer to the site-specific information sheets and site maps in Section 5.2.1 of this SPCC Plan for a description of the containment or diversionary structures and discharge or drainage controls at each storage tank facility. Section 5.2.2 and Section 5.2.3 contain information on secondary containment for drum storage areas and portable container storage areas, respectively. OFOE is addressed in Section 5.2.4 of this SPCC Plan.

6.3 Discharge Discovery Countermeasures

§112.7(a)(3) Describe in your Plan …

(iv) Countermeasures for discharge discovery, response, and cleanup (both the facility's capability and those that might be required of a contractor);

Immediate action must be taken to control, contain, and recover discharged product. Refer to tables with each datasheet for a summary of countermeasures for specific discharge discovery, response, and cleanup scenarios for each AST, UST, and drum and portable container storage area. See Section 6.0 for notification contact information.

6.3.1 Spill Notification Procedures

The immediate reporting of oil spill events is paramount to minimizing possible damage to the environment, health, and property. For purposes of spill notification, a spill event is defined as a discharge of oil into a berm, onto the ground, or onto the navigable waters of the United States. The initial oil spill report must not be delayed obtain in order to obtain more detailed information. Upon identification of an oil spill incident, the following actions shall be initiated unless otherwise instructed:

1. Notify the Naval Station Norfolk ECC / Emergency Dispatch at (757) 444-3333.

2. Emergency Dispatch will notify the Naval Station Norfolk Facility Response Team (FRT) to include Command Duty Officer (CDO), Environmental, Fire Department, and other responders as needed (NOSC for oil spills > 100 gallons).

3. The command / tenant responsible for the spill will send out all internal Navy correspondence as required by Navy policy.

4. Emergency Dispatch will perform the initial NRC notification as required.

5. NSA HR PWD Environmental Department will send out all other regulatory correspondence as required by state and federal regulations.

6.3.2 Information To Report

Upon discovery of a spill, the following information should be provided to the Emergency Dispatch Operator:

1. The product/material released.

2. Quantity released. Provide an estimate if exact amount is unknown and clearly convey that it is an estimate.

3. The location of the spill (building number and tank number if known) and if it has entered a waterway or storm drain or if entry is imminent.

4. The source of the spill and the root cause if known.

5. Is the source secured?

6. Is the spill contained?

7. Cleanup actions already underway.

6.3.3 Initial Spill Discovery Actions

The following are immediate actions to take before response personnel arrive if safe to do so:

1. Secure the source and all activities related to the release.

2. Warn personnel in the immediate area.

3. Turn off nearby ignition sources.

4. Contain the spill if possible with containment devices from spill kits.

5. Cover or protect nearby storm drains or divert the spill from waterways using dikes or man-made berms.

6.3.4 Spill Response Procedures

In the event of an oil spill, the following response activities will be followed:

1. Following notification to the Naval Station Norfolk ECC / Emergency Dispatch by the spill identifier, the Fire Department Initial Response Team will be dispatched to the scene to assess the spill. The Emergency Dispatch will notify the NSA HR PWD Environmental Department.

2. The Emergency Dispatch will perform any required notification to the NRC, and the NSA HR PWD Environmental Department will make other required spill notifications to state and local agencies.

3. Once on scene, the senior official of the first response unit (Fire Department) shall function as the Facility Incident Commander (FIC) until relieved by a higher qualified response person. The FIC is the Navy representative designated to coordinate and direct control and clean-up efforts at the scene of an oil spill.

4. The FIC shall assess the situation and determine what assistance, if any, is needed from NSA HR PWD or contractor spill response personnel identified in Section 6.5. The scene shall be assessed to determine if any natural resources or municipal services are at risk due to the spill. If there is a risk, the appropriate personnel will be contacted. Refer to the Important Emergency Contacts listed in Section 6.0.

5. If assistance from a commercial contractor is required, the FIC shall contact the NOSC to make the necessary arrangements. The NOSC will be notified on all petroleum spills greater than 100 gallons.

6.4 Spill Response Capability

NSA HR Headquarters has access to both NSA HR PWD (Navy) and outside spill response personnel and equipment for handling an oil spill. The NSA HR PWD Oil Recovery Team maintains a full-time staff of oil spill response personnel and equipment capable of containing and cleaning up an oil spill. Should additional assistance be required, NSA HR PWD can call upon other local naval facilities spill response equipment and personnel. Should it be necessary to obtain the services of a commercial contractor, NSA HR Headquarters maintains the ability to obtain assistance as required for oil spill recovery and cleanup.

Contacts for spill response assistance are listed below:

- Primary: NSA HR PWD:
    - NSA HR PWD Oil Recovery Team: (757) 341-0460 (0730-1600)
    - Naval Station Norfolk CDO: (757) 322-2366
    - NSA HR Headquarters CDO: (757) 438-3402

The NOSC shall provide commercial spill response contract support as needed.

Table 3. Typical Spill Response Assets Readily Available at Naval Station Norfolk

Equipment	Unit	Oil Recovery Naval Station Norfolk
Absorbent Material	Bag	100
Boom, Response	Feet	8,000
Boom, Permanent	Feet	1,500
Boat, Utility	Each	2
Boat, Boston Whaler	Each	2
Boat, Flattop, Work	Each	1
Boat, Platform	Each	4
Cleaner, Boom	Each	2
Forklift, 6000 pounds	Each	1
Generator, Diesel	Each	2
Lighting, Portable	Set	1
Mobile Van, Maintenance	Each	1
Mooring System	Each	4
Pads, Sorbent	Bundle	100
Pump, Diaphragm	Each	1
Skimmer, Rapid Response	Each	3
Skimmer, Portable Weir	Each	1
Tank, Storage	Each	7
Tank, 2000 gallon	Each	5
Tank, 10,000 gallon	Each	1
Tanker, 5000 gallon	Each	5
Tanker, Vacuum, 6000 gallon	Each	7
Tractor Truck, 15 ton	Each	2
Truck, Pump	Each	3
Truck, Stake-bed, 7 ton	Each	1
Truck, Vacuum 1800 gallon	Each	2
Truck, Vacuum 1300 gallon	Each	2
Truck, Vacuum 2500 gallon	Each	1
Truck, 1/2 ton	Each	2
Washer, high pressure	Each	2
Work Platform	Each	1

Note: Deployment time for obtaining the equipment listed above is less than 1 hour for equipment based at Naval Station Norfolk. The equipment listed above is representative of the types and quantities of oil spill response equipment maintained by NSA HR PWD Oil Recovery. To obtain an up-to-date listing of available equipment, contact the NSA HR PWD Oil Recovery office at (757) 341-0460.

6.5 Methods of Disposal of Recovered Material

§112.7(a)(3) Describe in your Plan …

(v) Methods of disposal of recovered materials in accordance with applicable legal requirements;

Recovered oil and spill materials will be disposed of in accordance with Virginia Solid Waste Management Regulations 9VAC20-80 or Virginia Hazardous Waste Management Regulations 9VAC20-60 and federal solid or hazardous waste regulations as appropriate. NSA HR PWD Hazardous Waste Program Managers and NSA HR PWD Oil Recovery personnel will determine the appropriate disposal method for recovered oil and debris.

CAUTION: DO NOT MIX NON-HAZARDOUS WASTES WITH HAZARDOUS WASTES. MINIMIZE HAZARDOUS WASTES GENERATED.

The types of waste NSA HR Headquarters may generate as a result of a spill response include:

- Hazardous and state-regulated wastes
- Fresh oil, oily wastes, and weathered oil
- Oil and water emulsions
- Oil-contaminated wastes such as:
  - Spent sorbents
  - Oil-contaminated debris and materials such as disposable personal protective equipment, rags, plastic bags or sheets, etc.
  - Oiled vegetation, soil, and sand if onshore cleanup operations occur in the response
  - Oil-contaminated wildlife carcasses
  - Waste decontamination solutions and effluents from decontamination operations
  - Non-contaminated wastes from response operations

NSA HR PWD Environmental Natural Resources personnel will coordinate disposition of contaminated wildlife and carcasses.

6.6 Post Discharge Review Procedures for NSA HR Headquarters

Each release will be evaluated by the responsible activity / tenant as well as the NSA HR Headquarters Environmental Protection Specialist, Fire Department, and XO / CO to determine the nature of the release, ensure all required notifications are made, and assess the effectiveness of response actions. When a problem is noted, corrective actions will be initiated to better prepare for or prevent any future discharge.

In accordance with 40 CFR 112.4, a report shall be submitted to the EPA Region 3 Administrator by the NSA HR PWD Spill Program Manager whenever the facility has discharged more than 1,000 gallons of oil in a single discharge, as described in §112.1(b), or discharged more than 42 gallons of oil in each of two discharges, as described in §112.1(b), occurring within any twelve month period. The report shall include the following information:

1. Facility name

2. Name of individual filing report

3. Facility location

4. Maximum storage or handling capacity of the facility and normal daily throughput

5. Corrective action and countermeasures taken, including a description of equipment repairs and replacements

6. An adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary

7. The cause of such discharge as described in §112.1(b), including a failure analysis of the system or subsystem in which the failure occurred

8. Additional preventive measures you have taken or contemplated to minimize the possibility of recurrence

9. Such other information as the Regional Administrator may reasonably require pertinent to the SPCC Plan or discharge

Appendix A: Storage Tank Management Plan

Naval Support Activity Hampton Roads Headquarters

This appendix was deleted in Amendment 1 because NSA HR HQ is covered in the Regional STMP.

Appendix B: SPCC Deficiencies

The following table lists observations of outstanding SPCC deficiencies and recommended corrective actions. Any actions corrected during the review period are not included.

Naval Support Activity Hampton Roads Headquarters SPCC Plan Deficiency List

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-BallField-AST-01A (Added in Amendment 1)	Best Management Practice	1. Tank is currently out of operation and not properly closed and may be intended for permanent closure.	1. Recommend permanently closing tank in accordance with SPCC regulations.
	40 CFR 112.8(c)(6)	2. No ID number posted on tank.	2. Properly close tank or post ID number on tank.
	NFPA Code 704	3. NFPA Hazard Diamond missing.	3. Properly close tank or install NFPA Hazard Diamond.
	NFPA 30 Chapter 27.6.4	4. Rust on tank fittings.	4. Properly close tank or remove rust and paint fittings
	NFPA 30 Chapter 27.4.3.2	5. Tank is equipped with PVC plugs in unused tank openings. Tank must be made of noncombustible materials.	5. Properly close tank or replace low melting point materials with steel plugs.
	NFPA 30 Chapter 6.5.4.2	6. Ground strap is disconnected.	6. Properly close tank or attach ground strap to tank or verify that tank is adequately grounded.
	40 CFR 112.8(c)(8)	7. Level gauge is opaque and needs to be replaced.	7. Properly close tank or replace level gauge
	NFPA 30 Chapter 22.11.4.5	8. Double-walled tanks must have an overfill alarm at 90% capacity. This tank does not have an overfill alarm.	8. Properly close tank or install overfill alarm.
	NFPA 30 Chapter 22.15	9. Tank must have vehicle protection. Bollards are not installed for the tank.	9. Properly close tank or install vehicle protection (bollards or jersey barriers). Use installation requirements in NFPA 30 4.3.7.2 as a guide.
NSA HQ-BallField-AST-01B (Added in Amendment 1)	Best Management Practice	1. Tank is currently out of operation and not properly closed and may be intended for permanent closure.	1. Recommend permanently closing tank in accordance with SPCC regulations
	40 CFR 112.8(c)(6)	2. No ID number posted on tank.	2. Properly close tank or post ID number on tank.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-BallField-AST-01B (Added in Amendment 1) (continued)	NFPA Code 704	3. NFPA Hazard Diamond missing.	3. Properly close tank or install NFPA Hazard Diamond.
	Best Management Practice	4. Capacity not labeled on tank.	4. Properly close tank or add label showing capacity of tank.
	NFPA 30 Chapter 27.6.4	5. Rust on tank fittings.	5. Properly close tank or remove rust and paint fittings
	NFPA 30 Chapter 27.4.3.2	6. Tank is equipped with PVC plugs in unused tank openings. Tank must be made of noncombustible materials.	6. Properly close tank or replace low melting point materials with steel plugs.
	NFPA 30 Chapter 6.5.4.2	7. Ground strap is disconnected.	7. Properly close tank or attach ground strap to tank or verify that tank is adequately grounded.
	40 CFR 112.8(c)(8)	8. Level gauge is opaque and needs to be replaced.	8. Properly close tank or replace level gauge.
	NFPA 30 Chapter 22.11.4.5	9. Double-walled tanks must have an overfill alarm at 90% capacity. This tank does not have an overfill alarm.	9. Properly close tank or install overfill alarm.
	NFPA 30 Chapter 22.15	10. Tank must have vehicle protection. Bollards are not installed for the tank.	10. Properly close tank or install vehicle protection (bollards or jersey barriers). Use installation requirements in NFPA 30 4.3.7.2 as a guide.
NSA HQ-BEN154-AST-01	NFPA 30 Chapter 22.15 NFPA 30A Chapter 6.5.1 (2015 editions)	1. Dispenser hose is on the ground and not protected by bollards. Hose must be secured to protect it from damage.	1. Keep dispenser hose off the ground and within protection of the bollards when not in use.
	NFPA 30 Chapter 21.8.6 (2015 Edition)	2. Concrete shell is crazed.	2. Seal cracks in concrete shell to protect secondary containment liner.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-BEN154-AST-01 (continued)	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	3. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	3. Existing vent whistle meets requirement for overfill alarm. Install flow restrictor on tank.
~~NSA HQ-BEN154-AST-02~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(2)~~	~~1. Single wall tank with no effective secondary containment.~~	~~1. Provide appropriate sized secondary containment and/or diversionary structure per 112.8(c)(2).~~
	~~40 CFR 112.8(c)(8)~~	~~2. Level gauge missing. No overfill prevention device provided.~~	~~2. Install direct vision level gauge or other means of overfill prevention per 112.8(c)(8).~~
	~~40 CFR 112.8(c)(10)~~	~~3. Oil residue and absorbent pad left on tank top from minor releases during filling.~~	~~3. Remove oil residue from all exterior surfaces of tank. Remove absorbent pad.~~
	~~40 CFR 112.8(c)(6)~~	~~4. Minor corrosion on tank top.~~	~~4. Treat corrosion and paint tank.~~
	~~NFPA 30 Chapter 22.7.1.1 (2015 edition)~~	~~5. No emergency vent installed on primary tank.~~	~~5. Install properly sized UL-listed emergency vent on primary tank in nozzle currently plugged.~~
NSA HQ-CA6-AST-05	NFPA 30 Chapter 6.5.4.2 (2015 edition)	1. No ground strap found.	1. Attach ground strap to tank or verify that tank is adequately grounded.
	NFPA 30 Chapter 21.6.6.3 (2015 edition)	2. Lumber stored behind and up against tank and debris on tank top surface. Area around tank shall be kept free of unnecessary combustible materials.	2. Remove lumber from behind tank and debris from tank top surface.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-CA6-AST-05 (continued)	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	3. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	3. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.
	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	4. No emergency vent installed on interstitial space.	4. Install properly sized UL-listed emergency vent on interstitial space.
NSA HQ-CA501-AST-01	40 CFR 112.8(c)(6)	1. Two ID numbers posted on tank.	1. Remove old sign CA-501-A from tank so inspection records can be maintained.
	NFPA Code 704	2. NFPA Hazard Diamond missing.	2. Install NFPA Hazard Diamond.
	40 CFR 112.8(c)(10)	3. Absorbent pads in spill bucket from minor releases during filling.	3. Remove absorbent pads and any fuel residue from spill bucket.
	NFPA 30 Chapter 22.15 (2015 edition)	4. Tank must have vehicle protection.	4. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	NFPA 30 Chapter 22.4.2.1 (2015 edition)	5. Minimum tank separation of 36 inches not maintained for Class I and Class II liquids.	5. Relocate tank(s) to provide minimum separation of 36 inches.
	NFPA 30 Chapter 22.15 NFPA 30A Chapter 6.5.1 (2015 editions)	6. Dispenser hose is on the ground and not protected by bollards. Hose must be secured to protect it from damage.	6. Keep dispenser hose off the ground and within protection of the bollards when not in use.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	7. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	7. Existing vent whistle meets requirement for overfill alarm. Install flow restrictor on tank.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-CA501-AST-01 (continued)	NFPA 30 Chapter 21.4.3.9 (2015 Edition)	8. Pressure-vacuum vent is required. Tanks storing Class 1B liquid (gasoline) require closed normal vents, except when venting under pressure or vacuum conditions.	8. Install a pressure-vacuum vent on normal vent.
	Best Management Practice	9. Sign showing contents is damaged.	9. Replace sign showing contents.
NSA HQ-CA501-AST-02	40 CFR 112.8(c)(6)	1. Two ID numbers posted on tank.	1. Remove old sign CA-501-B from tank so inspection records can be maintained.
	40 CFR 112.8(c)(10)	2. Absorbent pad in spill bucket from minor releases during filling.	2. Remove absorbent pad and any fuel residue from spill bucket.
	NFPA 30 Chapter 22.15 (2015 edition)	3. Tank must have vehicle protection.	3. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	NFPA 30 Chapter 22.4.2.1 (2015 edition)	4. Minimum tank separation of 36 inches not maintained for Class I and Class II liquids.	4. Relocate tank(s) to provide minimum separation of 36 inches.
	NFPA 30 Chapter 22.15 NFPA 30A Chapter 6.5.1 (2015 editions)	5. Dispenser hose is on the ground and not protected by bollards. Hose must be secured to protect it from damage.	5. Keep dispenser hose off the ground and within protection of the bollards when not in use.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	6. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	6. Install alarm and flow restrictor on tank.
	NFPA 30 Chapter 21.8.6 (2015 Edition)	7. Concrete shell is crazed.	7. Seal cracks in concrete shell to protect secondary containment liner. Top of concrete shell is already sealed.
NSA HQ-CA501-AST-03	40 CFR 112.8(c)(6)	1. Two ID numbers posted on tank.	1. Remove old sign CA-501-C from tank so inspection records can be maintained.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-CA501-AST-03 (continued)	40 CFR 112.8(c)(10)	2. Two oil filters left in spill bucket.	2. Remove oil filters in a timely manner from spill bucket after draining.
	NFPA 30 Chapter 22.15 (2015 edition)	3. Tank must have vehicle protection.	3. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	NFPA 30 Chapter 22.7.1.1 (2015 edition)	4. No emergency vent installed on primary tank.	4. Install properly sized UL-listed emergency vent on primary tank.
	NFPA 30 Chapter 22.4.2.1.2 (2015 edition)	5. Minimum tank separation of 36 inches not maintained - applicable for used oil because within drainage path of tanks storing Class I and Class II liquids.	5. Relocate tank(s) to provide minimum separation of 36 inches.
~~LR-H-AST-04~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(2)~~	~~1. Single wall tank with no effective secondary containment.~~	~~1. Provide appropriate sized secondary containment and/or diversionary structure per 112.8(c)(2).~~
	~~40 CFR 112.8(c)(6)~~	~~2. ID label posted on tank is LRA-LR-H-AST-04.~~	~~2. Change ID label to LR-H-AST-04 so inspection records can be maintained.~~
	~~NFPA 30 Chapter 22.7.1.1 (2015 edition)~~	~~3. No emergency vent installed on primary tank.~~	~~3. Install properly sized UL-listed emergency vent on primary tank if sufficiently sized nozzle available (e.g., plugged nozzle labeled tank overflow).~~
	~~NFPA 20 Chapter 4.14.1.1 (2015 Edition)~~	~~4. Copper tubing used for tank overflow return line where labeled "Tank Vent". Copper piping is prohibited for fire pump tank application.~~	~~4. Replace copper tubing with steel piping, and remove "Tank Vent" label.~~
LR-H-AST-05 (Added in Amendment 1)	NFPA 30 Chapter 6.5.4.2	1. No ground strap was found.	1. Attach ground strap to tank or verify that tank is adequately grounded.

Tank Number	Citation	Finding	Recommended Corrective Action
LR-H-AST-05 (Added in Amendment 1) (continued)	Best Management Practice	2. 90-degree elbows of the normal vent need to slant back.	2. Install the 90-degree elbows on the normal vent that allow for it to slant back.
	NFPA 20 Chapter 11.4.1.6	3. Normal vent and emergency vent for primary tank do not terminate outside of the building as required for a Class II liquid (diesel).	3. Install metal piping such that the properly marked UL-listed normal vent and emergency vent on primary tank terminate outside of the building.
	NFPA 20 Chapter 11.4.1.6	4. Emergency vent on secondary tank is vented indoors.	4. Install metal piping such that the properly marked UL-listed emergency vent on secondary tank terminates outside of the building.
	NFPA 20 Chapter 11.4.1.2.1	5. The fuel supply tanks are required to be reserved exclusively for the fire pump diesel engine. This tank serves a fire pump diesel engine and an emergency generator.	5. Configure tank to exclusively supply the fire pump diesel engine.
	NFPA 20 Chapter 11.4.1.4.	6. Fire pump supply tanks are to be securely mounted on noncombustible supports. Tank is not located on supports.	6. Install tank on supports.
LR-H-UST-01	NFPA 30 Chapter 23.3.5 (2015 Edition)	1. Significant corrosion of metal components in sump.	1. Remove rust; consider using corrosion-resistant materials or systems in sump.
	Best Management Practice	2. Due to proximity of storm drain active measure deployment required prior to fuel transfers.	2. Require spill mat cover on storm drain prior to beginning fuel transfers; remove mat after fuel transfers are completed.
LR-H-UST-02	NFPA 30 Chapter 23.3.5 (2015 Edition)	1. Significant corrosion of metal components in sump.	1. Remove rust; consider using corrosion-resistant materials or systems in sump.

Tank Number	Citation	Finding	Recommended Corrective Action
LR-H-UST-02 (continued)	Best Management Practice	2. Due to proximity of storm drain active measure deployment required prior to fuel transfers.	2. Require spill mat cover on storm drain prior to beginning fuel transfers; remove mat after fuel transfers are completed.
LR-H-UST-03	Fully regulated under 40 CFR 280	1. Water accumulated in sump.	1. Remove water from sump. Investigate water intrusion source.
	Fully regulated under 40 CFR 280	2. Due to proximity of storm drain active measure deployment required prior to fuel transfers.	2. Require spill mat cover on storm drain prior to beginning fuel transfers; remove mat after fuel transfers are completed.
NSA HQ-MCA612-AST-04	NFPA 30 Chapter 21.4.1 (2015 edition)	1. Tank is equipped with PVC plugs in unused tank openings. Tank must be noncombustible materials.	1. Replace low melting point materials with steel plugs.
	40 CFR 112.8(c)(10)	2. Spill bucket lids very rusty, and one spill bucket contains oil filters/debris.	2. Remove rust; paint lids. Remove oil filters/debris in a timely manner from spill bucket after draining.
	NFPA 30 Chapter 22.15 (2015 edition)	3. Tank must have vehicle protection.	3. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
NSA HQ-MCE1-AST-01	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	1. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	1. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.
	NFPA 30 Chapter 22.15 (2015 edition)	2. Tank must have vehicle protection.	2. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-MCE224-AST-05	40 CFR 112.8(c)(10)	1. Oil residue on tank top from release during filling and oil filters in spill bucket.	1. Remove oil residue from all exterior surfaces of tank. Remove oil filters in a timely manner from spill bucket after draining. Consider installing platform.
	NFPA Code 704	2. NFPA Hazard Diamond missing.	2. Install NFPA Hazard Diamond.
	NFPA 30 Chapter 22.15 (2015 edition)	3. Tank must have vehicle protection.	3. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	40 CFR 112.8(c)(10)	4. Oil in vacuum port spill box, and improper cap on port.	4. Remove standing oil from spill box, and install proper cap on vacuum port.
NSA HQ-MCE224-UST-06	Fully regulated under 40 CFR 280	No issues noted.	No corrective actions.
NSA HQ-MCE224-UST-07	Fully regulated under 40 CFR 280	No issues noted.	No corrective actions.
NSA HQ-MCE224-UST-08	Fully regulated under 40 CFR 280	No issues noted.	No corrective actions.
~~A HQ-NH8-AST-01~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(2)~~	~~1. Single wall tank with no effective secondary containment.~~	~~1. Provide appropriate sized secondary containment and/or diversionary structure per 112.8(c)(2).~~
	~~NFPA 30 Chapter 22.7.1.1 (2015 edition)~~	~~2. No emergency vent installed on primary tank. Two normal vents vented inside of building.~~	~~2. Install properly sized UL-listed emergency vent on primary tank in place of one normal vent. Route other normal vent outside of building.~~
	~~40 CFR 112.8(c)(10)~~	~~3. Absorbent pads placed around fill port area.~~	~~3. Remove absorbent pads whenever they contain spilled fuel.~~
	~~NFPA 30 Chapter 21.6.6.3 (2015 edition)~~	~~4. Four plastic bottles stored next to tank. Area around tank shall be kept free of unnecessary combustible materials.~~	~~4. Remove plastic bottles from area around tank.~~
	~~NFPA 30 Chapter 6.5.4.2 (2015 edition)~~	~~5. No ground strap found.~~	~~5. Attach ground strap to tank or verify that tank is adequately grounded.~~

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH8-AST-02	NFPA 30 Chapter 22.7.1.1 (2015 edition)	1. No emergency vent installed on primary tank.	1. Install properly sized UL-listed emergency vent on primary tank.
	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	2. No emergency vent installed on interstitial space.	2. Install properly sized UL-listed emergency vent on interstitial space in place of plug.
	NFPA 30 Chapter 21.4.3.1 (2015 edition)	3. No normal vent on tank.	3. Install normal vent on tank; vent outside of building.
	NFPA 30 Chapter 21.4.1 (2015 edition)	4. Two unused openings still have plastic shipping plugs.	4. Replace low melting point materials with steel plugs.
	40 CFR 112.8(c)(6)	5. Interstitial leak detection sensor not wired and no ATG. Leak detection monitoring is not taking place.	5. Provide a compliant leak detection system.
	40 CFR 112.8(c)(6)	6. Corrosion on back outer tank shell.	6. Treat corrosion and paint tank.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	7. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	7. Install alarm and flow restrictor on tank.
	NFPA 30 Chapter 6.5.4.2 (2015 edition)	8. No ground strap found.	8. Attach ground strap to tank or verify that tank is adequately grounded.
NSA HQ-NH8-AST-03	NFPA 30 Chapter 22.7.1.1 (2015 edition)	1. No emergency vent installed on primary tank.	1. Install properly sized UL-listed emergency vent on primary tank.
	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	2. No emergency vent installed on interstitial space and vent nozzle open to atmosphere.	2. Install properly sized UL-listed emergency vent on interstice where vent nozzle is open to atmosphere backside of tank.
	NFPA 30 Chapter 21.4.3.1 (2015 edition)	3. No normal vent on tank.	3. Install normal vent on tank; vent outside of building.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH8-AST-03 (continued)	NFPA 30 Chapter 21.4.1 (2015 edition)	4. Three unused openings still have plastic shipping plugs.	4. Replace low melting point materials with steel plugs or required vents.
	40 CFR 112.8(c)(6)	5. Interstitial leak detection sensor not wired to a monitoring system. Leak detection monitoring is not taking place.	5. Provide a compliant leak detection system.
	40 CFR 112.8(c)(6)	6. Corrosion on back outer tank shell.	6. Treat corrosion and paint tank.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	7. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	7. Install alarm and flow restrictor on tank.
	NFPA 30 Chapter 6.5.4.2 (2015 edition)	8. No ground strap found.	8. Attach ground strap to tank or verify that tank is adequately grounded.
NSA HQ-NH8-AST-04 (Added in Amendment 1)	NFPA 30 Chapter 24.1.1, 24.13.5	1. Emergency vents for both the primary tank and secondary tank do not terminate outside of the building as required for a Class II liquid (diesel).	1. Install metal piping such that the properly marked UL-listed primary tank and secondary tank emergency vent terminates outside of the building.
	NFPA 30 Chapter 24.1.1, 24.13.5	2. Normal vent on primary tank does not terminate outside of the building as required for a Class II liquid (diesel).	2. Install metal piping such that the properly marked UL-listed primary tank normal vent terminates outside of the building.
	NFPA 30 Chapter 24.14.7	3. Tank is filled inside the building. Fill port for tanks located inside buildings must be located on the exterior of the building.	3. Install correct filling mechanism in accordance with all provisions of NFPA 30 Chapter 24.14.7.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH8-AST-04 (Added in Amendment 1) (continued)	NFPA 30 Chapter 22.11.4.5	4. Double-walled tanks must have an overfill alarm at 90% and an automatic fuel-flow shutoff device mechanism at 95% capacity. This tank does not have an overfill alarm and automatic fuel-flow shutoff mechanism.	4. Install overfill alarm fuel-flow shutoff mechanism on tank.
	NFPA 30 Chapter 21.6.6.3	5. Plastic anti-freeze container, a combustible material, is located on the tank.	5. Remove the plastic antifreeze container and any other combustible material from tank.
NSA HQ-NH12-AST-01	NFPA Code 704	1. NFPA Hazard Diamond missing.	1. Install NFPA Hazard Diamond.
	Best Management Practice	2. Stairs/platform needed to safely fill the tank.	2. Install stairs/platform to provide safe access for filling tank.
	NFPA 30 Chapter 27.6.6.1 (2015 Edition)	3. Tank drain valve and isolation valves are globe valves. These must be ball valves.	3. Replace tank drain valve and isolation valves with ball valves.
	NFPA 30 Chapter 27.6.6.1 (2015 Edition)	4. Return line has a globe valve. Must be a ball valve with the handle removed.	4. Replace return line valve with a ball valve with handle removed.
	40 CFR 112.8(c)(3)	5. Berm drain valve should have lock.	5. Install lock on berm drain valve.
	NFPA 30 Chapter 27.6.6.3 (2015 Edition)	6. Fuel supply line requires a check valve to protect against backflow.	6. Confirm that fuel supply line has a check valve. If not, install check valve.
NSA HQ-NH19-AST-07	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	1. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity. Tank does not have high level alarm.	1. Install high level alarm on tank.
	Best Management Practice	2. Capacity not labeled on tank.	2. Add label showing capacity of tank.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH26-AST-01	NFPA 30 Chapter 21.8.6 (2015 Edition)	1. Tank outer shell is corroded.	1. Remove rust from outer shell.
	NFPA 30 Chapter 21.4.3.2 (2015 Edition)	2. Two normal vents and two emergency vent stacks exit the building roof. The interstitial space should not have a normal vent.	2. Remove normal vent from interstitial space.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	3. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	3. Install alarm and flow restrictor on tank.
	NFPA 30 Chapter 21.6.6.3 (2015 edition)	4. Plastic containers on tank. Area around tank shall be kept free of unnecessary combustible materials.	4. Remove plastic containers from tank top surface.
NSA HQ-NH31-AST-02	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	1. No emergency vent installed on interstitial space.	1. Install properly sized UL-listed emergency vent on interstice.
	NFPA 30 Chapter 22.15 (2015 edition)	2. Tank must have vehicle protection. New gravel road beside generator.	2. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	NFPA 30 Chapter 6.5.4.2 (2015 edition)	3. No ground strap found.	3. Attach ground strap to tank or verify that tank is adequately grounded.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	4. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	4. Install alarm and flow restrictor on tank.
	NFPA 30 Chapter 21.6.6.3 (2015 edition)	5. Tank top is covered in debris, making leak detection or spill removal difficult. Area around tank shall be kept free of unnecessary combustible materials.	5. Remove debris from tank top.
	NFPA 30 Chapter 21.8.6 (2015 Edition)	6. Tank outer shell has significant corrosion.	6. Remove corrosion from tank outer shell.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH31-AST-03	NFPA 30 Chapter 22.15 (2015 edition)	1. Tank must have vehicle protection. New gravel road beside generator.	1. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	NFPA 30 Chapter 21.4.1 (2015 edition)	2. Plastic breather cap used for normal vent.	2. Replace low melting point materials with steel. Install proper normal vent.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	3. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	3. Install alarm and flow restrictor on tank.
	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	4. Emergency vents on primary tank and interstice are not UL-listed or properly labeled.	4. Install properly sized UL-listed emergency vents on primary tank and interstice.
NSA HQ-NH31-AST-04	NFPA 30 Chapter 22.15 (2015 edition)	1. Tank must have vehicle protection. New gravel road beside generator.	1. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	NFPA 30 Chapter 21.4.1 (2015 edition)	2. Plastic breather cap used for normal vent.	2. Replace low melting point materials with steel. Install proper normal vent.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	3. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	3. Install alarm and flow restrictor on tank.
	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	4. Emergency vents on primary tank and interstice are not UL-listed or properly labeled.	4. Install properly sized UL-listed emergency vents on primary tank and interstice.
NSA HQ-NH31-AST-05	112.8(c)(6) Best Management Practice	1. New tank that requires label showing tank ID, contents and capacity.	1. Install tank ID label so inspection records can be maintained. Install capacity and contents labels.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH31-AST-05 (continued)	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	2. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	2. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.
	NFPA 30 Chapter 22.15 (2015 edition)	3. Tank must have vehicle protection.	3. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
NSA HQ-NH32-AST-01	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	1. Emergency vents not UL listed or properly labeled.	1. Install properly sized UL-listed emergency vents.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	2. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	2. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.
NSA HQ-NH33-AST-01	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	1. Emergency vents not UL listed or properly labeled.	1. Install properly sized UL-listed emergency vents.
	NFPA 30 Chapter 21.6.6.3 (2015 edition)	2. Wood posts and table stored next to generator tank. Area around tank shall be kept free of unnecessary combustible materials.	2. Remove wood posts and table from area around tank.
	NFPA 30 Chapter 6.5.4.2 (2015 edition)	3. No ground strap found.	3. Attach ground strap to tank or verify that tank is adequately grounded.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	4. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	4. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH33-AST-01 (continued)	NFPA 30 Chapter 27.6.4 (2015 Edition)	5. Corrosion on nozzle plugs and caps has reached the point of requiring attention. Corrosion protection required.	5. Remove rust from nozzle plugs and caps.
NSA HQ-NH36-AST-01	NFPA 30 Chapter 22.7.1.1, 22.7.1.1.1, 21.4.3.1 (2015 edition)	1. No emergency vents or normal vent installed on tank.	1. Install properly sized UL-listed emergency vents and normal vent on tank, as required.
	40 CFR 112.8(c)(6)	2. Interstitial monitoring is not taking place.	2. Provide a compliant leak detection system.
	NFPA 30 Chapter 21.6.6.3 (2015 edition)	3. Oil container on the tank top. Area around tank shall be kept free of unnecessary combustible materials.	3. Remove oil container from tank top.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	4. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	4. Install alarm and flow restrictor on tank.
	40 CFR 112.8(c)(10)	5. Oil seepage from the primary tank drain.	5. Remove all oil residue from outside of tank at drain. Determine cause of oil seepage from drain, and address issue.
	40 CFR 112.8(c)(10)	6. Oil residue all over the tank top at the fill port.	6. Remove all oil residue from top of tank. Determine cause of oil residue (e.g., filling issue, engine maintenance, tank integrity), and address issue.
~~NSA HQ-NH41-AST-01~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(2)~~	~~1. Single wall tank with no effective secondary containment.~~	~~1. Replace tank or provide appropriate sized secondary containment and/or diversionary structure per 112.8(c)(2).~~

Tank Number	Citation	Finding	Recommended Corrective Action
~~NSA HQ-NH41-AST-01~~ (Removed in Amendment 1) (continued)	~~40 CFR 112.7(c)~~	~~2. Storm drain next to generator, meaning there may be insufficient time to deploy active measures after a spill.~~	~~2. Replace tank or require use of drain blockers on nearby storm drains throughout filling operations as part of active measures.~~
	~~NFPA 30 Chapter 22.7.1.1, 21.4.3.1 (2015 edition)~~	~~3. No emergency vent or normal vent installed on tank.~~	~~3. Replace tank or install properly sized UL-listed emergency vent and normal vent on tank, as required.~~
	~~NFPA 30 Chapter 6.5.4.2~~	~~4. No ground strap found.~~	~~4. Replace tank or attach ground strap to tank or verify that tank is adequately grounded.~~
	~~NFPA 30 Chapter 21.8.6 (2015 Edition)~~	~~5. Corrosion on top surface of tank.~~	~~5. Replace tank or repair corrosion.~~
NSA HQ-NH41-AST-02 (Repairs confirmed in Amendment 1)	~~NFPA 30 Chapter 22.7.1.1, 22.7.1.1.1, 21.4.3.1 (2015 edition)~~	~~1. No emergency vents or normal vent installed on tank.~~	~~1. Install properly sized UL-listed emergency vents and normal vent on tank, as required.~~
	40 CFR 112.7(c)	2. Storm drain next to generator, meaning there may be insufficient time to deploy active measures after a spill.	2. Require use of drain blockers on nearby storm drains throughout filling operations as part of active measures.
	~~40 CFR 112.8(c)(6)~~	~~3. Interstitial leak detection sensor not installed. Leak detection monitoring is not taking place.~~	~~3. Install leak detection system, as required.~~
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	4. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	4. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.
	~~40 CFR 112.8(c)(10)~~	~~5. Oily residue on tank top near fill port.~~	~~5. Clean oily residue from top of tank.~~

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH41-AST-03 (Added in Amendment 1)	NFPA 30 Chapter 22.11.4.5	1. Double-walled tanks must have an automatic fuel-flow shutoff device mechanism at 95% capacity. This tank does not have an automatic fuel-flow shutoff mechanism.	1. Install fuel-flow shutoff mechanism on tank.
	40 CFR 112.7(c)	2. Storm drain next to generator, meaning there may be insufficient time to deploy active measures after a spill.	2. Require use of drain blockers on nearby storm drains throughout filling operations as part of active measures.
NSA HQ-NH46-AST-01	NFPA 30 Chapter 21.4.1 (2015 edition)	1. PVC vent pipe connects to iron pipe from tank within generator cabinet. Tank must be noncombustible materials.	1. Replace low melting point PVC vent pipe with steel pipe.
	40 CFR 112.8(c)(6)	2. Minor corrosion on tank top.	2. Treat corrosion and paint tank.
	40 CFR 112.8(c)(6)	3. Interstitial leak detection sensor not installed. Leak detection monitoring is not taking place.	3. Install leak detection system, as required.
	NFPA 30 Chapter 6.5.4.2 (2015 edition)	4. No ground strap found.	4. Attach ground strap to tank or verify that tank is adequately grounded.
	NFPA 30 Chapter 22.15 (2015 edition)	5. Vehicle protection is required.	5. Install bollards in accordance with NFPA 30A 4.3.7.2 or other form of vehicle protection for tank.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	6. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	6. Install flow restrictor on tank. Tank already has overfill alarm.
	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	7. Emergency vents are not UL listed or properly labeled.	7. Install properly sized UL-listed emergency vents.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH74-AST-01	NFPA 30 Chapter 21.4.1 (2015 edition)	1. Plastic breather cap used for normal vent.	1. Replace low melting point materials with steel. Install proper normal vent.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	2. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	2. Install alarm and flow restrictor on tank.
	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	3. No emergency vent installed on interstitial space.	3. Install properly sized UL-listed emergency vent on interstitial space.
	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	4. Emergency vent on primary tank not UL listed or properly labeled.	4. Install properly sized UL-listed emergency vent on primary tank.
NSA HQ-NH75-AST-02	40 CFR 112.8(c)(6)	1. ID number posted on tank needs to be corrected from NS-NH75-AST-01.	1. Correct ID number on tank so inspection records can be maintained.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	2. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	2. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.
	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	3. No emergency vent installed on interstitial space.	3. Install properly sized UL-listed emergency vent on interstitial space.
NSA HQ-NH94-AST-06	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	1. Normal vent pipes for tank and interstice connected and routed outside building. Air and vapors from tank can enter interstice. Interstice only needs an emergency vent.	1. Replace normal vent pipe on interstice with a properly sized UL-listed emergency vent that discharges outside the building.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH94-AST-07	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	1. Normal vent pipes for tank and interstice connected and routed outside building. Air and vapors from tank can enter interstice. Interstice only needs an emergency vent.	1. Replace normal vent pipe on interstice with a properly sized UL-listed emergency vent that discharges outside the building.
NSA HQ-NH94-AST-08	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	1. Normal vent pipes for tank and interstice connected and routed outside building. Air and vapors from tank can enter interstice. Interstice only needs an emergency vent.	1. Replace normal vent pipe on interstice with a properly sized UL-listed emergency vent that discharges outside the building.
NSA HQ-NH94-AST-09	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	1. Normal vent pipes for tank and interstice connected and routed outside building. Air and vapors from tank can enter interstice. Interstice only needs an emergency vent.	1. Replace normal vent pipe on interstice with a properly sized UL-listed emergency vent that discharges outside the building.
NSA HQ-NH94-AST-10	NFPA 30 Chapter 27.6.4 (2015 Edition)	1. Rust on some fittings and transfer line. Corrosion protection required.	1. Remove rust and paint fittings and transfer line.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	2. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	2. Used oil is pumped from inside building to tank located outside. The Veeder-Root system inside building is programmed for overfill/high level alarm. Add an automatic flow shutoff mechanism at 95% capacity.
	NFPA 30 Chapter 22.15 (2015 edition)	3. Vehicle protection is required.	3. Install bollards in accordance with NFPA 30A 4.3.7.2 or other form of vehicle protection for tank.
NSA HQ-NH94-AST-11	NFPA 30 Chapter 27.6.4 (2015 Edition)	1. Rust on fittings, vent, and transfer line. Corrosion protection required.	1. Remove rust and paint fittings, vent, and transfer line.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH94-AST-11 (Continued)	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	2. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	2. Used oil is pumped from inside building to tank located outside. The Veeder-Root system inside building is programmed for overfill/high level alarm. Add an automatic flow shutoff mechanism at 95% capacity.
	NFPA 30 Chapter 22.15 (2015 edition)	3. Vehicle protection is required.	3. Install bollards in accordance with NFPA 30A 4.3.7.2 or other form of vehicle protection for tank.
NSA HQ-NH94-UST-01	Fully regulated under 40 CFR 280 (40 CFR 280.30)	1. No effective overfill prevention device. Overfill alarm cannot be heard or seen by fuel delivery driver.	1. Install effective overfill prevention device.
	Fully regulated under 40 CFR 280 (40 CFR 280.33)	2. Minor corrosion apparent at fill port riser tubing.	2. Evaluate corrosion condition. Consider installing a drop tube with flapper valve which would also address overfill prevention.
NSA HQ-NH94-UST-02	Fully regulated under 40 CFR 280 (40 CFR 280.30)	1. No effective overfill prevention device. Overfill alarm cannot be heard or seen by fuel delivery driver.	1. Install effective overfill prevention device.
	Fully regulated under 40 CFR 280 (40 CFR 280.33)	2. Minor corrosion apparent at fill port riser tubing.	2. Evaluate corrosion condition. Consider installing a drop tube with flapper valve which would also address overfill prevention.
NSA HQ-NH94-UST-03	Fully regulated under 40 CFR 280 (40 CFR 280.30)	1. No effective overfill prevention device. Overfill alarm cannot be heard or seen by fuel delivery driver.	1. Install effective overfill prevention device.
	Fully regulated under 40 CFR 280 (40 CFR 280.33)	2. Significant corrosion apparent at fill port riser tubing.	2. Evaluate corrosion condition. Consider installing a drop tube with flapper valve which would also address overfill prevention.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH95-AST-01	40 CFR 112.8(c)(2)	1. Single wall tank with no effective secondary containment.	1. Provide appropriate sized secondary containment and/or diversionary structure per 112.8(c)(2), or replace tank.
	40 CFR 112.8(c)(8)	2. Level gauge missing. No overfill prevention device provided. Level checked with stick.	2. Install at least one approved means of overfill prevention per 112.8(c)(8).
	40 CFR 112.8(c)(6)	3. Minor corrosion on tank top due to leaking battery.	3. Clean up acid leaked from battery, replace battery if necessary. Treat corrosion on tank.
	NFPA 30 Chapter 22.7.1.1 (2015 edition)	4. No emergency vent installed on primary tank.	4. Install properly sized UL-listed emergency vent on primary tank, and extend to outside.
	Best Management Practice	5. "No Smoking" sign missing from tank.	5. Add "No Smoking" sign to tank.
NSA HQ-NH139-AST-01	40 CFR 112.8(c)(6)	1. Label has new ID number of NS-NH139-AST-04; tank was repainted but does not appear to be new. Tank numbers must be reconciled.	1. Determine if tank is a replacement; if not, correct ID label so inspection records can be maintained.
	40 CFR 112.8(c)(2)	2. No secondary containment is provided. The unit is in a cinder block wall building not designed to be liquidtight.	2. Provide required secondary containment. In accordance with NFPA 30 Chapter 22.11.2.4 walls of the diked area shall be of earth, steel, concrete, or solid masonry designed to be liquidtight and to withstand a full hydrostatic head.
	NFPA 30 Chapter 21.4.3.3 (2015 edition)	3. Normal vent shall not be less than 1.25 in. nominal inside diameter.	3. Replace 1 inch vent pipe with pipe not less than 1.25 inch nominal inside diameter.
	NFPA 30 Chapter 22.7.1.1 (2015 edition)	4. No emergency vent installed on primary tank.	4. Install properly sized UL-listed emergency vent on primary tank.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH139-AST-01 (continued)	NFPA 30 Chapter 21.6.6.3 (2015 edition)	5. Plastic bottle of antifreeze stored next to tank. Area around tank shall be kept free of unnecessary combustible materials.	5. Remove plastic bottle from vicinity of tank.
	40 CFR 112.8(c)(10)	6. Oil residue at pipe joints.	6. Remove oil residue from pipe joints. Perform maintenance to address any continuing oil seepage.
NSA HQ-NH139-AST-02	40 CFR 112.8(c)(6)	1. Label has new ID number of NS-NH139-AST-05; tank was repainted but does not appear to be new. Tank numbers must be reconciled.	1. Determine if tank is a replacement; if not, correct ID label so inspection records can be maintained.
	40 CFR 112.8(c)(2) NFPA 30 Chapter 22.11.2.4 (2015 Edition)	2. No secondary containment is provided. The unit is in a cinder block wall building not designed to be liquidtight.	2. Provide required secondary containment. In accordance with NFPA 30 Chapter 22.11.2.4 walls of the diked area shall be of earth, steel, concrete, or solid masonry designed to be liquidtight and to withstand a full hydrostatic head.
	NFPA 30 Chapter 21.4.3.3 (2015 edition)	3. Normal vent shall not be less than 1.25 in. nominal inside diameter.	3. Replace 1 inch vent pipe with pipe not less than 1.25 inch nominal inside diameter.
	NFPA 30 Chapter 22.7.1.1 (2015 edition)	4. No emergency vent installed on primary tank.	4. Install properly sized UL-listed emergency vent on primary tank.
NSA HQ-NH139-AST-03	40 CFR 112.8(c)(2)	1. Single wall tank with no effective secondary containment.	1. Provide appropriate sized secondary containment and/or diversionary structure per 112.8(c)(2).
	40 CFR 112.8(c)(6)	2. Label has new ID number of NS-NH139-AST-06; tank does not appear to be new. Inventory and tank numbers must be reconciled; no record of NS-NH-139-AST-06.	2. Determine if tank is a replacement; if not, correct ID label so inspection records can be maintained.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH139-AST-03 (continued)	NFPA 30 Chapter 22.7.1.1 (2015 edition)	3. No emergency vent installed on primary tank.	3. Install properly sized UL-listed emergency vent on primary tank.
	NFPA 30 Chapter 21.6.6.3 (2015 edition)	4. Lot of boxes and other material stored in generator room. Area around tank shall be kept free of unnecessary combustible materials.	4. Remove boxes and other combustible material from generator room.
NSA HQ-NH139-UST-02	Fully regulated under 40 CFR 280	1. Sump liquid sensor device is too tall for sump and is forced to be installed at an angle where it is less effective.	1. Replace sump liquid sensor device with one that fits properly in sump.
NSA HQ-NH139-UST-03	Fully regulated under 40 CFR 280	1. Water accumulated in sump.	1. Remove water from sump. Find and eliminate cause of water intrusion.
NSA HQ-NH154-AST-01	40 CFR 112.8(c)(6)	1. Pop-up gauge indicates leak in interstitial space. Secondary containment or primary tank may be compromised. Liquid in interstice.	1. Investigate source of liquid in interstice. If liquid is fuel, remove tank from service. If liquid is water, remove the water and correct all deficiencies.
	NFPA 30 Chapter 22.7.1.1.1 (2015 edition)	2. No emergency vent installed on interstitial space.	2. Install properly sized UL-listed emergency vent on interstitial space.
	NFPA 30 Chapter 21.4.1 (2015 edition)	3. Tank is equipped with PVC plugs in unused tank openings. Tank must be noncombustible materials.	3. Replace low melting point materials with steel plugs.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	4. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity. Guillotine valve has been cut to allow filling with standard nozzle.	4. Existing vent whistle meets requirement for overfill alarm. Replace Guillotine valve or provide other fuel flow shutoff mechanism at 95% capacity. Follow up with tank owner/operator to ensure equipment is not purposefully damaged in the future.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-NH154-AST-01 (continued)	NFPA 30 Chapter 21.6.6.3 (2015 edition)	5. Leaves and organic debris on tank. Area around tank shall be kept free of unnecessary combustible materials.	5. Remove leaves and organic debris from around tank.
	NFPA 30 Chapter 21.4.3.2 (2015 Edition)	6. Two normal vents installed on tank.	6. Remove short normal vent, and ensure that tall normal vent with vent whistle is located on primary tank and not the interstitial space.
NSA HQ-NH200-AST-01	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	1. Emergency vents not UL listed or properly labeled.	1. Install properly sized UL-listed emergency vents.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	2. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	2. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.
NSA HQ-SC1-AST-01 (Added in Amendment 1)	40 CFR 112.8(c)(8)	1. Capacity not labeled on tank.	1. Add label showing capacity of tank.
	40 CFR 112.8(c)(6), NFPA 30 Chapter 27.6.4	2. There is rust noted on the corner of the tank	2. Treat affected areas and spot paint as necessary.
	NFPA 30 Chapter 22.7.1.1	3. Emergency vent on the interstice is frozen shut.	3. Repair the emergency vent or install a properly sized UL-listed emergency vent on interstitial space.
	NFPA 30 Chapter 22.11.4.5	4. Double-walled tanks must have an overfill alarm at 90% and an automatic fuel-flow shutoff device mechanism at 95% capacity. This tank does not have an overfill alarm or an automatic fuel-flow shutoff mechanism.	4. Install overfill alarm and fuel-flow shutoff mechanism on tank.
	40 CFR 112.7(c)	5. Due to proximity of storm drain active measure deployment required prior to fuel transfers.	5. Require spill mat cover on storm drain prior to beginning fuel transfers; remove mat after fuel transfers are completed.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-SDA218-AST-01	NFPA 30 Chapter 22.4.2.1 (2015 Edition)	1. Shell-to-shell separation is less than 3 ft minimum required under NFPA 30.	1. Provide adequate minimum separation distance.
	40 CFR 112.8(c)(6) and NFPA 30 Chapter 21.6.5.3 (2015 Edition)	2. Tank ID number not posted.	2. Identify tank so inspection records can be tracked.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	3. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	3. Install alarm and flow restrictor on tank.
	40 CFR 112.8(c)(6)	4. Tank is not configured to monitor the interstitial space.	4. Remove vent cap from leak detection port and configure tank to conduct leak detection.
	NFPA 30 Chapter 22.15 (2015 Edition)	5. All tanks must be able to withstand vehicle impact or have external vehicle protection when installed in areas which have the potential for vehicle collisions.	5. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	NFPA 30 Chapter 22.7.1.1.2 (2015 Edition)	6. No emergency vent installed on interstitial space. Tank has a normal vent in the emergency vent nozzle.	6. Install properly sized UL-listed emergency vent on interstitial space.
	40 CFR 112.8(b)(2) and 112.8(c)(3)(iv)	7. Double-walled tanks are located in a berm. Berm has standing water which is creating a corrosive condition. Berm is drained by removal of threaded plug.	7. Configure berm with appropriate valve and maintain a log of discharge events.
NSA HQ-SDA218-AST-02	NFPA 30 Chapter 22.4.2.1 (2015 Edition)	1. Shell-to-shell separation is less than 3 ft minimum required under NFPA 30.	1. Provide adequate minimum separation distance.
	40 CFR 112.8(c)(6) and NFPA 30 Chapter 21.6.5.3 (2015 Edition)	2. Tank ID number not posted.	2. Identify tank so inspection records can be tracked.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-SDA218-AST-02 (continued)	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	3. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	3. Install alarm and flow restrictor on tank.
	40 CFR 112.8(c)(6)	4. Tank is not configured to monitor the interstitial space.	4. Remove vent cap from leak detection port and configure tank to conduct leak detection.
	NFPA 30 Chapter 22.15 (2015 Edition)	5. All tanks must be able to withstand vehicle impact or have external vehicle protection when installed in areas which have the potential for vehicle collisions.	5. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	NFPA 30 Chapter 22.7.1.1.2 (2015 Edition)	6. No emergency vent installed on interstitial space. Tank has a normal vent in the emergency vent nozzle.	6. Install properly sized UL-listed emergency vent on interstitial space.
	40 CFR 112.8(b)(2) and 112.8(c)(3)(iv)	7. Double-walled tanks are located in a berm. Berm has standing water which is creating a corrosive condition. Berm is drained by removal of threaded plug.	7. Configure berm with appropriate valve and maintain a log of discharge events.
NSA HQ-SDA218-AST-03	NFPA 30 Chapter 22.15 (2015 Edition)	1. All tanks must be able to withstand vehicle impact or have external vehicle protection when installed in areas which have the potential for vehicle collisions.	1. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	40 CFR 112.8(c)(6) and NFPA 30 Chapter 21.6.5.3 (2015 Edition)	2. Tank ID number not posted.	2. Identify tank so inspection records can be tracked.
	NFPA 30 Chapter 21.7.2.1 (2015 Edition)	3. NFPA 704 Hazard Diamond missing.	3. Install NFPA Hazard Diamond on tank.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-SDA218-AST-03 (continued)	40 CFR 112.8(c)(8)	4. Tank has no overfill protection.	4. Install overfill protection per 40 CFR 112.8(c)(8).
	40 CFR 112.8(c)(2)	5. Single-walled tank with no effective secondary containment (steel berm has corrosion perforations).	5. Tank must have sized secondary containment per 40 CFR 112.8(c)(2).
	40 CFR 279.22(c)(1)	6. Used oil ASTs at RCRA generator facilities must be labeled as "USED OIL." Tank is labeled "WASTE OIL."	6. Properly label used oil tank.
	40 CFR 112.8(c)(6)	7. Corrosion protection (paint layer) on tank / supports / appurtenance / metal berm has failed.	7. Treat corrosion and paint affected areas.
	40 CFR 112.7(g)	8. Tank is located in an unsecured area. Fill port must be locked.	8. Provide appropriate lockable fillport for tank.
NSA HQ-SDA313A-AST-01	NFPA 30 Chapter 21.4.1 (2015 edition)	1. Plastic breather cap used for normal vent.	1. Replace low melting point materials with steel. Install proper normal vent.
	NFPA 30 Chapter 21.6.6.3 (2015 edition)	2. Plastic oil bottles and an aerosol spray can stored on top of the tank. Area around tank shall be kept free of unnecessary combustible materials.	2. Remove oil bottles and aerosol can from top of tank.
	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	3. Emergency vents not UL listed or properly labeled.	3. Install properly sized UL-listed emergency vents.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	4. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	4. Install alarm and flow restrictor on tank.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-SDA313A-AST-01 (continued)	NFPA 30 Chapter 22.15 (2015 Edition)	5. All tanks must be able to withstand vehicle impact or have external vehicle protection when installed in areas which have the potential for vehicle collisions.	5. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection.
	Best Management Practice	6. Due to proximity of storm drain active measure deployment required prior to fuel transfers.	6. Require spill mat cover on storm drain prior to beginning fuel transfers; remove mat after fuel transfers are completed.
NSA HQ-SDA332-AST-02	NFPA 30 Chapter 22.7.3.10 (2015 Edition)	1. Emergency vents not UL listed or properly labeled.	1. Install properly sized UL-listed emergency vents.
	NFPA 30 Chapter 21.6.6.3 (2015 edition)	2. Insulation is covering part of tank. Area around tank shall be kept free of unnecessary combustible materials.	2. Remove loose insulation from tank.
	NFPA 30 Chapter 22.11.4.5 (2015 Edition)	3. Double-walled tank must have overfill alarm at 90% and automatic fuel flow shutoff mechanism at 95% capacity.	3. Install alarm and flow restrictor on tank. Direct reading level gauge includes sender for electrical signal to remote receiver, but per manufacturer (Rochester Gauges, Inc.) gauge is not to be used for tank filling or to prevent overfill.
~~NSA HQ-BEN154-DSA-01~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(11)~~	~~1. Indoor spill pallet does not hold 55 gallons.~~	~~1. Replace spill pallet with one having containment capacity of at least 55 gallons.~~
	~~40 CFR 112.8(c)(6)~~	~~2. No ID number posted for drum storage area.~~	~~2. Post ID number for drum storage area so inspection records can be maintained.~~
NSA HQ-CA477-DSA-01	40 CFR 112.8(c)(6)	1. No ID number posted for drum storage area.	1. Post ID number for drum storage area so inspection records can be maintained.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-CA501-PORT-01	40 CFR 112.12(c)(6)	1. No ID number posted for portable container storage area.	1. Post ID number for portable container storage area so inspection records can be maintained.
	NFPA 30 Chapter 22.5.2.2	2. Tank foundation shall be designed to minimize corrosion in any part of tank resting on foundation.	2. Provide concrete pad or other barrier between metal container and ground to minimize corrosion of tank.
	NFPA 30 Chapter 22.15 (2015 Edition)	3. All tanks must be able to withstand vehicle impact or have external vehicle protection when installed in areas which have the potential for vehicle collisions.	3. Install bollards in accordance with NFPA 30A 4.3.7.2 or jersey barriers to provide vehicle protection, or relocate the container closer to source and away from roadway.
	40 CFR 112.12(c)	4. No secondary containment provided for single-walled container.	4. Provide appropriate sized secondary containment or replace metal container with 30-gallon steel drums.
NSA HQ-MCA602-DSA-01 (Added in Amendment 1)	40 CFR 112.8(c)(11)	1. Drums are stored on the floor without sized secondary containment.	1. Replace drums with 30-gallon drums or provide appropriately sized secondary containment.
NSA HQ-MCA602-DSA-01 (Added in Amendment 1) (continued)	NFPA 30 Chapter 22.15	2. Drums are located in an area with vehicle traffic nearby without any vehicle protection.	2. Replace drums with 30-gallon drums or provide appropriate vehicle protection.
	40 CFR 112.7(c)	3. Lid on drums is not secure and is open to rain.	3. Replace drums with 30-gallon drums or secure lid on drums.
NSA HQ-MCA612-DSA-01 (Amended in Amendment 1)	No deficiencies noted.		
~~NSA HQ-MCA612-DSA-02~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(6)~~	~~1. No ID number posted for drum storage area.~~	~~1. Post ID number for drum storage area so inspection records can be maintained.~~
	~~NFPA 30 Chapter 21.7.2.1 (2015 Edition)~~	~~2. Required signage including NFPA 704 hazard diamond missing from cabinet.~~	~~2. Install signage on cabinet: NFPA 704 hazard diamond consistent with safety data sheet; "Warning" "Flammable" and "Keep Fire Away" signs.~~

Tank Number	Citation	Finding	Recommended Corrective Action
~~NSA HQ-MCA612-DSA-03~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(6)~~	~~1. No ID number posted for drum storage area.~~	~~1. Post ID number for drum storage area so inspection records can be maintained.~~
~~NSA HQ-MCA612-DSA-04~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(6)~~	~~1. No ID number posted for drum storage area.~~	~~1. Post ID number for drum storage area so inspection records can be maintained.~~
	~~NFPA 30 Chapter 21.7.2.1 (2015 Edition)~~	~~2. Required signage including NFPA 704 hazard diamond missing from cabinet.~~	~~2. Install signage on cabinet: NFPA 704 hazard diamond consistent with safety data sheet; "Warning" "Flammable" and "Keep Fire Away" signs.~~
NSA HQ-NH94-DSA-01	40 CFR 112.8(c)(11)	1. Indoor spill pallet does not hold 55 gallons.	1. Replace spill pallet with one having containment capacity of at least 55 gallons.
	40 CFR 112.8(c)(6)	2. No ID number posted for drum storage area.	2. Post ID number for drum storage area so inspection records can be maintained.
NSA HQ-NH94-DSA-02	40 CFR 112.8(c)(11)	1. Indoor spill pallet does not hold 55 gallons.	1. Replace spill pallet with one having containment capacity of at least 55 gallons.
	40 CFR 112.8(c)(6)	2. No ID number posted for drum storage area.	2. Post ID number for drum storage area so inspection records can be maintained.
NSA HQ-NH94-DSA-03	40 CFR 112.8(c)(11)	1. Drum not on spill pallet.	1. Place drum on spill pallet with containment capacity of at least 55 gallons.
	40 CFR 112.8(c)(6)	2. No ID number posted for drum storage area.	2. Post ID number for drum storage area so inspection records can be maintained.
NSA HQ-NH31C-PORT-01 (Added in Amendment 1)	40 CFR 112.8(c)(11)	1. Portable container must have adequately sized secondary containment. No secondary containment is provided for the portable container.	1. Provide appropriate sized secondary containment.

Tank Number	Citation	Finding	Recommended Corrective Action
NSA HQ-SC404-PORT-01 (Added in Amendment 1)	40 CFR 112.8(c)(11)	1. Portable container must have adequately sized secondary containment. No secondary containment is provided for the portable container.	1. Provide appropriate sized secondary containment.
	NFPA 30 Chapter 22.15	2. Portable container is located in an area with vehicle traffic nearby without any vehicle protection.	2. Provide appropriate vehicle protection.
~~NSA HQ-NH94-MOBILE-01~~ (Removed in Amendment 1)	~~40 CFR 112.8(c)(11)~~	~~1. Mobile oil storage container must have sized secondary containment. No containment provided for single wall tank.~~	~~1. Verify requirement for this asset, and replace if required; otherwise, position mobile oil storage container within a properly sized bermed or diked area during use and during storage.~~
	~~40 CFR 112.8(c)(6)~~	~~2. No ID number on tank.~~	~~2. Label tank with ID number so inspection records can be maintained. No evidence noted of monthly inspections for this tank.~~
	~~40 CFR 112.8(c)(6)~~	~~3. Significant corrosion of unit.~~	~~3. Verify requirement for this asset, and replace if required; otherwise, repair corrosion. If replaced, ensure that old tank is properly closed and removed.~~

Appendix C: Inspection Forms

No ASTs at NSA HR Headquarters regulated by the Commonwealth of Virginia have daily and weekly inspection requirements. This is due to the fact that the aggregate volume of the state-regulated tanks is less than 25,000 gallons. STI SP001 requires monthly and annual inspections for all non-portable oil storage tanks and containers greater than or equal to 55 gallons. STI SP001 requires monthly inspections of portable containers greater than or equal to 55 gallons. Portable containers, such as drums, must be inspected on a monthly basis. The inspection checklists used at NSA HR Headquarters are discussed below and are presented in this appendix.

When substantive technical changes are made to the tank inspection forms, this SPCC Plan must be amended and certified by a PE in accordance with Section 1.7.

Inspection Forms Used at NSA HR Headquarters

1. "**CNRMA MONTHLY Inspection Checklist - Portable Containers**"
   - Drums and other portable container inspections are recorded on form "CNRMA Monthly Inspection Checklist - Portable Containers."
   - Records must be maintained at container location-site for three years.

2. "**CNRMA MONTHLY Inspection Checklist for Fixed ASTs**"
   - Inspections of the following types of tanks are recorded on this form:
     - Double-walled ASTs greater than or equal to 55 gallons
     - Single-walled ASTs less than or equal to 660 gallons.
   - Records must be maintained at container location-site for three years.

     Note: These tanks also have annual inspection requirements under STI SP001. These inspections are conducted by a contract service provider and are recorded on the standard STI SP001 Annual Inspection Checklist.

3. "**CNRMA DAILY/WEEKLY/MONTHLY Inspection Checklist for Fixed Single-walled ASTs greater than 660 gallons**"
   - Inspections of single-walled ASTs greater than 660 gallons are recorded on this form which also integrates the daily and weekly inspection requirements of the Commonwealth of Virginia.
   - Records must be maintained at container location-site for five years.

     Note: These tanks also have annual inspection requirements under STI SP001. These inspections are conducted by a contract service provider and are recorded on the standard STI SP001 Annual Inspection Checklist.

4. "**NAVFAC Mid-Atlantic STI SP001 Annual Periodic Checklist**"
Annual inspections of all ASTs 55 gallons or greater are recorded on form "NAVFAC Mid-Atlantic STI SP001 Annual Periodic Checklist."

5. "**Internal Combustion Engine (ICE) PM Language for Maximo"**
Monthly inspections of all generator supply and base tanks 55 gallons or greater are recorded on form "Internal Combustion Engine (ICE) PM Language for Maximo" checklist."

Commander, Navy Region Mid-Atlantic

MONTHLY Inspection Checklist- Portable Containers

(Keep on-site for 3 years from inspection date)

Activity Name/ Building Number:		POC and phone:		
Date:	Inspector Name/signature/ last training date:			
TYPE OF STORAGE AREA (Check all that applies)		___ Drum ___Product Dispensing ___ GenSet ___Other:		
1.0 AST CONTAINMENT/STORAGE AREA		Storage Area ID:	Storage Area ID:	Storage Area ID:
		Compliant?	Compliant?	Compliant?
1.1 Are portable containers stored within a designated storage area? <STI-SP001-5-Q1.1>		Y N N/A	Y N N/A	Y N N/A
1.2 Is the containment or storage area free of debris, spills, or other fire hazards? <STI-SP001-5-Q1.2>		Y N N/A	Y N N/A	Y N N/A
1.3 For outdoor secondary containment area: is it free of accumulated rainwater? <STI-SP001-5-Q1.3>		Y N N/A	Y N N/A	Y N N/A
1.4 Is secondary containment drain valve operable and secured in a closed position? <STI-SP001-5-Q1.4>		Y N N/A	Y N N/A	Y N N/A
1.5 Are ingress/egress paths to and from storage area clear and are gates/doors operable? <STI-SP001-5-Q1.5>		Y N N/A	Y N N/A	Y N N/A
1.6 Are portable containers located entirely within secondary containment? <40CFR112.8(c)(11)>		Y N N/A	Y N N/A	Y N N/A
1.7 If portable containers are stacked, are they stacked securely, without the use of strapping material (dunnage)? <NFPA 30 9.3.9 and 9.3.9.1>		Y N N/A	Y N N/A	Y N N/A
2.0 LEAK DETECTION				
2.1 Is storage area, container(s), and surrounding area free of visible signs of leakage? <STI-SP001-5-Q2.1>		Y N N/A	Y N N/A	Y N N/A
3.0 CONTAINER				
3.1 Is portable container free of severe corrosion or noticeable holes, distortions, buckling, denting, or bulging? <40CFR112.7(c)>		Y N N/A	Y N N/A	Y N N/A
3.2 Are Drums/Container Lids/Tops closed and properly secured? <40CFR112.8(c)(11)>		Y N N/A	Y N N/A	Y N N/A
4.0 OTHER				
4.1 Are there readily accessible spill response equipment / supplies on-site? <40CFR112.7(c)>		Y N N/A	Y N N/A	Y N N/A
4.2 Are racks/shelves or platform structures secure with no sign of severe corrosion or damage?		Y N N/A	Y N N/A	Y N N/A
COMMENTS:				

Commander, Navy Region Mid-Atlantic

MONTHLY Inspection Checklist for Fixed Aboveground Storage Tanks (ASTs) *

Applies to Double Walled Tanks 55 gallons or greater and/ or Single-walled tanks less than or equal to 660 gallons

(For tanks 55 gal-660 gal, keep on-site for 3 years from inspection date. For tanks >660, keep on-site for 5 years.)

Activity Name:	Activity POC:	Phone:	Tank ID:
Date:	Inspector Name/ Signature/ & last training date:		

Inspection Area	Compliance Criteria <with Citations>	Compliance Status Yes= Compliant No= Noncompliant	Comments
1.0 TANK CONTAINMENT or AREA			
1.1 Containment Structure	Is Open-top Containment structure (berm) free of standing liquid? (If NO, follow separate Berm Discharge Log procedures. If sheen/ oil present contact Emergency Dispatch. If NO sheen or oil, discharge liquid according to procedures) <STI-SP001-5-Q1.1> and <9VAC25-91-130B(5)(a)(3)> see note -->	Yes No N/A	Note: If no berm, indicate N/A
1.2 Containment Structure	Is Open-top Containment structure (berm) free of vegetation, debris, or combustible/flammable materials? (includes wooden stairs, empty drums, etc.) <STI-SP001-5-Q1.1><9VAC25-91-130B(5)(c)(4)><NFPA30 22.11.2.8> see note -->	Yes No N/A	Note: If no berm, indicate N/A
1.3 Containment Structure	Is open Top Containment structure (berm) free of breaches, cracks, or structural deficiencies? <STI-SP001-5-Q1.1> see note -->	Yes No N/A	Note: If no berm, indicate N/A
1.4 Containment Drain Valves	Is containment drain valve operable and secured (closed)? <STI-SP001-5-Q1.3> and <9VAC25-91-130B(5)(a)(3) &(c)(3)> see note -->	Yes No N/A	Note: If no berm, indicate N/A
1.5 Pathways and Entry to Tank Area	Are pathways and entr(ies) to containment structure clear and are gates/doors operable? <STI-SP001-5-Q1.4> see note -->	Yes No N/A	Note: If no berm, indicate N/A
1.6 Tank Area	Is the tank area free of hazardous or potentially hazardous conditions? <9VAC25-91-130B(5)(a)(1)> <NAVFAC POLICY>	Yes No N/A	
1.7 Tank Area	Is the base of the tank free of high grass, weeds, and debris? <9VAC25-91-130B(5)(c)(4)> <STI-SP001-5-Q2.3>	Yes No N/A	
2.0 LEAK DETECTION			
2.1 Tank	Is tank free of visible signs of leakage AND damage? <STI-SP001-5-Q2.1> and <9VAC25-91-130B(5)(a)(4)>	Yes No** N/A	
2.2 Secondary Containment	Is tank free of visible signs of leakage into secondary containment (berm)? <STI-SP001-5-Q2.2> see note -->	Yes No** N/A	Note: If no berm, indicate N/A
2.3 Surrounding Soil	Is surrounding soil/concrete free of visible signs of leakage? <STI-SP001-5-Q2.3> and <9VAC25-91-130B(5)(a)(2)>	Yes No** N/A	
2.4 Interstice	*For double-walled tanks with a pop-up gauge:* Is interstitial space free of liquid? <STI-SP001-5-Q2.4> see note -->	Yes No** N/A	Note: Inspect only if pop-up gauge is present.
3.0 TANK and TANK EQUIPMENT			
3.1 Valves	a. Are valves, hoses, & piping free of visible signs of leaks AND damage? <STI-SP001-5-Q3.1& 3.5> <9VAC25-91-130B(5)(a)(4), (a)(5), (c)(11), & (c)(12)>	Yes No N/A	
	b. Is main tank drain valve **locked**? <STI-SP001-5-Q3.1b>	Yes No N/A	
3.2 Spill Containment Boxes on Fill Pipe	a. Is spill box free of debris, oily residue, or water? (remove debris, if applicable) <STI-SP001-5-Q3.2> see note -->	Yes No N/A	Note: If no spill box, indicate N/A
	b. Is drain valve on spill box operable & closed? <STI-SP001-5-Q3.2> see note -->	Yes No N/A	Note: If no spill box, indicate N/A

Activity Name:	Activity POC:	Phone:	Tank ID:
Date:	Inspector Name/ Signature/ & last training date:		

Inspection Area	Compliance Criteria <with Citations>	Compliance Status Yes= Compliant No= Noncompliant	Comments
3.3 Liquid Level Equipment	a. Are liquid level devices (both visual and mechanical) free of obvious physical damage? <STI-SP001-5-Q3.3a>	Yes No N/A	
	b. Is liquid level device visible to refueling operator and easily readable? <STI-SP001-5-Q3.3b>	Yes No N/A	
3.4 Overfill Equipment	a. If overfill equipment has a "test" button, audible horn, or light, activate to confirm operation. Was test confirmed as operational? (If battery powered, replace batteries as needed) <STI-SP001-5-Q3.4>	Yes No N/A	
	b. Have all overfills been prevented in the last month? <40CFR 112.4(a) & 112.8(8)>	Yes No** N/A	date of overfill:
3.5 Corrosion	Are the tank shell surface, metal containment structures, welds, seams, piping, and hose connections free of peeling areas, corrosion, or other deterioration? <STI-SP001-5-Q3.5> <9VAC25-91-130B(5)(c)(5)&(11)>	Yes No N/A	
3.6 Tanks Greater than 660 gal only	a. Is fill port secured (locked)? <9VAC25-91-130B(5)(c)(10)>	Yes No N/A	If tank <660, indicate N/A
	b. Does leak detection equipment appear to be operable and functioning as designed? <9VAC25-91-130B(5)(c)(7)>	Yes No N/A	If tank <660, indicate N/A
4.0 TANK ATTACHMENTS and Appurtenances			
4.1 Ladder and Platform Structure	Is Ladder and platform structure secure and free of corrosion or damage? <STI-SP001-5-Q4.1>	Yes No N/A	
4.2 Tanks w/ fueling dispensers (NEX & Transportation ASTs, use other form)	a. Is fueling dispenser & dispenser hardware (nozzle, hose, breakaway valve, swivel) in proper working order & free of leaks? <NFPA 30A 6.3.6 & 6.3.6.1>	Yes No N/A	If tank has no fueling dispenser, indicate N/A
	b. Is inside of dispenser cabinet free of leaks, damage, corrostion, & weathering? <NFPA 30A 6.3.6.2>	Yes No N/A	If tank has no dispenser cabinet, indicate N/A
5.0 OTHER CONDITIONS			
5.1 Other Considerations	a. Is area free of any other condition(s) that may affect safe operation or SPCC concerns such as overfills, spills or leaks? (identify concerns in comments or below and contact EPS) <STI-SP001-5-Q5.1>	Yes No N/A	
	b. Are spill response equipment/ supplies readily available? <STI-SP001-5-Q5.1>	Yes No N/A	
5.2 Signage	a. Is No Smoking and Fire Diamond signage present & visible? <STI-SP001-5-Q5.1> <NFPA 704>	Yes No N/A	
	b. Is tank clearly labeled with Tank ID, capacity, & contents? <9VAC25-91-130B(3)(d)> <40CFR112.8(c)(6)> <STI-SP001-5-Q5.1>	Yes No N/A	
Additional Comments:			

***Perform this inspection at least once monthly & also <u>within one working day</u> after a severe weather event (i.e. excessive rainfall, or wind, ice, or snow storm)**

**** If deficiencies are noted on any checklist items with an ** asterisk, immediately notify Petroleum Tank Media Manager and EPS**

DAILY/WEEKLY/MONTHLY Inspection Checklist for Fixed Aboveground Storage Tanks (AST) Greater than (>) 660 Gallons that are either Single-Walled Aboveground Storage Tanks (ASTs) OR Double Walled ASTs storing Fuel for High-Volume Motor Fuel Dispensing Facilities*
(Keep on-site for 5 years from inspection date)

*Includes NEX & Transportation dispensing facilities storing motor fuel in ASTs >660 gal

Activity Name		**POC**												**Phone**											**Month/Year**								
Inspector Name		**Inspector Signature**												**Inspector's last training date:**											**Tank ID:**								
Category	**Inspection Question** <with Regulatory Citations>	**Daily Inspector's Initials**																														
		Date	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
		Insp. Type	**Compliant? For Daily Inspection Write (Y N N/A) in Cell.**																														
SAFETY	Is Storage Tank area free of hazardous conditions? <9VAC25-91-130B(5)(a)(1)>	Daily																															
1. AST Containment Area	1.1 Is Open-top Containment structure (berm) free of standing liquid?* (If NO, follow Berm Discharge protocol) <9VAC25-91-130B(5)(a)(3) & (c)(2)>	Daily																															
	1.2 Is containment drain valve operable and secured (closed)? <9VAC25-91-130B(5)(a)(3)&(c)(3)>	Daily																															
	1.3 Is Open-top Containment and base of tank structure free of vegetation, debris, & combustible/ flammable materials (incl wooden stairs, empty drums, etc.)? <9VAC25-91-130B(5)(c)(4)> <NFPA30 22.11.2.8>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:					Date: Y N N/A Sign:							
	1.4 Is Open-top Containment area free of breaches, cracks, or structural deficiencies? <9VAC25-91-130B(5)(c)(1)> <STI-SP001-5-Q1.1>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:					Date: Y N N/A Sign:							
	1.5 Are pathways & entr(ies) to containment structure clear & are gates/doors operable?<STI-SP001-5-Q1.4>	Monthly	Date:_____ Y N N/A Comments: Sign:																														
2a. AST	2.1 Is tank free of signs of leakage AND damage?* <9VAC25-91-130B(5)(a)(4)> <STI-SP001-5-Q2.1>	Daily																															
	2.2 Is fill port secured? <9VAC25-91-130B(5)(c)(10)>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:					Date: Y N N/A Sign:							
	2.3 Are welds, rivets/bolts, seams, metal containment structures, pad, & foundation free of rust or other deterioration? <9VAC25-91-130B(5)(c)(5)>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:					Date: Y N N/A Sign:							
	2.4 Is tank shell surface, piping, & hose connections free of peeling paint, corrosion, damage, or deterioration? <9VAC25-91-130B(5)(c)(5)> <STI-SP001-5-Q3.5>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:					Date: Y N N/A Sign:							
	2.5 Is tank labeled with Tank ID, capacity & contents, No Smoking & NFPA diamond? <NFPA 704> <STI-SP001-5-Q5.1> <9VAC25-91-130B(3)(d)>	Monthly	Date:_____ Y N N/A Comments: Sign:																														
2b. ASTs with Vehicle Fueling Dispenser Cabinets	2.6 Is fueling dispenser & dispenser hardware (nozzle valve, hose, breakaway valve, swivel) in proper working order & free of leaks? <NFPA 30A 6.3.6 & 6.3.6.1>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:					Date: Y N N/A Sign:							
	2.7 Is inside of dispenser cabinet free of leaks, damage, corrostion, & weathering? <NFPA 30A 6.3.6.2>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:					Date: Y N N/A Sign:							
3. Leak Detection	3.1 Are cement pad, ground surface around tank, transfer area, and/or containment berm free of visible signs of leakage? <9VAC25-91-130B(5)(a)(2) & (c)(6)><STI-SP001-5-Q2.2,Q2.3>	Daily																															

Activity Name		POC												Phone											Month/Year							
Inspector Name		Inspector Signature												Inspector's last training date:											Tank ID:							
Category	Inspection Question <with Regulatory Citations>	Daily Inspector's Initials																													
		Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Leak Detection, con'd	3.2 Is leak detection equipment operable and functioning as designed? <9VAC25-91-130B(5)(c)(7)>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						
4. Piping, Valves, Hoses, Vents	4.1 Are valves, hoses, and/or piping free of visible signs of leaks AND damage?* <STI-SP001-5-Q3.1,Q3.5> <9VAC25-91-130B(5)(a)(4),(a)(5), (c)(11), & (c)(12)>	Daily																															
	4.2 Are vents and vent risers free of visible signs of rust and damage? <9VAC25-91-130B(5)(a)(5)>	Daily																															
	4.3 Are tank fill ports and valves secure (**locked**)? (incl. fill ports/valves, water bottom drawoff valves, main tank drain valve, etc.) <STI-SP001-5-Q3.1b> <9VAC25-91-130B(5)(c)(9&10)>	Weekly	Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: N N/A Sign:						Y
5. Overfill Equipment	5.1 Are liquid level devices (visual & mechanical) free of obvious physical damage, easily readable, visible to the refueling operator, & functioning properly? <STI-SP001-5-Q3.3a & b> <9VAC25-91-130B(5)(a)(5) & (c)(13)>	Daily																															
	5.2 Spill containment buckets on the fill pipe are free of debris, residue, and water, are capable of holding liquid, & have an operable, manual drain valve that drains to the primary tank? <STI-SP001-5-Q3.2a and b>	Monthly	If no spill box/bucket, indicate N/A Date: Y N N/A Comments: Sign:																														
	5.3 If overfill equipment has a "test" button, audible horn, or light, activate to confirm operation. Was test confirmed as operational? (If battery powered, replace batteries as needed) <STI-SP001-5-Q3.4>	Monthly	Date: Y N N/A Comments: Sign:																														
	5.4 Have all overfills been prevented in the last month? <40CFR 112.4(a) & 112.8(8)>	Monthly	Date: Y N N/A Comments: Sign:																														
6. Other Conditions	6.1 Is area free of any other condition(s) that may affect safe operation or SPCC concerns such as overfills, spills or leaks? (identify concerns in comments or below and contact EPS) <STI-SP001-5-Q5.1>	Monthly	Date: Y N N/A Comments: Sign:																														
	6.2 Are spill response equipment/ supplies readily available? <STI-SP001-5-Q5.1>	Monthly	Date: Y N N/A Comments: Sign:																														
	6.3 Are ladder and/or platform structures secure & free of severe corrosion/damage? <STI-SP001-5-Q4.1>	Monthly	Date: Y N N/A Comments: Sign:																														
7. Severe Weather or Maintenance	**Within one working day after** a severe weather event (i.e. excessive rainfall, or wind, ice, or snow storms) or maintenance (i.e. painting), an extra inspection must be performed. If any question is marked N (i.e. noncompliant), describe the problem(s) and how it was resolved in the comments section, below. <STI-SP001-5-Q3.4a>		Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: Y N N/A Sign:						Date: N N/A Sign:						Date: Y N N/A Sign:						Y
8. Notes	*** If items marked with an asterisk are not compliant, immediately contact the tank program media manager or the EPS that is assigned to the tank.**																														
9. Comments (add sheets if needed)																																	

NAVFAC Mid-Atlantic STI SP001 Annual Periodic Checklist		
Tank Inspected (Navy ID #):	**Inspection Date:**	
Prior Inspection Date:	*Retain Until Date:*	
Inspector Name:	*STI Category:*	
Tank Contents:	*Tank Capacity (GAL):*	
Tank Corrosion Protection:		
Tank Construction Method:		
Tank Manufacturer:		
Release Prevention Barrier (RPB):		
Secondary Containment Type:		
Secondary Containment Material:		
Containment Drainage Controls:		
Release Detection Method:		
Overfill Prevention Methods:	☐ Active Measures ☐ Comm link b/w Gauger & Pumper (Electronic) ☐ Overfill Prevention Valve ☐ Level Gauge ☐ Comm link b/w Gauger & Pumper (Visual) ☐ None (Deficiency) ☐ Vent Whistle ☐ Overfill/High Level Alarm	
Tank Physical Location:		
GPS Coordinates (North, West):		
Access Key Holder POC (Name, phone, etc.):		
General Access Requirements:		
Special Access Requirements:		

INSERT AERIAL PHOTO OF GENERAL TANK LOCATION

Tank Inspected (Navy ID #):			Inspection Date:	
(S) - Satisfactory; (U) - Unsatisfactory; (NA) - Not Applicable				
1.0 TANK CONTAINMENT [1.1 Containment Structure (Check containment structure for:)]				
	a. Holes or cracks in containment wall or floor;			
	b. Washout;			
	c. Liner degradation;			
	d. Corrosion;			
	e. Paint failure; and			
	f. Tank settling.			
2.0 TANK FOUNDATION AND SUPPORTS [2.1 Foundation] [2.2 Concrete Pad and Ringwall] [2.3 Supports] [2.4 Water Drainage] [2.5 Tank grounding]				
	2.1 Check tank settlement and foundation washout.			
	2.2 Check concrete pad/ring wall for cracking/spalling.			
	2.3 Check supports for corrosion, paint failure, etc.			
	2.4 Check that water drains away from tank.			
	2.5 Check tank ground strap is properly secured and is in good condition?			
3.0 CATHODIC PROTECTION [3.1 Galvanic Cathodic Protection System] [3.2 Impressed Current System]				
	3.1 Confirm system is functional, includes the wire connections for galvanic systems.			
	3.2 Inspect the operational components (power switch, meters, and alarms).			
	3.2 Record hour meter, ammeter and voltmeter readings.			
4.0 TANK SHELL, HEADS, ROOF [4.1 Coating] [4.2 Steel Condition] [4.3 Roof Slope]				
	4.1 Check for coating failure (indicate extent of failure and whether full re-coating of the tank is recommended)			
	4.2 Check steel condition for:			
	a. Dents;			
	b. Buckling;			
	c. Bulging;			
	d. Corrosion; and			
	e. Cracking.			
	4.3 Check roof slope for low points and standing water.			
5.0 TANK EQUIPMENT [5.1 Vents] [5.2 Valves] [5.3 Interstitial leak detection system] [5.4 Spill containment boxes on fill pipe] [5.5 Strainer] [5.6 Filter] [5.7 Flame arrestors] [5.8 Leak detector] [5.9 Liquid level equipment] [5.10 Overfill equipment]				
	5.1.1 Primary Tank Venting	Vent Size/Capacity:	Vent heights above grade (inches):	
	Normal:			
	Emergency:			
	a. Verify vent heights above grade are adequate.			
	b. Verify that components are moving freely.			
	c. Verify vent passways are not obstructed.			
	d. Check for safe vent discharge.			
	5.1.2 Interstice Venting	Vent Size/Capacity:	Vent heights above grade (inches):	
	Normal:			
	Emergency:			
	a. Verify vent heights above grade are adequate.			
	b. Verify that components are moving freely.			
	c. Verify vent passways are not obstructed.			
	d. Check for safe vent discharge.			

Tank Inspected (Navy ID #):		**Inspection Date:**	
	5.2.1 General Valves: Check the condition of all valves for leaks, corrosion and damage.		
	5.2.2 Anti-Siphon, Check and Gate Valves		
	a. Cycle the valve(s) open and closed.		
	b. Check for proper operation.		
	5.2.3 Pressure Regulator Valves: Check for proper operation. (Note that there may be a small, 1/4 inch drain plugs in the bottom of the valve that are not visible by looking from above only).		
	5.2.4 Expansion Relief Valves: Check that the valve is in the proper orientation. (Note that fuel must discharge back to the tank via a separate pipe or tubing.)		
	5.2.5 Solenoid Valves: Check that the valve is in the proper orientation. (Note that fuel must discharge back to the tank via a separate pipe or tubing.)		
	5.2.6 Fire and Shear Valves		
	a. Manually cycle the valve to ensure components are moving freely and that the valve handle or lever has clearance to allow valve to close completely.		
	b. Valves must not be wired in open position.		
	c. Make sure fusible element is in place and correctly positioned.		
	d. Be sure test ports are sealed with plug after testing is complete and no temporary test fixture or component remains connected to valve.		
	5.3 Interstitial Leak Detection (Check condition of equipment, including:)		
	a. The window is clean and clear in sight leak gauges.		
	b. The wire connection of electronic gauges for tightness.		
	c. Activate the test button, if applicable.		
	5.4 Spill Containment Boxes on Fill Pipe		
	a. If corrosion damage, or wear has compromised the ability of the unit to perform spill containment functions, replace the unit.		
	b. Inspect the connections to the AST for tightness, as well as the bolts, nuts, washers for condition and replace as necessary.		
	c. Drain valves must be operable and closed.		
	5.5 Strainer		
	a. Check that the strainer is clean and in good condition.		
	b. Access strainer basket and check cap and gasket seal as well as bolts.		
	5.6 Filter		
	a. Check that the filter is in good condition and is within the manufacturer's expected service life. Replace, if necessary.		
	b. Check for leaks and decreased fuel flow.		
	5.7 Flame arrestors: Follow manufacturer's instructions. Check for corrosion and blockage of air passages.		
	5.8 Leak Detector for Submersible Pump Systems: Test according to manufacturer's instructions and authority having jurisdiction (AHJ). Verify leak detectors are suited and properly installed for aboveground use.		
	5.9 Liquid Level Equipment		
	a. Has equipment been tested to ensure proper operation?		
	b. Does equipment operate as required?		
	c. Follow manufacturer's instructions?		
	5.10 Overfill Equipment		
	a. Follow manufacturer's instructions and regulatory requirements for inspection and functionality verification.		
	b. Confirm device is suited for above ground use by the manufacturer.		
	c. Check for adequate overfill prevention.		
	d. Location of Fill Port:		

Tank Inspected (Navy ID #):			Inspection Date:	
6.0 INSULATED TANKS [6.1 Insulation] [6.2 Insulation cover or jacket]				
	6.1 Check condition of insulation for:			
	a. Missing sections;			
	b. Areas of moisture;			
	c. Mold; and			
	d. Damage.			
	6.2 Check for damage to the insulation cover or jacket that will allow water intrusion			
7.0 MISCELLANEOUS				
	7.1 Electrical Wiring and Boxes: Are they in good condition?			
	7.2 Labels and Tags			
	a. Navy Tank identification markings readable and adequately secured.			
	b. Tank fuel type markings readalbe and adequately secured.			
	c. Tank capacity markings readable an adequately secured.			
	d. Tank Nameplate readable and adequately secured.			
	e. NFPA Fire Label readable and adequately secured.			
	7.3 Tank spacing between obstruction (buildings, right-of-ways, etc.)			
	Tank Sides	Obstruction Name	Spacing (feet)	
	Front Side:			
	Back Side:			
	Left Side:			
	Right Side:			
	7.4 Tank Anti-Vehicle Protection			
	a. Check for adequate anti-vehicle protection.			
	b. Type of protection:			
	7.5 Water\Liquid Presence			
	a. Check for presence of water in primary tank.			
	b. Check for the presence of liquid in the interstitial space.			
	c. Check the secondary containment for signs of breach and excessive water.			
	d. Check that the secondary containment drain valve is secured.			
	7.6 Tank Ladders and Platforms			
	a. Check the ladders and platforms for corrosion and paint failure.			
	b. Check the ladders and platforms for proper handrails, mid rails, and kick toes.			
	7.7 Low Melting Point Materials: Check for low melting materials (plastic fittings, copper lines, etc.).			
	7.8 Pipe-to-Soil Contact: Check piping to verify no direct pipe-to-soil contact.			
	7.9 Combustible Materials: Check to verify combustible materials are not within berms, against tanks, piping, etc.			
Additional Comments:				

Internal Combustion Engine (ICE) PM language for Maximo 27 Oct 2015

For questions contact Leal Boyd, NAVFAC MIDLANT Air Senior Program Manager, 757-341-0387

All ICE PM job plans must include the following language and be scheduled at least monthly

1. Perform all O&M per manufacturer recommendations
2. Do not change emission related engine settings unless manufacturer specified
3. Record date of operation: _____
4. Record engine hour meter reading BEFORE operation: _____
5. Minimize engine idle during startup; limit startup time to 30 minutes
6. Record engine START time: _____
7. Record engine STOP time: _____
8. Record engine hour meter reading AFTER operation: _____
9. Record reason for operation (maintenance, testing, emergency): _____
10. Perform visual inspection of associated tanks as described below.
11. Tank ID: _____Second Tank ID (if generator has two tanks):_____
12. Answer each question "Yes", "No", or "N/A". ("Yes" means item is compliant with tank rules, "No" indicates a non-compliant situation; If you observe a spill or leakage, liquid in secondary containment, or any safety or fire hazards, immediately notify your supervisor for immediate notification to Environmental.)
13. Is open top containment structure (berm) free of water, fuel, fuel residue, vegetation, debris, and fire hazards (combustible/flammable materials)? (Yes, No, N/A).
14. Is open top containment structure (berm) free of breaches, cracks, or structural deficiencies? (Yes, No, N/A)
15. Are open top containment structure (berm) drain valves operable and secured (closed)? (Yes, No, N/A)
16. Are pathways and entry to open top containment structure (berm) clear and gates/doors operable? (Yes, No, N/A)
17. Are the tank, piping, flexible lines, filter housings and valves free of visible signs of leakage? (Yes, No, N/A).
18. Is tank free of visible signs of leakage of fuel or water into closed secondary containment? (Check pop up leak gauge or electronic sensor.) (Yes, No, N/A).
19. Is surrounding soil/concrete free of visible signs of leakage? (Yes, No, N/A).
20. Are main tank drain valves locked (if so equipped)? (Yes, No, N/A)
21. Is the area around the fuel fill opening or inside spill containment box on fill pipe free of debris, oily residue, or water? (Yes, No, N/A)
22. Is drain valve on spill containment box on fill pipe operable and closed? (Yes, No, N/A)

23. Are liquid level devices (both visual and mechanical) easily readable and free of evident physical damage? (Yes, No, N/A)
24. If overfill equipment has a "test" button, audible horn, light, or mechanical test mechanism, activate to confirm operation. Was test confirmed as operational? (Yes, No, N/A) If battery powered, replace batteries as needed.
25. Are the tank, piping and hose connections free of corrosion, or damage? (Yes, No, N/A). .
26. Is ladder and platform structure secure and free of corrosion or damage? (Yes, No, N/A)
27. Is area free of any other conditions that should be addressed regarding continued safe operation? (Yes, No, N/A).
28. Identify issues that may affect the site spill prevention plan:_____
29. Additional Comments: _____
30. Printed Name: _____
31. Signature: _____
32. Submit completed work order to supervisor within 1 week of completion.

ANNUAL ICE PM job plans must ALSO include the following language:

33. Change oil & filter (required annually or every 500 hours, whichever comes first). Record date of oil and filter change: _____
34. Inspect/replace as necessary, air cleaner: condition ok (Y/N)? ____ if "N", date replaced: _____
35. Inspect/replace as necessary, hoses: condition ok (Y/N)? ____ if "N", date replaced: _____
36. Inspect/replace as necessary, belts: condition ok (Y/N)? ____ if "N", date replaced: _____
37. For spark ignition engines, inspect/replace as necessary, spark plugs: condition ok (Y/N)? ____ if no, date replaced: _____

Appendix D: Assumptions and Calculations

The following flow rate assumptions were used to develop the estimates required in the released scenarios required under 40 CFR 112.7 (b). The assumptions are based on industry standards and physical observation.

Flow Rate Data

Delivery truck flow rate at nozzle:	50 GPM
Delivery truck flow rate from ruptured hose:	60 GPM
Dispenser flow rate:	10 GPM
Combustion source burn rate:	1 GPM
Used oil collection suction loading rate:	10 GPM
Drum and Used Oil Tank Filling (Manual Pouring)	5 GPM

1. Overfill By Delivery Truck

Assume: a.) 6 sec response time to stop flow when overfill occurs (worst case 112.7(b))
b.) 5 sec response time to stop flow when overfill occurs (most likely 112.7(c))

Release volume=flow rate× response time

Maximum Volume (112.7(b))=50 GPM×6 sec×1 min/60 sec=**5 gallons**

Most Likely Volume (112.7(c))=50 GPM×5 sec×1 min/60 sec=**4 gallons**

2. Spillage During Delivery Hose Retrieval

Assume: a.) Hose is pressurized during retrieval
b.) 60 sec response time to stop flow when hose fails (worst case 112.7(b))
c.) 5 sec response time to stop flow when hose drips (most likely 112.7(c))

Release volume=flow rate× response time

Maximum Volume (112.7(b))=60 GPM×60 sec×1 min/60 sec=**60 gallons**

Most Likely Volume (112.7(c))=60 GPM×5 sec×1 min/60 sec=**5 gallons**

3. Transfer Out Of Tank (Fuel Dispenser)

Assume: a.) 12 sec response time for dispensing spills (worst case 112.7(b))
b.) 6 sec response time for dispensing spills (most likely 112.7(c))

Release volume=flow rate× response time

Maximum Volume (112.7(b))=10 GPM×12 sec×1 min/60 sec=**2 gallons**

Most Likely Volume (112.7(c))=10 GPM×6 sec×1 min/60 sec=**1 gallon**

4. Filling Used Oil Tank

Assume: a.) Entire volume of transfer container is spilled (worst case 112.7(b))
b.) 12 sec response time for terminating pour following spill (most likely 112.7(c))

Release volume=flow rate× response time

Maximum Volume (112.7(b))=Volume of transfer container=**5 gallons**

Most Likely Volume (112.7(c))=5 GPM×12 sec×1 min/60 sec=**1 gallon**

5. Transfer Out Of Used Oil Tank (Collection Suction Truck)

Assume: a.) 60 sec response time for securing suction following spill (worst case 112.7(b))
b.) 12 sec response time for securing suction following spill (most likely 112.7(c))

Release volume=flow rate× response time

Maximum Volume (112.7(b))=10 GPM×60 sec×1 min/60 sec=**10 gallons**

Most Likely Volume (112.7(c))=10 GPM×12 sec×1 min/60 sec=**2 gallons**

6. Spillage During Used Oil Collection Hose Retrieval

Assume: a.) Hose is essentially empty during retrieval
b.) 5 sec response time to pick up hose if it drops to ground

Release volume=flow rate× response time

Maximum Volume (112.7(b))=1 GPM×5 sec×1 min/60 sec=**<1 gallon**

Most Likely Volume (112.7(c))=1 GPM×5 sec×1 min/60 sec=**<1 gallon**

7. Transfer Out Of Tank (Small Combustion Source (Boilers and Generators))

Assume: a.) Combustion source transfer lines are typically suction feed and gravity return.
b.) Supply and return flow rate are 1 GPM.
c.) Combustion source will not operate for extended time with a hole in the suction line.

Maximum Volume (112.7(b))=**1 gallon before source cannot sustain combustion**

Most Likely Volume (112.7(c))=**1 gallon before source cannot sustain combustion**

8. Drum Filling and Emptying Releases

Assume a.) Drums are manually filled by 5-gallon containers.
b.) Total quantity of oil which could be potentially released during filling is the volume of the 5-gallon container used to fill the drum.
c.) Total quantity of oil which could be potentially released during emptying is the volume of the drum.

Since both these operations are manned and closely observed, the most likely volumes released during filling and emptying are substantially less. An engineering estimation of 1 gallon will be used for the most likely volumes released during both filling and emptying. When any sort of release occurs, the operator will immediately terminate the operation and initiate response efforts.

Filling Drum

Maximum Volume (112.7(b))=Volume of filling container=**5 gallons**
Most Likely Volume (112.7(c))=**1 gallon**

Emptying Drum

Maximum Volume (112.7(b))=Volume of Drum=**55 gallons**
Most Likely Volume (112.7(c))=**1 gallon**

Dispensing from Drum

Maximum Volume (112.7(b))=Volume of filling container=**5 gallons**
Most Likely Volume (112.7(c))=**1 gallon**

Appendix E: Standard Operating Procedures

Tank Truck Loading/Unloading Procedures

Ensure that tank car, tank truck, and vessel loading/unloading procedures meet the minimum requirements and regulations established by the Department of Transportation. Delivery personnel are required to adhere to the following procedures:

1 Prior to Product Transfer

1. All ASTs should be equipped with a functioning level gauge that is readily visible at the fill port and indicates the level of oil or quantity of oil in the tank. The level gauge shall be used in conjunction with other mechanical systems to provide overfill protection for the tank. In addition, the storage capacity, product stored, and tank identification number shall be clearly marked on the tank.

2. If no spill containment structures at the fuel transfer area are present, the truck shall be parked as close as practical to the tank to load or unload oil. The minimum length of transfer hose possible should be used to complete the connection between the truck and tank.

3. The tanker vehicle drains, valves, and outlets shall be inspected for evidence of leakage.

4. The driver must supply and implement active measures such as drip pans or absorbent pads during each transfer to minimize minor dripping and incidental fuel spillage, especially for hose disconnections and hose retrieval.

5. The loading/unloading truck and transfer lines shall be checked to ensure they are located within a containment system or on a sloped pavement that will drain to a containment system, if available.

6. If the tank is equipped with camlock connection fittings on the fillport, a compatible hose shall be used.

7. If equipped, the fillport located inside the spill bucket shall be used. Spill containment devices shall not be bypassed by filling the tank through unused tank perforations on the tank exterior.

8. All transfer hoses shall be visually checked for signs of leakage. If dripping, weeping or leakage is discovered, the driver must implement active measures to minimize incidental spillage (see Step 3 above).

9. Adequate bonding/grounding of the tanker truck shall be established before connecting to the fuel transfer point.

10. Transfer hose ends shall be kept tightly capped while moving hoses into position to minimize drips.

2 During Product Transfer

1. The driver shall ensure the transfer operation is monitored continually, either by manual or automatic means, until complete.

2. The driver will not leave the vehicle unattended during the loading/unloading process.

3. When transferring Class 1 (flammable) liquids, motors of auxiliary or portable pumps shall be shut off when making and breaking hose connections.

4. A direct line of communication between the gauge reader and the pump operator shall be maintained at all times. For one man fueling operations, visual observation of the level gauge during transfer is sufficient.

5. All transfer hose couplings shall be monitored for leakage.

6. The liquid level in the receiving tank shall be monitored to prevent overflow by level gauge or visual observation of the free surface of oil in the container.

7. The flow rate shall be reduced while topping off the tank to provide sufficient reaction time for pump shutdown without overflow of the receiving tank.

8. The receiving tank shall never be completely filled when loading; provide sufficient head space (minimum 5%) to prevent overflow due to thermal expansion.

3 Following Completion of Product Transfer

1. Securely close all vehicle internal, external, and dome-cover valves before disconnecting.

2. Close all tank and loading valves before disconnecting.

3. Make sure that all product transfer operations are complete before disconnecting any transfer hoses.

4. Ensure that transfer hoses or other connecting devices are drained, vented, blown down, or blown out with inert gas to remove the remaining product prior to moving them away from their connections.

5. Ensure that active measures (drip pans, absorbent pads, spill equipment) are in place before breaking a connection to prevent minor spills.

6. Cap the end of the transfer hose or other connecting devices before moving them to prevent uncontrolled oil leakage.

7. Disconnect grounding/bonding wires.

8. Cap associated transfer hose risers.

9. Close all transfer hose riser valves not in use.

10. Inspect tanker truck drains, valves, and outlets for evidence of leakage.

11. Remove any wheel chocks that have been used.

12. Properly dispose of any contaminated equipment used to control incidental spillage and fuel collected in drip pans during transfer operations.

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From: NAVFAC MIDLANT EV11- Petroleum, Oil, and Lubricants (POL) Compliance

To: Operators and/or owners of any AST including tenants, contractors, fueling personnel, automotive personnel, and facilities planning and Environmental personnel.

Subj: Standard Operating Procedure (SOP) for Aboveground Storage Tanks (AST)

1. PURPOSE:

Portable and fixed aboveground containers of petroleum, oil, or lubricants (POL) having a capacity greater than or equal to 55 gallons are subject to state and/or federal regulations. The purpose of this SOP is to specify these compliance requirements for each applicable POL container. This SOP reflects the requirements detailed in the facility's Spill Prevention, Control, and Countermeasures (SPCC) Plan (**Ref (a)**) and also serves to minimize releases of POL into navigable waters of the United States as required by **Ref (b)**.

2. REFERENCES:

- **Ref (a)-** Facility Spill Prevention, Control, and Countermeasures Plan, current revision
- **Ref (b)-** 40 CFR 112
- **Ref (c)-** Virginia Department of Environmental Quality Facility and Aboveground Storage Tank Regulation
  9VAC 25-91-10 *et. seq* (eff. Nov 1, 2015)
- **Ref (d)-** OPNAV M-5090.1 DoN CNO Environmental Readiness Program Manual (current version)
- **Ref (e)-** National Fire Protection Association, NFPA 30 Flammable and Combustible Liquids Code (2015 Edition)
- **Ref (f)-** National Fire Protection Association, NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection (2013 Edition)
- **Ref (g)-** Procedure for the Installation of Shop-Fabricated Aboveground Storage Tanks on Hampton Roads Naval Facilities
- **Ref (h)-** Procedure for the Closure of Shop-Fabricated Aboveground Storage Tanks on Hampton Roads Naval Facilities

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3. ENCLOSURES:

- **Encl (1)**- NAVFAC MIDLANT Environmental Contact List
- **Encl (2)**- HR-Spills-SOP-02- Hampton Roads Naval Installation Tenant Spill Reporting and Documentation Standard Operating Procedure
- **Encl (3)**- Berm Discharge Log
- **Encl (4)**- Monthly Inspection Checklist for Portable containers
- **Encl (5)**- Monthly Inspection Checklist for Fixed ASTs (Including Double-Walled Tanks Greater than 660 Gallons)
- **Encl (6)**- Daily/Weekly/Monthly Inspection Checklist for Single-Walled Tanks Greater than 660 gallons OR Double-Walled ASTs that Store Product for High-Volume Motor Fuel Dispensing Facilities
- **Encl (7)**- Training Instructions

4. APPLICABILITY:

This SOP pertains to portable and fixed (stationary) aboveground containers of POL with a capacity equal to or greater than 55 gallons that are located within the Hampton Roads area of Virginia for longer than 30 days*. These containers include but are not limited to: aboveground storage tanks, day tanks, emergency generator base tanks, fixed and portable fire pump fuel tanks, 55-gallon drums, fixed portable emergency generators, pierside oil containers, contractor's tanks, and/or any container with a capacity of 55 gallons or more storing POL prior to use, during use, or pending disposal or future use. Tanks that are onsite for longer than 180 days are also included in the facilities Spill Prevention, Control, and Countermeasures (SPCC) Plan (**Ref (a)**) and can be found at the Installation's Environmental Office.

> *POL containers greater than or equal to 55 gallons that are stored onsite for less than 30 days are still subject to all requirements herein sans inspection requirements.

This SOP does not apply to field constructed tanks, underground storage tanks, mobile refuelers, pressure vessels, liquefied/liquid petroleum gas (such as propane or butane), motive-power fuel containers or oil-filled operational equipment (OFOE) as defined herein. Further, this SOP does not apply to SIXCON Fuel Storage mobile refueling pods or other military equipment, which are covered by other SOPs.

This SOP applies to Installation Environmental Program Directors (IEPDs), Petroleum Tank Media Managers, Environmental Protection Specialists (EPSs), tenants, contractors, fueling personnel, automotive personnel, and operators and/or owners of any AST.

5. REGULATORY DRIVERS:

Per **Ref (a)**, **Ref (b)**, **Ref (c)**, **Ref (d), Ref (e) and/or Ref (f)** all ASTs are required to have overfill/spill prevention equipment/requirements and approved secondary containment. Further, specific requirements also apply to inspections, maintenance, berm discharge protocol, notifications, training, and record-keeping.

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Non-compliance with federal, state, and Navy requirements can lead to regulatory Notices of Violation (NOVs), petroleum releases to the environment, substantial cleanup efforts, preventable expenses, and negative publicity.

6. DEFINITIONS:

   a. **AST**- Aboveground storage tank. For the purposes of this SOP, AST pertains to fixed containers with a capacity equal to or greater than 55 gallons.

   b. **Blind fill-** a fillport located outside of a building while the actual AST or container is located inside the building. This is required for fire pump fueling ASTs under **Ref (f)**.

   c. **High-Volume Motor Fuel Dispensing Facility**- Motor vehicle fuel dispensing facilities at Navy Exchange (NEX) and NAVFAC Transportation sites that store large volumes of motor vehicle fuel (intended for dispensing into vehicles) in ASTs >5,000 gal. Coordinate with Installation Environmental for applicable tanks.

   d. **Interstice**- In a double-walled tank, the space between the primary tank and the secondary tank, which is considered to be secondary containment for the primary tank if it fails.

   e. **Motive-power fuel containers**- Exempt from this SOP and SPCC requirements. Motive power containers are located in or on a motor vehicle and serve as petroleum storage used primarily to power the movement or propulsion of said vehicle.

   f. **Oil-filled operational equipment (OFOE)**- Exempt from this SOP but may be regulated in the facility's SPCC Plan- **Ref (a)**. OFOE includes equipment with an oil storage container (or multiple containers) in which the oil is present solely to support the function of the apparatus or the device. OFOE includes equipment such as transformers, circuit breakers, gear boxes, elevator oil reservoirs, hydraulic systems and/or reservoirs, wind turbines, and some machine tool coolant reservoirs. Emergency generator base tanks are NOT considered to be OFOE and therefore ARE included in this SOP.

   g. **Oil handling personnel**- personnel and contractors engaged in the inspection, operation, management, and maintenance of oil storage containers, the operation of equipment related to storage containers, fueling operations for equipment and vehicles, and/or emergency response personnel.

   h. **POL**- Petroleum, oil, and lubricants. Typical POL includes but is not limited to: gasoline, OTTO fuel, E-85, diesel, diesel fuel marine (DFM), biodiesel, any kind of fuel or heating oils (#2 fuel oil, #4 fuel oil, etc.), kerosene, JP-5 and other aviation fuels, cooking oil or grease, mineral oils, other vegetable-based oils, lube oil, hydraulic fluid or other synthetic oils, recovered oil, and used oil. If there are any questions regarding applicability of POL, please contact the Installation Petroleum Tank Media Manager.

   i. **Portable container/AST**- For the purposes of this SOP, this applies to portable POL containers with a capacity equal to or greater than 55 gallons. Typical portable containers include but are not limited to: portable generators, 55-gallon drums, SIXCONs, portable lube dispensers, and nonmetal cooking oil containers.

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j. **Primary tank**- In a double-walled tank, the innermost tank that stores and actually touches the oil product.

7. ACTIONS/ PROCEDURES FOR AST OWNERS AND OPERATORS:

In accordance with this document, tenants, owners, or operators of ASTs; contractors; or designated personnel are responsible for: maintaining secondary containment, performing required inspections, maintaining records, repairing non-compliant findings, completing required training, and providing notifications to Installation Environmental personnel (including Installation EPSs, IEPDs, and/or Petroleum Tank Media Managers) when any part of an AST system is removed, installed, relocated (moved), modified, or found to be non-compliant in any way (such as spilling or leaking).

8. GENERAL TANK REQUIREMENTS:

a. Contact the Installation EPS or Petroleum Tank Media Manager (**Encl (1)**) when facility planning includes addition, removal, or moving of fixed or portable ASTS. This includes but is not limited to: aboveground storage tanks, petroleum base tanks for fixed or emergency generators, 55-gallon drums, fire pump supply tanks, and mobile refueling equipment.

Specific installation and removal requirements apply and are defined in separate SOPs for AST Installations (**Ref (g)**) and AST Closures (**Ref (h)**). These SOPs are managed by NAVFAC MIDLANT EV11 POL Compliance and can be obtained by contacting the Installation Petroleum Tank Media Manager.

b. All ASTs must be clearly labeled per **Ref (a)** and **(d)**:

i. All labels must be legible (minimum 1.25") and visible to emergency services personnel.

ii. ASTs must be affixed with a yellow label with black characters to show tank ID, tank capacity, and tank contents;

iii. AST must be affixed with proper National Fire Protection Association (NFPA) fire diamond and No Smoking signs. Coordinate proper annotation with the Installation EPS or Petroleum Tank Media Manager.

iv. Contact the Installation Environmental Office or Petroleum Tank Media Manager (**Encl (1)**) to assign a tank ID and provide a label.

c. Tenant or holder of the Maintenance UIC (MUIC) is, at a minimum, responsible for funding repairs and upgrades and may be responsible for petroleum cleanup costs.

9. OVERFILL PREVENTION REQUIREMENTS:

a. Per **Ref (a)** and/or **(e)**, all fixed ASTs must have the following operational liquid level devices:

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i. Liquid level gauge such as a direct vision gauge (pop-up gauge, clock gauge, etc.), digital computer, or telepulse. This gauge must be functional and it must be legible.

ii. High liquid level audible or visual alarm (such as Automatic Tank Gauge (ATG) or air vent/whistle). This alarm must be functional and must be able to be heard over surrounding equipment and/or fueling vehicle. Visual alarms must be visible by the driver during fueling operations (e.g. vehicle in refueling area must not block visual alarm).

iii. High liquid level pump cutoff device (overfill prevention valve or liquid level switch) to stop flow at 95% full by volume, which should be clearly marked on the level gauge

b. Refueling operators at blind fills must be able to hear and/or see audible and/or visual alarms at the fillport. Liquid level devices must be visible at the fillport.

c. A person must be present during an entire refueling operation to monitor gauges and avoid overfills. Direct audible or code signal communication must be maintained between the gauger and the pumping station.

d. For tanks greater than 660 gallons, each operator shall institute safe fill, shutdown, and transfer procedures IAW **Ref (a)** that will ensure prevention of overfills during fueling operations.

e. If liquid level device is not functioning properly, owner/operator is responsible to replace or repair immediately. Immediately contact Installation EPS or Petroleum Tank Media Manager for guidance and recommendation(s) as needed (**Encl (1)**.

10. SECONDARY CONTAINMENT REQUIREMENTS:

a. Secondary containment is required by **Ref (a)** and applicable industry standards for **all** portable and fixed POL containers equal to or greater than 55 gallon capacity regardless of how much POL is actually present inside the container.

There are two types of required secondary containment, which must be approved by the signing Professional Engineer (PE) of **Ref (a)**:

i. **General** secondary containment (also called active measures):
All ASTs, including mobile refuelers, must meet "general" secondary containment requirements per 40 CFR 112.7(c) where the secondary containment must be sufficient to address a typical failure and contain the most likely quantity of oil that would be discharged. The most typical failures include overfills and drips/leaks from piping and hoses.

Examples of general secondary containment include: spill kits, sorbents, oil-dry (kitty litter), drip pans, portable berms, etc.

ii. **Sized** secondary containment (also called passive containment):
All ASTs must also have "sized" secondary containment per 40 CFR 112.8(c) where the secondary containment must be able to contain the entire

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POL capacity of the largest single compartment or container with sufficient freeboard for precipitation. See Berm Requirements for more information regarding freeboard.

The following are examples of acceptable sized secondary containment but are not intended to be an entire list of acceptable containment. All forms of secondary containment must be approved by the Professional Engineer that prepared the facility's SPCC Plan, **Ref (a)**:

1. An approved secondary containment spill pallet that completely holds any number of 55-gallon drums in a single layer with no overhang. If subject to precipitation, must also account for freeboard.
2. An entire building floor space or room can be used as secondary containment for many containers of POL, provided that the building or room has been designed or modified to fully contain the contents of the largest container [this determination must be made by the PE preparing the facility's SPCC Plan- **Ref (a)**]. Floor drains may only discharge to oil-containing structures such as oil-water separators or underground storage tanks with sufficient storage capacity.
3. In rare situations where tanks are manifolded, sized containment must be capable of holding the entire volume of all manifolded tanks.
4. 55-gallon drums properly stored inside of "clamshell" lockers;
5. Single-walled ASTs properly and completely situated within an intact and impervious secondary containment berm having the capacity to hold the contents of the largest single container plus sufficient freeboard if subject to precipitation (see information in Berm Requirements for additional freeboard information);
6. Double walled AST with an interstitial space that is verified on a monthly basis not to contain fuel or water;
7. Containers of POL in an indoor or outdoor Hazardous Material shed which has secondary containment space under the floor grating and has the capacity to hold the contents of the largest single POL container;

b. Mobile refuelers must meet sized secondary containment while being stored, but only require general containment (i.e. spill kit, drip pans) while transporting fuel and undergoing fueling activities.

c. Containment must be sufficient to contain a spill. Per **Ref (a)**: "The entire secondary containment system, including walls and floor (if applicable), must be capable of containing oil and must be constructed so that any discharge… will not escape the containment system before cleanup occurs". This means:

   i. Portable or "pop-up" berms must be deployed properly and may **not** be collapsed on one or more sides. They must be capable of containing oil (i.e. no rips, holes, etc.)

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ii. Concrete berms must have no significant cracks or crevices and must have been certified by a PE.

11. BERM and BERM DISCHARGE REQUIREMENTS:

a. If the secondary containment for an AST is an open structure (hereafter referred to as a berm) that is outdoors with no roof or enclosure to prevent precipitation from accumulating:

i. The berm must be able to contain the entire capacity of the largest single container and sufficient freeboard to contain precipitation.

1. For permanent berms: The berm capacity must be calculated to contain 100% of the capacity of the largest single tank that it holds plus "freeboard", which is determined by rainfall criterion for the geographical region. In Hampton Roads, an additional ~7" of berm depth (added to 100% capacity of the largest single tank within the berm) is required to achieve sufficient containment. See **Ref (a)** for specific depth for each facility.

2. For temporary or portable berms: This capacity is calculated to be a minimum of 110% of the largest single tank that it contains. (This deviates from permanent berms because when ~7" is applied to the height of a portable berm to achieve freeboard requirements, the sidewalls topple and berm integrity fails.)

ii. The berm must be capable of containing a worst-case discharge and free of significant cracks, holes, rips, corrosion, or any other weaknesses that could allow for the secondary containment to fail if a release were to occur.

iii. The berm must be kept free of accumulated precipitation, weeds, vegetation, debris, and combustible and/or flammable materials or other fire hazards, including wooden walkways.

iv. Berm discharge valves must be kept closed and locked at all times except during compliant discharge activities described below. Flapper valves are not allowed.

b. BERM DISCHARGE (release of accumulated precipitation) must be initiated within one (1) working day of a rainfall event to regain the full containment volume of the berm. Prior to discharge, the accumulated precipitation must be inspected by the personnel trained IAW the Training Requirements in this SOP to ensure that oil is not present (visible sheen).

i. If a sheen is present, but no measureable petroleum product,

1. Contact the Installation EPS

2. Coordinate sheen removal with EPS.

3. Coordinate with EPS to determine source of sheen and perform any corrective action.

ii. If measureable oil is present:

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1. Contact **Emergency Dispatch** (**Encl (1)**. Emergency dispatch will contact spill response personnel.
2. Owner/operator must follow Spill Reporting procedures as outlined in **Encl(2)**.
3. Under no circumstances should precipitation with a visible oily sheen be released from the berm.
4. If the presence of oil is persistent, coordinate with Installation EPS and Petroleum Tank Media Manager (**Encl 1**) for corrective action and/or repairs.

iii. If oil is not present: open the bypass (berm discharge) valve and drain the precipitation under responsible supervision.

iv. After berm discharge is complete, immediately secure/close the bypass (berm discharge) valve. Only manual valves are allowed. No flapper valves are allowed.

v. Record the berm discharge in the Berm Discharge Log, **Encl (3)**.

vi. The Berm Discharge Log records must be kept for 5 years per **Ref (b)**

12. INSPECTION REQUIREMENTS:

a. Per **Ref (a)**, at a minimum, all portable and fixed ASTs and containers must be visually inspected at least monthly. Per **Ref (b)** and Navy policy, ASTs that are greater than 660 gallons and are either i) single-walled, or ii) store product for high-volume motor fuel dispensing facilities (see definitions) must perform daily, weekly, and monthly inspections.

Additionally, all ASTs located outside must be inspected after any severe weather incident (snow, ice, hurricane, nor'easter, etc.) within one working day after the event or as soon as it is safe to do so. In general, all inspections must include observations of the AST, piping, appurtenances, secondary containment, and the surrounding area to ensure that leaking or spillage has not occurred and that the AST system is rust-free and in proper working order.

b. Tenants, tank owners, and/or tank operators are responsible for performing these inspections and must designate a primary and alternate individual (or group of individuals) to conduct monthly visual inspections.

c. Tank inspectors must complete training as defined in the TRAINING REQUIREMENTS section of this SOP.

d. The Installation EPS or Petroleum Tank Media Manager must provide an Information binder with all pertinent tank and inspection information, including this SOP and associated enclosures. This binder must be maintained onsite at all times or at a location disclosed to the Installation EPS **(Encl 1)**.

e. Inspections must be recorded on appropriate AST checklists provided in **Encl (4)**, **(5)**, and **(6)** and maintained in aforementioned binder. See (h) below for details.

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f. Inspection records for tanks that are associated with Internal Combustion Engines (ICE) may be kept with or included in the pertinent engine preventative maintenance records. Contact Installation Petroleum Tank Media Manager (**Encl 1**) to determine location and details.

g. In the event the tank is no longer needed or has been out of use for at least three months, contact Installation EPS or Petroleum Tank Media Manager for tank closure requirements. Tank inspections must continue and tank equipment must be maintained until all tank closure requirements have been performed and permanent closure has been achieved.

h. PORTABLE CONTAINERS: Each portable container or storage area with multiple containers, including secondary containment structure(s), must be inspected monthly:

   i. Utilize **Encl (4)** Monthly Inspection Checklist for Portable containers to document inspection.

   ii. Only one inspection per drum or per drum storage area is required each month.

   iii. Each portable container or group of containers must be identified as a designated Drum Storage Area:

      1. Contact Installation EPS (**Encl (1)**) to set up the Drum Storage Area.

      2. If personnel are unable to co-locate all portable containers in one area, multiple Drum Storage Areas may be designated within one building/room/warehouse.

i. FIXED ASTs: Each fixed AST, including piping and its secondary containment structure must be inspected in accordance with the following:

   i. For double walled ASTs and/or single walled ASTs 660 gallons or less, utilize **Encl (5)** Monthly Inspection Checklist for Fixed ASTs (Including Double-Walled Tanks Greater than 660 Gallons) to document the inspection.

   ii. For double-walled ASTs that are greater than 660-gallons and store product for High-Volume Motor Fuel Dispensing Facilities (see definitions):

      1.In addition to monthly inspections, daily and weekly inspections must also be conducted.

      2.Utilize **Encl (6**) Daily/Weekly/Monthly Inspection Checklist for Fixed Aboveground Storage Tanks (AST) Greater than (>) 660 Gallons that are either Single-Walled Aboveground Storage Tanks (ASTs) OR Double Walled ASTs that Store Product for High-Volume Motor Fuel Dispensing Facilities

   iii. For single-walled tanks that are greater than 660-gallons, additional state requirements apply:

      1. In addition to monthly inspections, daily and weekly inspections must also be conducted.

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2. Utilize **Encl (6)** Daily/Weekly/Monthly Inspection Checklist for Fixed Aboveground Storage Tanks (AST) Greater than (>) 660 Gallons that are either Single-Walled Aboveground Storage Tanks (ASTs) OR Double Walled ASTs that Store Product for High-Volume Motor Vehicle Dispensing Facilities.
3. EXCEPTIONS: Emergency generator base tanks of any size, whether single walled or double walled, are not subject to Daily and Weekly inspections, but are still subject to monthly inspections.

13. NOTIFICATION REQUIREMENTS:
    a. When a confirmed or imminent POL spill, leak, release, or overfill from any part of the AST system (including piping) has occurred, the Responsible Party and/or the party that discovers the incident must follow complete and specific protocol found in **Encl (2)**, including generating a Spill Message.
    b. In general, if POL has been released to a building, land surface, pavement, environment, or berm: **Contact Emergency Dispatch (Encl (1)).**
    c. If liquid is found in the tank interstice, **Contact Emergency Dispatch** or Installation EPS (**Encl (1)**)

14. TRAINING REQUIREMENTS:
    a. All oil handling personnel (see definitions) must complete the following training which can be completed using Environmental Compliance Assessment Training & Tracking System (ECATTS), the Navy's environmental on-line training system. Instructions for accessing ECATTS are provided in **Encl (7)**:
        i. Initial (one-time) Installation-specific SPCC training;
        ii. Annual Spill Briefing training- Follows initial training on an annual basis;
    b. All personnel that conduct AST inspections must first complete the training in (a) and complete the following training, as applicable:
        i. PORTABLE INSPECTIONS: Personnel that conduct monthly inspections of portable containers must complete applicable Inspector Training via ECATTS prior to performing inspections.
        ECATTS Instructions to take "Monthly Inspections for Portable Containers" can be found in **Encl (7).**
        ii. FIXED AST INSPECTIONS:
            1. Personnel that conduct MONTHLY inspections for single-walled tanks less than or equal to 660 gallons tanks OR double walled tanks of any size must complete applicable Inspector Training via ECATTS prior to performing inspections.
            ECATTS Instructions to take "Monthly Inspections for Fixed Aboveground Storage Tanks (Double Walled Tanks 55 gallons or

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greater and/ or Single-walled tanks less than or equal to 660 gallons)" can be found in **Encl (7)**

2. Personnel that conduct DAILY/WEEKLY/and MONTHLY inspections for single-walled tanks more than 660 gallons must complete applicable Inspector Training via ECATTS prior to performing inspections and every three years afterwards (at a minimum).
ECATTS Instructions to take "Daily/ Weekly/ Monthly Inspections for Fixed Single Walled Aboveground Storage Tanks Greater than 660 Gallons" can be found in **Encl (7)**

iii. Supplemental and/or hands-on training can also be provided by the Installation Petroleum Tank Media Manager (**Encl (1)**.

iv. Must keep all certificates IAW RECORDKEEPING REQUIREMENTS.

15. RECORDKEEPING REQUIREMENTS:

a. Training Certificates- Tank Operators/Inspectors are required to maintain certificate hardcopies of the below training requirements in the tank binder. Records must be made available for Installation EPS and/or Petroleum Tank Media Manager. Retain records in accordance with the following:

i. Initial Installation-specific SPCC training- minimum three years

ii. Annual Spill Briefing training- minimum three years

iii. Inspection training for tanks less than or equal to 660 gallons- minimum three (3) years

iv. Inspection training for tanks greater than 660 gallons- minimum five (5)years

v. Inspection training for portable tanks- minimum three (3) years

Training certificates for personnel that have left the command must remain on-site for the required length of time

b. Inspection Checklists- Personnel responsible for conducting AST inspections or monthly portable container inspections must maintain the following:

i. Inspection checklists must be signed by the appropriate supervisor or inspector;

ii. Hard copies of the inspection checklist must be completed in pen and ink, with month and date denoted;

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c. Hardcopies must be maintained onsite or at a main location for:

Inspection/ Log	Three Years	Five Years
Portable Monthly Inspection	X	
Fixed AST Monthly inspections for tanks less than 660 gallons	X	
Fixed AST Monthly inspections for tanks greater than 660 gallons		X
Berm Discharge Logs for tanks less than 660 gallons	X	
Berm Discharge Logs for tanks greater than 660 gallons		X

HR-SOP-POL-01_REV B- Enclosure (1)

Location/ Installation	Emergency Dispatch*	EV11 / POL Media Manager (POL MM)	Installation Environmental Program Director (IEPD)	Environmental Protection Specialist (EPS)
Environmental Core, EV11		(757) 341-0381		
POL Compliance Director, EV11		(757) 341-0381		
Sr. POL Program Manager		(757) 341-0453		
Navy On-Scene Coordinator		(757) 341-0449		
24-hour number		(757) 636-4378		
Spill Program Manager		(757) 341-0390		
PWD JEBLC-FS		(757) 341-0391	(757) 462-5350	(757) 462-5361 (Lead)
				(757) 462-5355
Joint Expeditionary Base Little Creek	757-462-4444 (RDC)			(757) 462-5356
Joint Expeditionary Base Fort Story	757-422-7141 (RDC)			(757) 462-5353
PWD Norfolk		(757) 341-0362	(757) 341-0523	(757) 341-0520 (Lead)
				(757) 341-0517
				(757) 341-0511
Naval Station Norfolk	757-444-3333 (NSN ECC)			(757) 341-0515
				(757) 341-0516
DFSP Craney Island				(757) 341-0520
PWD Naval Support Activity Hampton Roads		(757) 341-0391	(757) 836-1862	(757) 421-8114
NSA HR- Headquarters	757-444-3333 (NSN ECC)			
NSA HR-Northwest Annex	911 (Chesapeake Emergency Services)			
NSA HR-Portsmouth Annex (Naval Medical Center)	757-396-3333 (NNSY ECC)			
PWD Oceana		(757) 341-0424	(757) 433-3437	(757) 433-3435 (Lead)
Naval Air Station Oceana				(757) 433-3434
Dam Neck Annex	911			(757) 433-3439
Naval Auxiliary Landing Field Fentress	(ECC or local emergency services)			
Dare County Bombing Range				
PWD Portsmouth		(757) 341-0391	(757) 396-8270	(757) 396-8195
Norfolk Naval Shipyard				
St. Juliens Creek Annex	757-396-3333 (NNSY ECC)			
Scott Center Annex				
Southgate Annex				
PWD Yorktown		(757) 341-0390	(757) 887-4086	(757) 887-4881 (Lead)
NWS Yorktown				(757) 887-4095
Cheatham Annex	757-887-4911 (ECC)			(757) 887-4384
Yorktown Fuels				
ROTHR New Kent				

*ECC- Emergency Communications Center is pending change to RDC- Regional Dispatch Center. This list is current as of February 18, 2017.

Appendix F: Integrity Testing Program

40 CFR 112.8 (c)(6) requires that each aboveground container be tested for integrity on a regular schedule. Integrity testing is defined in §112.8(c)(6) as any means to measure the strength (structural soundness) of the container shell, bottom, and/or floor to contain oil and may include leak testing to determine whether the container will discharge oil. A detailed discussion of the integrity testing program requirements for NSA HR Headquarters is presented in Section 4.8 of this SPCC Plan.

The following table provides specific information on scheduling of inspection and testing for each tank and piping system at NSA HR Headquarters. The table provides dates for the most recent test completion as well as the required dates for the subsequent inspection. For those tanks which fully meet integrity testing requirements through routine STI monthly and annual inspections, rather than providing a date for the next integrity test, a notation is made that STI periodic inspection is required.

Aboveground Storage Tank Integrity Testing Program

Tank Number	Capacity (gallons)	Contents	STI Category	Integrity Test Method	Last Integrity Test	Next Integrity Test
NSA HQ-BallField-AST-01A (Added in Amendment 1)	250	Gasoline	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-BallField-AST-01B (Added in Amendment 1)	250	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-BEN154-AST-01	250	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
~~NSA HQ-BEN154-AST-02~~ (Removed in Amendment 1)	~~70~~	~~Diesel~~	~~3~~	~~STI Periodic, Formal External and Leak Test (10)~~	~~STI Periodic, Formal External and Leak Test October 2013~~	~~STI Periodic[A], Formal External and Leak Test October 2023~~
NSA HQ-CA6-AST-05	200	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-CA501-AST-01	1,000	Gasoline	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-CA501-AST-02	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-CA501-AST-03	250	Used Oil	1	STI Periodic	STI Periodic	STI Periodic[A]
~~LR-H-AST-04~~ (Removed in Amendment 1)	~~275~~	~~Diesel~~	~~3~~	~~STI Periodic, Formal External and Leak Test (10)~~	~~STI Periodic, No Formal External and Leak Test Records Available~~	~~STI Periodic[A], Formal External and Leak Test **DUE IMMEDIATELY**[D]~~
LR-H-AST-05 (Added in Amendment 1)	275	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-MCA612-AST-04	500	Used Oil	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-MCE1-AST-01	875	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-MCE224-AST-05	250	Used Oil	1	STI Periodic	STI Periodic	STI Periodic[A]
~~NSA HQ-NH8-AST-01~~ (Removed in Amendment 1)	~~100~~	~~Diesel~~	~~3~~	~~STI Periodic, Formal External and Leak Test (10)~~	~~STI Periodic, No Formal External and Leak Test Records Available~~	~~STI Periodic[A], Formal External and Leak Test **DUE IMMEDIATELY**[D]~~
NSA HQ-NH8-AST-02	200	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH8-AST-03	200	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH8-AST-04 (Added in Amendment 1)	75	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH12-AST-01	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH19-AST-07	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH26-AST-01	350	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH31-AST-02	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH31-AST-03	150	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]

Tank Number	Capacity (gallons)	Contents	STI Category	Integrity Test Method	Last Integrity Test	Next Integrity Test
NSA HQ-NH31-AST-04	150	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH31-AST-05	55	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH32-AST-01	898	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH33-AST-01	1,250	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH36-AST-01	100	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
~~NSA HQ-NH41-AST-01~~ (Removed in Amendment 1)	~~245~~	~~Diesel~~	~~3~~	~~STI Periodic, Formal External and Leak Test (10)~~	~~STI Periodic, Formal External and Leak Test October 2013~~	~~STI Periodic[A], Formal External and Leak Test October 2023~~
NSA HQ-NH41-AST-02 (Repairs confirmed in Amendment 1)	75	Diesel	1	STI Periodic	STI Periodic and Leak Test[B]	STI Periodic[A, B]
NSA HQ-NH41-AST-03 (Added in Amendment 1)	408	Diesel	1	STI Periodic	STI Periodic	STI PeriodicA
NSA HQ-NH46-AST-01	4,400	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH74-AST-01	100	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH75-AST-02	255	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH94-AST-06	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH94-AST-07	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH94-AST-08	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH94-AST-09	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH94-AST-10	1,000	Used Oil	1	STI Periodic	STI Periodic and Formal External[C] October 2012	STI Periodic[A, C]
NSA HQ-NH94-AST-11	1,000	Used Oil	1	STI Periodic	STI Periodic and Formal External[C] October 2012	STI Periodic[A, C]
NSA HQ-NH95-AST-01	200	Diesel	3	STI Periodic, Formal External and Leak Test (10)	STI Periodic, No Formal External and Leak Test Records Available	STI Periodic[A], Formal External and Leak Test **DUE IMMEDIATELY[D]**
NSA HQ-NH139-AST-01	75	Diesel	3	STI Periodic, Formal External and Leak Test (10)	STI Periodic, No Formal External and Leak Test Records Available	STI Periodic[A], Formal External and Leak Test **DUE IMMEDIATELY[D]**

Tank Number	Capacity (gallons)	Contents	STI Category	Integrity Test Method	Last Integrity Test	Next Integrity Test
NSA HQ-NH139-AST-02	75	Diesel	3	STI Periodic, Formal External and Leak Test (10)	STI Periodic, No Formal External and Leak Test Records Available	STI Periodic[A], Formal External and Leak Test **DUE IMMEDIATELY[D]**
NSA HQ-NH139-AST-03	200	Diesel	3	STI Periodic, Formal External and Leak Test (10)	STI Periodic, No Formal External and Leak Test Records Available	STI Periodic[A], Formal External and Leak Test **DUE IMMEDIATELY[D]**
NSA HQ-NH154-AST-01	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-NH200-AST-01	194	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-SC1-AST-01 (Added in Amendment 1)	382	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-SDA218-AST-01	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-SDA218-AST-02	500	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-SDA218-AST-03	500	Used Oil	3	STI Periodic, Formal External and Leak Test (10)	STI Periodic, No Formal External and Leak Test Records Available	STI Periodic[A], Formal External and Leak Test **DUE IMMEDIATELY[D]**
NSA HQ-SDA313A-AST-01	278	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]
NSA HQ-SDA332-AST-02	196	Diesel	1	STI Periodic	STI Periodic	STI Periodic[A]

[A] Integrity testing is fully met through routine monthly and annual periodic inspection; no date is provided.
[B] Leak Test conducted for data collection purposes. No follow-on leak testing required.
[C] Formal External conducted for data collection purposes. No follow-on formal external inspection required.
[D] No Formal External or Leak Test records available. Conduct required testing immediately, or configure tank to Category 1 status.

Portable Container Integrity Testing Program

Tank Number	Number of units	Contents	STI Category	Integrity Test Method	Last Integrity Test	Next Integrity Test
~~NSA HQ-BEN154-DSA-01~~ (Removed in Amendment 1)	~~2~~	~~Oil~~	~~3~~	~~STI Periodic~~	~~STI Periodic~~	~~STI Periodic~~
NSA HQ-CA477-DSA-01	3	Oil	1	STI Periodic	STI Periodic	STI Periodic
NSA HQ-CA501-PORT-01	1	Used Cooking Oil & Grease	3	STI Periodic	STI Periodic	STI Periodic
NSA HQ-MCA602-DSA-01 (Added in Amendment 1)	3	Used Cooking Oil	3	STI Periodic	STI Periodic	STI Periodic

Tank Number	Number of units	Contents	STI Category	Integrity Test Method	Last Integrity Test	Next Integrity Test
NSA HQ-MCA612-DSA-01 (Updated in Amendment 1)	5	Lube Oil, Hydraulic Oil	1	STI Periodic	STI Periodic	STI Periodic
~~NSA HQ-MCA612-DSA-02~~ (Removed in Amendment 1)	~~6~~	~~Lube oil~~	~~1~~	~~STI Periodic~~	~~STI Periodic~~	~~STI Periodic~~
~~NSA HQ-MCA612-DSA-03~~ (Removed in Amendment 1)	~~2~~	~~Hydraulic Oil, Gasoline~~	~~1~~	~~STI Periodic~~	~~STI Periodic~~	~~STI Periodic~~
~~NSA HQ-MCA612-DSA-04~~ (Removed in Amendment 1)	~~2~~	~~Gasoline~~	~~1~~	~~STI Periodic~~	~~STI Periodic~~	~~STI Periodic~~
NSA HQ-NH31C-PORT-01 (Added in Amendment 1)	1	Used Cooking Oil	3	STI Periodic	STI Periodic	STI Periodic
NSA HQ-NH94-DSA-01	2	Lube oil	3	STI Periodic	STI Periodic	STI Periodic
NSA HQ-NH94-DSA-02	1	Lube oil	3	STI Periodic	STI Periodic	STI Periodic
NSA HQ-NH94-DSA-03	1	Lube oil	3	STI Periodic	STI Periodic	STI Periodic
NSA HQ-SC404-PORT-01 (Added in Amendment 1)	1	Used Cooking Oil	3	STI Periodic	STI Periodic	STI Periodic

All steel drums and portable containers must be Department of Transportation tested and recertified every 12 years.

Piping Integrity Testing Program (9VAC25-91-130.B.4.)

Tank Number	Capacity (gallons)	STI Category	Last Pipe Integrity Test	Pipe Integrity Test Method	Next Required Pipe Integrity Test	Level Gauge Calibration
NSA HQ-CA501-AST-01	1,000	1	N/A[A,B]	N/A[A,B]	N/A[A,B]	N/A[A,B]
NSA HQ-NH94-AST-10	1,000	1	N/A[B]	N/A[B]	N/A[B]	N/A[B]
NSA HQ-NH94-AST-11	1,000	1	N/A[B]	N/A[B]	N/A[B]	N/A[B]

[A] The pipes are flexible rubber dispenser hoses. According to Virginia DEQ dispenser hoses are not subject to 9VAC25-91-130.B.4.
[B] These tanks are not subject to 9VAC25-91-130.B.4 because the facility aggregate aboveground storage capacity subject to regulation is <25,000 gallons.

Appendix G: Berm Inspection and Drainage Instructions

EPA SPCC regulations (40 CFR 112) require the emptying of secondary containment berms for oil storage tanks after rain events under responsible supervision. For tanks with open berms (no roof or enclosure preventing rain from collecting), the berm should be drained as soon as possible following a rain event to regain the full containment volume of the berm. The berm must first be inspected for sheen or oil. If oil is present in the berm (visible sheen or oil), the oil must be removed prior to discharge. If no oil or sheen is present, berm valve must be secured immediately following the drainage event and recorded using the Berm Discharge Log included in this appendix. The NSA HR Headquarters Environmental Protection Specialist can be contacted for cleanup options and assistance in determining the cause of the release. If the presence of oil is persistent, use of the tank should be discontinued until repairs can be made. The Berm Discharge Log records must be kept for five years.

Commander, Navy Region Mid-Atlantic
Berm Discharge Log

Activity Name		POC		Phone	

List Tank ID for all tanks inspected					

Berm discharge must be initiated within **1 WORKING DAY** of a rainfall event to regain the full containment volume of the berm. The following procedure **MUST** be followed:

1) Inspect the retained rainwater to ensure that there is no presence of oil or visible sheen.
2) If measurable oil is present in the berm:
   a. Immediately contact Emergency Dispatch.
   b. Follow Spill Reporting and message protocol in accordance with Hampton Roads Naval Installation Tenant Spill Reporting and Documentation Standard Operating Procedure (**Encl (2)**)
3) If visible sheen is present oil is present in the berm:
   a. Immediately contact Installation EPS.
   b. Follow Spill Reporting and message protocol in accordance with Hampton Roads Naval Installation Tenant Spill Reporting and Documentation Standard Operating Procedure (**Encl (2)**)
4) If oil is not present:
   a. Open the bypass (berm discharge) valve and drain the rainwater under responsible supervision.
   b. Immediately secure/close the bypass (berm discharge) valve after discharge of rainwater is complete.
5) Under no circumstances should rainwater with a visible sheen be released from the containment.
6) If the presence of sheen or oil is persistent, coordinate with Installation EPS and Petroleum Tank Media Manager (**Encl (1)**) for corrective action and/or repairs.
7) Record the berm discharge in the Berm Discharge Log below.
8) Retain this Berm Discharge Log for 5 years.

Date	**Sheen/Oil Present?*** (Y/N)	**Discharge Time** (if no sheen/oil present) Begin	End	**Inspector**	**Comments** *If sheen/oil present, denote volume removed by Oil Recovery

Date	**Sheen/Oil Present? *** (Y/N)	**Discharge Time** (if no sheen/oil present) Begin	End	**Inspector**	**Comments** *If sheen/oil present, denote volume removed by Oil Recovery

Appendix H: Oil-Filled Operational Equipment

The following is the NAVFAC Mid-Atlantic Standard Operating Procedure for the inspection of OFOE. It is in use at NSA HR Headquarters.

STANDARD OPERATING PROCEDURES (SOPs) FOR OIL-FILLED OPERATIONAL EQUIPMENT (OFOE) INSPECTIONS

Background

Oil-filled operational equipment (OFOE) is equipment that includes an oil storage container in which the oil is present solely to support the function of the apparatus or device. Types of OFE include electrical equipment such as transformers, electrical switches, and circuit breakers, as well as hydraulic systems, lubricating systems, gear boxes, machining coolant systems, heat transfer systems, certain aviation ground support maintenance equipment, and elevator hydraulic reservoirs.

40 CFR 112.2 specifically excludes OFOE from the definition of bulk storage container. The effect of this distinction is that OFOE is not subject to the sized secondary containment requirements of 112.8(c)(2). However, OFOE is subject to the general secondary containment requirements of 112.7 (b) and (c). 40 CFR 112.7 (c) requires that general secondary containment be provided for the most likely quantity of oil that would be released from OFOE. The required secondary containment is calculated based on volume and flow rate of the most likely release of oil from the OFOE.

40 CFR 112.7 (k) allows the facility to implement alternate requirements in lieu of general secondary containment required in paragraph 40 CFR 112.7 (c). This exception is allowable if (a) the facility has had no single discharge from any oil-filled operational equipment exceeding 1,000 US gallons and (b) no two discharges from any oil-filled operational equipment exceeding 42 US gallons within any twelve-month period in the three years prior to the SPCC Plan certification date (Qualification Criteria). The Alternative Requirements to general secondary containment require the facility to establish and document the facility procedures for inspections or a monitoring program to detect equipment failure and/or a discharge, have an Oil Spill Contingency Plan, and have a written commitment of manpower and resources to expeditiously control and remove any released oil. It is noted that the last two requirements are met if the facility has prepared a Facility Response Plan.

Procedures for Inspections

1. This SOP applies only to Navy-owned assets. The local utilities authority will be responsible for any response and clean-up actions to include notification of federal, state, and local authorities in the event of an incident involving OFOE owned by non-Navy entities. Navy response assets may be used on these OFOEs if required.

2. NSA HR Headquarters meets the qualification criteria as defined in §112.7(k)(1) and is allowed to employ alternate requirements to secondary containment for OFOE units as defined in §112.7(k)(2). When determining the applicability of this criterion, the gallon amount(s) specified in any spills (either 1,000 or 42) refers to the amount of oil that actually reaches navigable waters or adjoining shorelines, not the total amount of oil spilled. In the event that an installation no longer meets the qualification criteria, the SPCC Coordinator or the Tank Program Manager will re-assess the secondary containment strategy.

3. Inspections on electrical equipment will take place annually in accordance with applicable codes and industry standards such as IEEE Std 62–1995 (R2005) and NFPA 70B. Other OFOE will be inspected in accordance with specific equipment requirements or annually, whichever is most frequent.

4. In the event of a release of oil from Navy-owned OFOEs, call the installation EOC for emergency dispatch.

Transformers and Electrical OFEs Owned by NSA HR Headquarters

1. NAVFAC Mid-Atlantic Utilities Department at each installation will conduct an annual visual inspection of transformers and electrical OFOE with storage capacity of 55 gallons or more on an annual basis.

2. The MAXIMO production control software program automatically generates work requests to conduct the annual inspections. Records of the inspections can be retrieved through the MAXIMO system as required.

3. Monthly electrical meter readings can also be used to satisfy the inspections required in §112.7(k)(1)(i). Any leak will be identified and reported to the NSA HR Headquarters Fire Protection Division when the OFOE is physically visited to obtain a reading. Records of meter readings are maintained by the Utilities Department.

4. Typically, significant loss of oil from transformers would result in almost immediate overheating and shutdown, thereby triggering a maintenance call to restore electric service. This would also yield an immediate observation of a release of oil and would also activate the procedures in the SOP for ASTs.

Elevators

1. It is likely that any failure of the reservoir or hydraulic lift system will result in a discharge from the automatic elevator sump pump system installed in most elevator shafts.

2. All elevator reservoirs are part of a two-phase inspection program which, in part, assesses the overall condition of the hydraulic system and reservoir. Each elevator system is subject to a mandatory monthly safety inspection and a certification inspection every six months. These formal inspection programs adequately meet the inspection requirements under §112.7(k)(2)(i).

3. The MAXIMO production control software program automatically generates work requests to conduct the required elevator inspections. Records of the inspections can be retrieved through the MAXIMO system as required.

Other Types of OFOEs

1. OFOE other than electrical equipment and elevator reservoirs are routinely inspected by the equipment operators during the course of their duties. Typically there are no records of these routine daily inspections.

2. All available records of annual inspections for any other type of OFOE will be maintained by Utilities.

Enclosure 8. NSAHR HQ SWPPP

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PWD NSA HAMPTON ROADS

2019 Stormwater Pollution Prevention Plan (SWPPP)

NSA Hampton Roads

Contract No: N62470-16-D-9007
Delivery Order No: N40085-19-F6369

Final Report
April 2020

Prepared For:
NAVFAC Mid-Atlantic
Water Compliance Section
9324 Virginia Avenue
Norfolk, Virginia 23511

Prepared By:
Michael Baker International
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Virginia Beach, VA 23452

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Michael Baker
INTERNATIONAL

TRANSMITTAL

TO:	Brian Powell, NAVFAC Mid-Atlantic *(1 hard copy, 1 electronic copy)* Amy Hardy, PWD NSA HAMPTON ROADS *(2 hard copies, 2 electronic copies)*
FROM:	Elizabeth Krousel, Michael Baker *(1 hard copy, 1 electronic copy)*
COPIES:	James Kelly, Michael Baker LaToya Webb, Michael Baker Theresa Harris, Michael Baker
DATE:	April 29, 2020
PROJECT NAME:	**2019 Site Compliance Evaluation, Stormwater Pollution Prevention Plan, SWPPP Mapping Update and Cooling Tower and Boiler Inventory Plan, NSA Hampton Roads**
CONTRACT & DO #:	N62470-16-D-9007; DO# N40085-19-F6369
BAKER PROJECT #:	174521
SUBJECT:	**Task C: Stormwater Pollution Prevention Plan**
CD ENCLOSURE:	FINAL SWPPP Report
ATTACHMENT:	Response to Comments (RTC) matrix

Please find enclosed the FINAL Stormwater Pollution Prevention Plan (SWPPP) Report for Naval Support Activity Hampton Roads (NSA-HR), completed for Naval Facilities Engineering Command Mid-Atlantic (NAVFAC) Division under Contract No. N62470-16-D-9007, Delivery Order # N40085-19-F6369. The report was finalized after addressing the two comments documented in the attached Response to Comments (RTC) matrix. The associated map book is submitted under a separate cover.

As part of this effort, a total of ten (10) sites and twenty-six (26) outfalls were inspected. A total of five sites were determined to be industrial regulated and five were determined to be non-regulated sites that receive periodic inspections due to past site activities. As always, thank you for the continued opportunity to supply engineering support and services to NAVFAC Mid-Atlantic.

Prepared for: NAVFAC Naval Facilities Engineering Command

Contract Number: N62470-16-D-9007
Delivery Order: N40085-19-F6369

Comments for: DRAFT 2019 SWPPP and SWPPP Mapping for NSN and NSA HR Headquarters

No.	Location in Document	Comment	Creator	Additional Notes	Michael Baker International Response to Comment / Notes
1	NSA HR SWPPP Mapbook, Page Index	Please denote outfall locations.	AEH		Outfall locations were denoted on the NSA HR SWPPP Mapbook
2	NSA HR SWPPP Report, Figure 1-1 General Location Map	Please denote outfall locations.	AEH		Outfall locations were denoted on the NSA HR SWPPP Report on Figure 1-1

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LIST OF ACRONYMS AND ABBREVIATIONS

AFFF	Aqueous Film-Forming Foam
AST	Aboveground Storage Tank
Baker	Michael Baker International, LLC.
BMP	Best Management Practice
CFR	Code of Federal Regulations
CTBI	Cooling Tower and Boiler Inventory
CWA	Clean Water Act
DEQ	Department of Environmental Quality
DLA	Defense Logistics Agency
DLADS	Defense Logistics Agency Disposition Services
DMR	Discharge Monitoring Report
DO	Delivery Order
ECC	Emergency Communications Center
ECATTS	Environmental Compliance Assessment, Training, and Tracking System
EMS	Environmental Management System
EPA	Environmental Protection Agency
EPS	Environmental Protection Specialist
HR	Hampton Roads
HRSD	Hampton Roads Sanitation District
HVAC	Heating, Ventilation, and Air Conditioning
HWAA	Hazardous Waste Accumulations Area
IDS	Illicit Discharge Survey
MS4	Municipal Separate Storm Sewer System
NAVFAC	Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
NSA	Naval Support Activity
NSN	Naval Station Norfolk
OWS	Oil/Water Separator
PDMP	Pesticide Discharge Management Plan
PPT	Pollution Prevention Team
POL	Petroleum, Oil, and Lubricant
PWC	Public Works Center
RCRA	Resource Conservation and Recovery Act
SAA	Satellite Accumulation Area
SCE	Site Compliance Evaluation
SDA	South Depot Annex
SIC	Standard Industrial Classification
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Stormwater Pollution Prevention Plan
TSD	Treatment, Storage, and Disposal

USN	United States Navy
UST	Underground Storage Tank
VPDES	Virginia Pollutant Discharge Elimination System

2019 NSA Hampton Roads,

Certification as required by Part II, Section K of VPDES Permit VA0004421 (page 6 of 10)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____

Linda Hicks, Installation Environmental Program Director
By direction of the Commander

_____

Date

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EXECUTIVE SUMMARY

Michael Baker International, LLC (Baker), under contract with Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Division to provide engineering services (Contract Number N62470-16-D-9007; Delivery Order [DO] N40085-19-F6369), was tasked with the 2019 Site Compliance Evaluation (SCE), Stormwater Pollution Prevention Plan (SWPPP), SWPPP Mapping Update, and Cooling Tower and Boiler Inventory (CTBI) Plan for Naval Station Norfolk (NSN) and Naval Support Activity (NSA)- Hampton Roads (HR), Norfolk, Virginia. This document comprises the **2019 annual update to the SWPPP** for NSA-HR.

NSA-HR is currently regulated by Virginia Pollutant Discharge Elimination System (VPDES) Permit Number VA0004421 in accordance with the VPDES, Virginia State Water Control Law, and the Federal Clean Water Act (CWA). The VPDES permit sets requirements for sampling and analysis of runoff from both stormwater and non-stormwater sources and requires the development and implementation of a SWPPP to identify potential sources of pollution that may affect the water quality of stormwater discharges associated with an industrial activity. The objectives of the SWPPP are to identify the regulated industrial activities at the facility and describe the best management practices (BMPs) to implement at the activities to reduce the potential pollutants in stormwater discharges associated with industrial activity. The previous permit expired on 3 May 2016 which covers both NSN and NSA-HR. NSN is currently in the process of renewing the VPDES permit. This SWPPP has been conducted in accordance with the existing permit, effective 4 May 2011 through 3 May 2016. While NSA-HR is currently covered under VPDES Permit VA0004421 with NSN; the installation is planning to seek coverage under their own permit, but the exact timeframe for this action has yet to be determined.

A comprehensive survey was completed of the entire installation to identify activities onsite with the potential for stormwater pollution. The survey functioned as a screening mechanism and then a more detailed site investigation was completed for buildings/areas that may be regulated under the VPDES permit requirements and/or have the potential to contribute to stormwater pollution.

A total of 10 sites were inspected as part of the field work conducted between 7 November and 9 December 2019. A total of five sites were determined to be industrial regulated and five were determined to be non-regulated sites that receive periodic inspections due to past site activities. In addition, 26 outfalls were inspected and evaluated to assess coverage under the VPDES permit. Outfall 200, a non-regulated outfall, is not listed in the GIS and was therefore not evaluated. Pertinent site information was documented at all sites identified as industrial regulated, including site description, site activities, potential pollutants, method of on-site storage or disposal, existing BMPs to be maintained (in the categories of structural and nonstructural), and additional recommended BMPs, which were categorized as high-priority (mandatory), medium-priority (recommended), and low-priority (for consideration). No high-priority BMPs were identified during the 2019 comprehensive site inspections. Several low priority BMPs and two medium-priority BMP were identified during the 2019 comprehensive site inspection with recommended additional action for NSA-HR.

Activities regulated by the Virginia Department of Environmental Quality (DEQ) industrial stormwater permit are categorized by industrial sector. The sectors group facilities by the nature of industrial activity, type of materials handled, and material management practices employed and are for the most part based on a facility's Standard Industrial Classification (SIC) code. The sectors applicable to facilities at NSA-HR, regulated by VPDES Permit Number VA0004421 are identified below. Note that some sites may have multiple sectors applicable to them.

- Sector N: Scrap Recycling and Waste Recycling Facilities (1 sites)
- Sector P: Land Transportation and Warehousing Facilities (3 sites)

- Sector AD: Non-Classified Facilities (2 sites)

Additional information presented in the SWPPP includes:

- Pollution Prevention Team (PPT) members
- Additional permit requirements (including annual comprehensive site compliance evaluations, SWPPP storage and update requirements, and outfall monitoring)
- Assessment of potential pollutant sources
- Details on stormwater conditions and control measures for regulated industrial activities
- References used to populate information for the SWPPP

SWPPP Update Snapshot

SITE INFORMATION:	# of Sites Inspected: 10	# of Industrial Regulated Sites: 5	# of Non–Industrial Sites: 5	Total # of Sites: 10
Recommended Changes from 2018 to 2019:	*# of Sites Inspected:* 10	*# of Recommended Additional Industrial Sites:* 0	*# of Sites Recommended for Removal from Industrial:* 0	*Total # of Changes from 2018 to 2019:* 0
OUTFALL INFORMATION:	Outfalls Inspected: 26	# of Industrial Regulated Monitored Outfalls Inspected: 5	# of Non–Industrial Monitored Outfalls Inspected: 21	Total # of Outfalls: 26
RECOMMENDED BMP INFORMATION:	High Priority BMPs Recommended: 0	Medium Priority BMPs Recommended: 2	Low Priority BMPs Recommended: Numerous	Total BMPs Recommended: Numerous

1. Introduction

This section of the report provides the authorization and scope for this project, background and site overview, outline of the content of the report, summary of stormwater drainage areas, overview of regulations, and a summary of activities at NSA Hampton Roads (NSA-HR).

Authorization and Scope

Michael Baker International, LLC. (Baker), under contract with Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Division to provide engineering services (Contract Number N62470-16-D-9007; Delivery Order [DO] N40085-19-F6369), was tasked with the 2019 Site Compliance Evaluation (SCE), Stormwater Pollution Prevention Plan (SWPPP), SWPPP Mapping Update, and Cooling Tower and Boiler Inventory (CTBI) Plan for Naval Station Norfolk (NSN) and Naval Support Activity (NSA) - Hampton Roads (HR), Norfolk, Virginia. This document comprises the **2019 annual update to the SWPPP** for NSA-HR.

Background and Site Overview

NSA Hampton Roads, located in the City of Norfolk, Virginia, has the largest concentration of fleet headquarters administrative and communication facilities outside of Washington, D.C. The receiving waters for NSA Hampton Roads are Oastes Creek, the Elizabeth River, and Boush Creek. NSA Hampton Roads is bounded to the north by Naval Station Norfolk and to the east, south, and west by the City of Norfolk. Refer to **Figure 1-1** for a general location map. Additional detailed information can be found in the SWPPP Mapbook provided under separate cover.

The mission of NSA Hampton Roads is to provide consistent, operationally ready, and secure shore installation support services that allow tenant activities to dedicate their resources to warfighting, forward operations, and combat readiness. NSA-HR tenant organizations include Camp Allen, Joint Forces Staff College, United States Navy Shipboard Firefighting School, Defense Logistics Agency (DLA), a Marine Corps compound, and North Atlantic Treaty Organization Headquarters. These organizations include numerous maintenance shops, housing areas, vocational and training schools, and administrative support facilities.

The Navy currently has a joint permit that includes NSN and NSA-HR and is required to file for an individual Virginia Pollutant Discharge Elimination System (VPDES) permit due to the non-stormwater discharges at NSN that are not allowable under the general permit and other industrial stormwater discharges designated by the Virginia Department of Environmental Quality (DEQ) Director. The permit will be divided by installation in the future and NSA-HR will seek coverage under the general permit. NSA-HR has been issued VPDES Permit Number VA0004421 in accordance with the VPDES, the Virginia State Water Control Law, and the Federal Clean Water Act (CWA). The VPDES Permit Number 0004421, effective 4 May 2011 through 3 May 2016, is included as **Appendix AA**. The permit covers 248 outfalls that discharge stormwater associated with industrial activity, 52 of these are monitored through analytical sampling and 20 discharge process wastewater. These process discharges include deicing, once-through non-contact equipment cooling water, and wastewater discharges associated with the operation and maintenance of cooling towers that contain chemical additives.

The previous permit expired on 3 May 2016. NSN and NSA-HR is currently in the process of renewing the VPDES permit. This SWPPP has been conducted in accordance with the existing

permit, effective 4 May 2011 through 3 May 2016, and included in **Appendix AA**. This is anticipated to be the final SWPPP update under the existing permit before NSA-HR starts coverage under a new permit.

Content of Report

The purpose of this report is to present the updated SWPPP, which is required by VPDES Permit Number 0004421. The SWPPP contains five sections and related appendices:

- **Section 1** presents an introduction to the report, including authorization and scope, an overview of the site, a description of the report organization, summary of stormwater outfall drainage areas, background information on the regulatory requirements, and a summary of activities at NSA-HR.
- **Section 2** includes the planning and organization of the Pollution Prevention Team (PPT), whose role it is to oversee this SWPPP, as well as information on the annual inspection reports and update requirements.
- **Section 3** provides an assessment of potential pollutant sources and a summary of discharge monitoring data.
- **Section 4** describes the stormwater conditions and controls that relate to regulated industrial activities at NSA-HR.
- **Section 5** presents the references for development of this report and supporting materials.
- **Appendices** include the site-specific reference information required by the VPDES permit.
  - **Appendix A.1** Regulated Monitored Stormwater Outfalls
  - **Appendix A.2** Regulated Non-Monitored Stormwater Outfalls
  - **Appendix A.3** Non-Industrial Permitted Stormwater Outfalls
  - **Appendix A.4** Municipal Separate Storm Sewer System (MS4) Stormwater Outfalls
  - **Appendix B.1** Industrial Activities by Outfall
  - **Appendix B.2** Outfall Grouping Justification
  - **Appendix C** Dry-Weather Flow Observations
  - **Appendix D** Inventory of Outdoor Storage Areas
  - **Appendix E** Inventory of Aboveground Storage Tanks
  - **Appendix F** Inventory of Outdoor Liquid Transfer Operations
  - **Appendix G** Inventory of Aircraft Wash Rack Areas
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- **Appendix M** Inventory of Vehicle/Equipment Fueling Areas
- **Appendix N** Inventory of Ship Maintenance/Repair Areas
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- **Appendix S** Quarterly Visual Monitoring
- **Appendix T** Sampling Data 2008-2019
- **Appendix U** Monitoring Requirements
- **Appendix V** Spills and Leaks
- **Appendix W** Oil/Water Separators (OWSs)
- **Appendix X** Structural BMPs Recommended for Implementation
- **Appendix Y** Non-Structural BMPs Recommended for Implementation
- **Appendix Z** Recommended Buildings for Inspections
- **Appendix AA** VPDES Permit Number VA0004421, effective 4 May 2011 through 3 May 2016

This SWPPP establishes a comprehensive program to control stormwater discharge from NSA-HR. This plan identifies and maps potential pollutant sources that could contribute to the contamination of stormwater discharge. These sources include outdoor industrial activity, process areas, materials storage areas, loading and unloading areas, liquid transfer areas, and waste disposal practices that are exposed to stormwater.

Included in Section 4 are specific best management practices (BMPs) to prevent or minimize material exposure to stormwater. Additional inspection, operation, and maintenance programs are implemented to improve the effectiveness of ongoing pollution abatement practices.

The SWPPP and appendices are supplemented by mapping that provides the location of industrial activities exposed to rainfall, material storage areas, materials loading and access areas, and existing BMPs. The report and mapping (submitted under separate cover) are provided in formats to facilitate the periodic update of the SWPPP by NAVFAC Mid-Atlantic personnel so that the document is a “living document”.

Summary of Stormwater Outfall Drainage Areas

Outfalls occurring at NSA-HR, as identified within the current VPDES permit, have been numbered according to where they discharge, as follows:

- **200-208** – discharge to the Elizabeth River
- **600-617** – discharge to Bousch Creek

Appendices A.1 and **A.2** list the outfall number, latitude, longitude, total drainage area in acres, impervious area in acres, receiving stream, permitted activities, and building and structure

numbers associated with monitored and non-monitored outfalls, respectively. Outfalls not subject to this permit are listed in **Appendix A.3**.

Prefixes used to identify the various outfalls at NSA-HR include the following:

- **NP** – outfalls not subject to VPDES Permit Number VA0004421 since "not permitted"
- **SF** – areas that drain by "sheet flow" and are therefore not covered under VPDES Permit Number VA0004421.

MS4 Regulated Outfalls

Information for outfalls covered under the MS4 permit has been added to the report in **Appendix A.4** and includes the following information for each outfall:

- Unique identifier
- Estimated MS4 acreage served
- Name of the receiving surface water and indication as to whether the receiving water is listed as impaired in the Virginia Draft 2016 303(d)/305(d) Water Quality Assessment Integrated Report
- Applicable Total Maximum Daily Load
- Associated Hydrologic Unit Code

Other than the inventory of non-permitted outfalls and MS4 outfalls identified in **Appendices A.3** and **A.4**, this SWPPP is limited to the industrial outfalls regulated by VPDES Permit Number VA0004421.

Overview of Regulations

The following sections provide an overview of the federal and state regulations that govern the regulatory compliance for industrial stormwater discharges.

Federal Regulations

Section 402(p) of the CWA requires that operators of "discharges associated with industrial activity" obtain a National Pollutant Discharge Elimination System (NPDES) permit. In 1990, the U.S. Environmental Protection Agency (EPA) developed permitting regulations under the Phase I NPDES to control stormwater discharges associated with the following eleven categories of industrial activity, as identified in Title 40 of the Code of Federal Regulations (CFR), Subsection 122.26(b)(14)(i)-(xi).

- Category One (i): Facilities subject to federal stormwater effluent discharge standards in 40 CFR Parts 405-471
- Category Two (ii): Heavy manufacturing (for example, paper mills, chemical plants, petroleum refineries, and steel mills and foundries)
- Category Three (iii): Coal and mineral mining, and oil and gas exploration and processing
- Category Four (iv): Hazardous waste treatment, storage, or disposal facilities
- Category Five (v): Landfills, land application sites, and open dumps with industrial wastes

- Category Six (vi): Metal scrapyards, salvage yards, automobile junkyards, and battery reclamation
- Category Seven (vii): Steam electric power generating plants
- Category Eight (viii): Transportation facilities that have vehicle maintenance, equipment cleaning, or airport deicing operations
- Category Nine (ix): Treatment works treating domestic sewage with a design flow of one million gallons a day or more
- Category Ten (x): Construction activities, including clearing, grading, and excavating, that result in land disturbance of equal to or greater than one acre and less than five acres
- Category Eleven (xi): Light manufacturing (e.g., food processing, printing and publishing, electronic and other electrical equipment manufacturing, and public warehousing and storage)

State Regulations

Activities regulated by the Virginia DEQ industrial stormwater permit are also categorized by industrial sector. The sectors group similar facilities by the nature of industrial activity, type of materials handled, and material management practices employed and are for the most part based on a facility's Standard Industrial Classification (SIC) code. The sectors are listed below, along with the associated, regulated SIC code:

- Sector A: Timber Products Facilities
  - SIC Codes: 2411, 2421, 2426, 2429, 2431-2439, 2441, 2448, 2449, 2451, 2452, 2491, 2493, and 2499
- Sector B: Paper and Allied Products Manufacturing Facilities
  - SIC Codes: 2611, 2621, 2631, 2652-2657, and 2671-2679
- Sector C: Chemical and Allied Products Manufacturing and Refining Facilities
  - SIC Codes: 2812-2819, 2821-2824, 2851, 2861-2869, 2873-2879, 2891-2899, and 3952
- Sector D: Asphalt Paving and Roofing Materials and Lubricant Manufacturing Facilities
  - SIC Codes: 2951, 2952, 2992, and 2999
- Sector E: Glass, Clay, Cement, Concrete, and Gypsum Product Facilities
  - SIC Codes: 3211, 3221, 3229, 3231, 3241, 3251-3259, 3261,3269, 3274, 3275, 3281, and 3291-3299
- Sector F: Primary Metals Facilities
  - SIC Codes: 3312-3317, 3321-3325, 3331-3339, 3341, 3351-3357, 3363-3369, 3398, and 3399
- Sector G: Metal Mining (Ore Mining and Dressing) Facilities
  - SIC Codes: 1011, 1021, 1031, 1041, 1044, 1061, 1081, 1094, and 1099
- Sector H: Coal Mines and Coal Mining-Related Facilities
  - SIC Codes: 1221-1241

- Sector I: Oil and Gas Extraction and Refining Facilities
  - SIC Codes: 1311, 1321, 1381-1389, and 2911
- Sector J: Mineral Mining and Dressing Facilities
  - None
- Sector K: Hazardous Waste Treatment, Storage, or Disposal Facilities
  - SIC Codes: HZ
- Sector L: Landfills, Land Application Sites, and Open Dumps
  - SIC Codes: LF
- Sector M: Automobile Salvage Yards
  - SIC Codes: 5015
- Sector N: Scrap Recycling and Waste Recycling Facilities
  - SIC Codes: 5093, and 4499
- Sector O: Steam Electric Generating Facilities
  - SIC Codes: SE
- Sector P: Land Transportation and Warehousing Facilities
  - SIC Codes: 4011, 4013, 4111-4173, 4212-4231, 4311, and 5171
- Sector Q: Water Transportation Facilities
  - SIC Codes: 4412-4499 (except 4499)
- Sector R: Ship and Boat Building and Repair Yards
  - SIC Codes: 3731, 3732
- Sector S: Air Transportation Facilities
  - SIC Codes: 4512-4581
- Sector T: Treatment Works
  - SIC Codes: TW
- Sector U: Food and Kindred Products Facilities
  - SIC Codes: 2011-2015, 2021-2026, 2032-2038, 2041-2048, 2051-2053, 2061-2068, 2074-2079, 2082-2087, 2091-2099, and 2111-2141
- Sector V: Textile Mills, Apparel, and Other Fabric Products Manufacturing
  - SIC Codes: 2211-2299, 2311-2399, and 3131-3199 (except 3111)
- Sector W: Furniture and Fixtures Facilities
  - SIC Codes: 2434, 2511-2599
- Sector X: Printing and Publishing Facilities
  - SIC Codes: 2711-2796

- Sector Y: Rubber, Miscellaneous Plastic Products, and Miscellaneous Manufacturing Industries
    - SIC Codes: 3011, 3021, 3052, 3053, 3061, 3069, 3081-3089, 3931, 3942-3949, 3951-3955 (except 3952), 3961, 3965, and 3991-3999
- Sector Z: Leather Tanning and Finishing Facilities
    - SIC Codes: 3111
- Sector AA: Fabricated Metal Products Facilities
    - SIC Codes: 3411-3499, and 3911-3915
- Sector AB: Transportation Equipment, Industrial or Commercial Machinery Facilities
    - SIC Codes: 3511-3599 (except 3571-3579) and 3711-3799
- Sector AC: Electronic and Electrical Equipment and Components, Photographic and Optical Goods Facilities
    - SIC Codes: 3571-3579, 3612-3699, and 3812-3873
- Sector AD: Non-Classified Facilities / Stormwater Discharges Designated by the Board as Requiring Permits
    - Other stormwater discharges designated by the Regional Director or Board

The specific sectors applicable to facilities at NSA-HR regulated by VPDES Permit Number VA0004421 are identified below. Note that some sites may have multiple sectors applicable to them.

- Sector N: Scrap Recycling and Waste Recycling Facilities (1 site)
- Sector P: Land Transportation and Warehousing Facilities (3 sites)
- Sector AD: Non-Classified Facilities (2 sites)

Most industrial stormwater discharges are covered under general permits, as opposed to individual permits, although States and EPA can and do issue individual permits to some facilities based on site- or industry-specific concerns. NSA-HR has authorization to discharge under an individual permit (Industrial Minor), VPDES Permit Number VA0004421, which requires that a facility with regulated industrial activities develop a SWPPP. The specific requirements listed in Part I of the permit are listed below along with the corresponding section in this document that addresses the requirement.

- Part I.B.6 (page 32/89): Non-Contact Cooling Water Systems and Boiler Additives (Section 3)
- Part I.D.1.f (page 45/89): Quarterly Visual Monitoring (Section 3)
- Part I.D.1.g (page 47/89): Allowable Non-Stormwater Discharge (Section 3)
- Part I.D.1.i (page 49/89): Co-Located Industrial Activities (Section 4)
- Part I.D.1.j (page 49/89): Salt Storage (Section 3)
- Part I.D.2.b(1) (page 50/89): Pollution Prevention Team (Section 2)
- Part I.D.2.b(2) (page 51/89): Site Description (Appendices and Mapbook)
- Part I.D.2.b(3) (page 52/89): Summary of Potential Pollutant Sources (Section 3)

- Part I.D.2.b(4) (page 53/89): Spills and Leaks (Section 3 and Appendix V)
- Part I.D.2.b(5) (page 53/89): Sampling Data (Section 3 and Appendices T & U)
- Part I.D.2.b(6) (page 53/89): Stormwater Controls (Section 4)
- Part I.D.2.c (page 58/89): SWPPP Maintenance (Section 2)
- Part I.D.2.d (page 58/89): Comprehensive Site Compliance Evaluation (Section 2)
- Part I.D.2.e (page 60/89): Signature and Plan Review (Section 2)
- Part I.D.2.f (page 61/89): Maintaining an Updated SWPPP (Section 2)
- Part I.D.3 (page 62/89): Scrap Recycling and Waste Recycling Facilities (Section 4)
- Part I.D.4 (page 72/89): Various Land Transportation Facilities (Section 4)
- Part I.D.5 (page 76/89): Ship and Boat Building or Repair Yards (Section 4)
- Part I.D.6 (page 82/89): Air Transportation (Section 4)

Summary of Activities at NSA-HR

A list of the sites/buildings regulated under VPDES Permit Number VA0004421, along with their designated SIC code and associated description is summarized in **Table 1-1**.

Table 1-1
Summary of Regulated Industrial Activities and Associated SIC Codes at NSA-HR

Outfall(s)	Building	Map Sheet	2019 Sector	2019 SIC Code	Industrial Activity Description
207, 208	SDA-205	T-4, U-4, U-5	P	4225	General Warehousing and Storage
207, 208	SDA-210	T-4, U-4	N, P	5093, 4225	Scrap and Waste Materials and General Warehousing and Storage
208	SDA-204	U-4, U-5	P	4225	General Warehousing and Storage
605	MCA-612	P-9, P-10	AD	7699	Vehicle Maintenance or Land Transportation,
611, 612 [1]	NH-31A	S-8, T-8	AD	7699	Operations level vehicle maintenance and repair

[1]This table displays the outfalls as permitted under VPDES Permit No. VA000442 and does **not** reflect the updates as a result of the 2018 basin re-delineations.

All sites were determined to be in compliance with the SWPPP and permit requirements during the 2019 SCE investigation. There were no changes identified at NSA-HR during the 2019 SCE inspections.

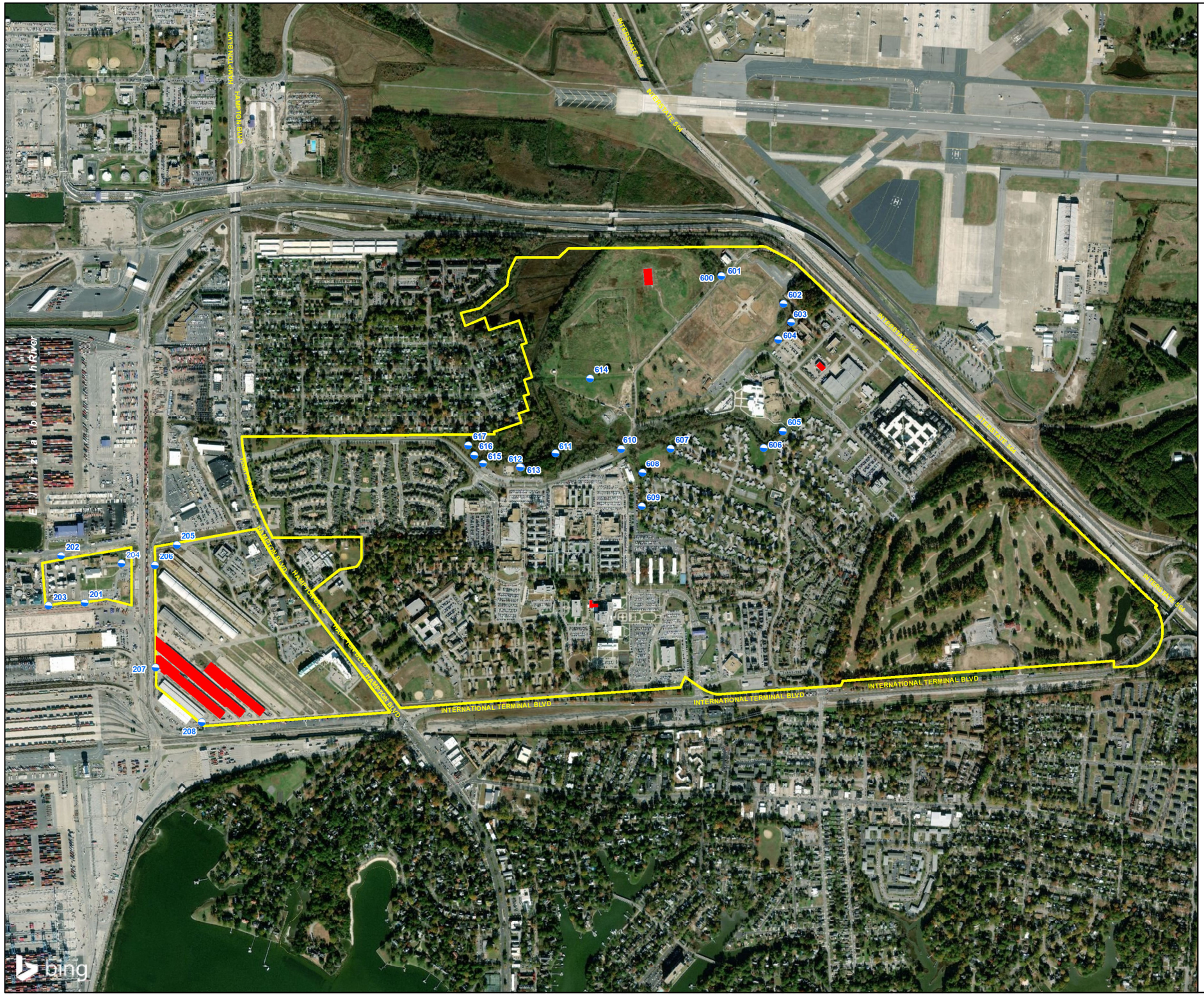

Figure 1-1
General Location Map
NSA Hampton Roads
Norfolk, Virginia

Legend

- Outfalls
- SWPPP Regulated Area
- NSA Hampton Roads

Michael Baker INTERNATIONAL

NAVFAC Naval Facilities Engineering Command

1,100 550 0 1,100 Feet

1 inch = 1,100 feet

NSA Hampton Roads
Baker Project No: 174521
Contract No: N62470-16-D-9007
Delivery Order No: N40085-19-F6369

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2. Planning and Organization

This SWPPP establishes an organizational hierarchy to plan and implement stormwater control measures in accordance with existing environmental pollution prevention/contingency plans and unit-level operational activities at NSA-HR. This section outlines some of the key components to planning and organizing the implementation of these items.

Pollution Prevention Team

A PPT has been identified to oversee implementation, maintenance, and revision of the NSA-HR SWPPP. The PPT members were chosen for their ability to address a variety of topics pertaining to implementation of this SWPPP, to include:

- Inventories and inspections of hazardous material, hazardous wastes, and petroleum, oil, and lubricant (POL)
- Implementation of pollution prevention training
- Development of safety inspection procedures for hazardous materials
- Implementation of spill response and cleanup
- Development and implementation of BMPs

Members of the PPT and their roles and responsibilities include:

- Installation Water Program Manager for NSA-HR
  - Develop the SWPPP to ensure compliance with provisions of VPDES Permit Number VA0004421
  - Implement, maintain, and revise the SWPPP
  - Review, prioritize, and implement BMPs
  - Provide tenant stormwater training, as deemed necessary
- NSA-HR Environmental Protection Specialist (EPS)
  - Conduct SWPPP inspections and report any noncompliance to the Water Program Manager
  - Periodically patrol the base to ensure compliance at sites that are not routinely inspected
  - Provide input for review, prioritization, and implementation of BMPs
  - Provide and/or coordinate tenant stormwater training, as deemed necessary
  - Maintain records of periodic stormwater inspections and training
- Other members of the PPT are designated as necessary by the Installation Water Program Manager and the Installation Environmental Program Director.

PPT meetings are held as needed, with continuing discourse outside of formal meetings, to:

- Discuss operational status of regulated facilities
- Identify areas with a high pollution potential
- Evaluate and prioritize the need for BMP implementation
- Identify and assess potential new sites and new tenants for BMP implementation

Site Compliance Evaluations

The identification of potential BMPs or modifications to existing BMPs is facilitated by the use of information gathered from annual SCEs, water quality monitoring data, spill reports, interviews, and personnel suggestions. The information collected is reviewed to identify the need to implement both structural and nonstructural BMPs. BMP recommendations are categorized as low-priority (for consideration); medium-priority (recommended); or high-priority (mandatory).

The following items were evaluated in accordance with VPDES Permit Number VA0004421, Part I, Section D.2.d (1):

- Industrial materials, residue, or trash that may have or could come into contact with stormwater
- Leaks or spills from industrial equipment, drums, barrels, tanks, or any other containers that have occurred within the past three years
- Offsite tracking of industrial or waste materials or sediment where vehicles enter or exit the site
- Tracking or blowing of raw, final, or waste materials from non-exposed areas to exposed areas
- Evidence of, or the potential for, pollutants entering the drainage system
- Evidence of pollutants discharging to surface waters at all facility outfalls, and the condition of and around the outfall, including flow dissipation measures to prevent scouring
- Review of training performed, inspections completed, maintenance performed, quarterly visual examinations, and effective operation of BMPs
- Results of both visual and analytical monitoring conducted during the past year

In addition to these items identified within the permit, the following evaluations were conducted during the SCE:

- A visual inspection of equipment needed to implement the SWPPP, such as spill response equipment
- Verification of SWPPP site maps, including associated materials storage location revisions, and changes in storm drainage conveyance systems and/or drainage boundaries
- Recommendations for plan improvement to reduce pollutant loading to the stormwater drainage system
- A review of annual Discharge Monitoring Report (DMR) data to verify that existing BMPs are preventing stormwater pollutants from discharging at levels exceeding monitoring requirements

In accordance with Part I, Section D.2.d (2) (page 59 of 89), the SWPPP must be updated within 30 days unless permission for a later date is granted in writing by Virginia DEQ. If existing BMPs need to be modified or if additional BMPs are necessary, implementation shall be completed before the next anticipated storm event, if practicable, but not more than 60 days after completion of the comprehensive site evaluation, unless permission for a later date is granted in writing by Virginia DEQ.

Site-specific BMPs are presented in the SCE Report and SCE Forms (under separate cover). Structural and non-structural BMPs are identified in **Appendix X** and **Appendix Y**, respectively.

SWPPP Storage and Update Requirements

The industrial stormwater permit includes specific storage and maintenance (updating) requirements. Some of these are mentioned in other sections of this report because they apply to specific requirements such as inspections or monitoring; however, these requirements are repeated here to assist with SWPPP compliance and implementation.

In accordance with Part I, Section D.2.e (1) (page 60 of 89), the SWPPP shall be signed, dated, and retained onsite at the facility covered by the permit in accordance with Part II.B.2. The SWPPP is stored and maintained at Building NH-34 by the NSA-HR Water Program Manager. In accordance with Part I, Section D.2.e (2) (page 60 of 89), the SWPPP, annual SCE report, and other information are available to the Virginia DEQ and other regulatory agencies upon request.

In addition to any revisions required from the annual SCE, in accordance with Part I, Section D.2.f (1) (page 61 of 89), the SWPPP shall be reviewed and amended as appropriate whenever any of the following conditions apply:

- There is construction or a change in design, operation, or maintenance at the facility that has a significant effect on the discharge, or the potential for the discharge, of pollutants from the facility
- Routine inspections or compliance evaluations determine that there are deficiencies in the BMPs
- Inspections by local, state, or federal officials determine that modifications to the SWPPP are necessary
- There is a spill, leak, or other release at the facility
- There is an unauthorized discharge from the facility

In accordance with Part I, Section D.2.f (2) (page 61 of 89), SWPPP modifications shall be made within 30 calendar days after discovery, observation, or an event trigging a SWPPP modification. Implementation of new or modified BMPs (distinct from regular preventive maintenance of existing BMPs) shall be initiated before the next storm event, if possible, but no later than 60 days unless otherwise provided or approved by the Virginia DEQ. The amount of time taken to modify a BMP or implement additional BMPs shall be documented in the SWPPP.

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3. Assessment of Potential Pollutant Sources

This section of the report describes the regulated industrial activities at NSA-HR (e.g., recycling operations, and vehicle/equipment repair, maintenance, and fueling, warehouse distribution, etc.), discharge monitoring data, spills and leaks, and identification of non-stormwater discharges.

Site Mapping

Field investigations are periodically conducted to update existing and identify new sources of stormwater pollution. These sources are presented in the SWPPP Mapbook (provided under separate cover) as a combination of symbols and shapes to designate areas where spills and leaks have occurred, industrial activities, BMPs, material storage areas, hazardous materials/waste storage, POL storage, material loading and access areas, and chemical application areas. A detailed description of the major sources that can potentially pollute stormwater is provided in the following sections.

Potential Pollutant Sources

Appendix B.1 presents a summary of industrial activities by outfall. Only outfalls associated with regulated industrial activities are included in the summary. **Appendix B.2** is the Outfall Grouping Justification representing the current industrial activities.

Pollution potential ratings are categorized as low, medium, or high potential dependent on a risk assessment of pollutant releases to navigable waterways. The definition for each risk category for pollution potential is as follows:

- **Low** – Low risk of stormwater exposure that is unlikely to result in a measurable impact. Additional BMPs are not warranted.
- **Medium** – Potential risk to stormwater runoff with possible environmental impacts. Additional BMPs may be appropriate.
- **High** – Conditions require implementation of BMPs to prevent impact to stormwater. Note that material exposed to stormwater is not necessarily an indicator of current environmental damage. Additional BMPs are warranted.

These ratings are based on the following criteria:

- Type and quantity of stored material
- Type of containment provided (if applicable)
- Type of cover provided (if applicable)
- Proximity to navigable waterways, tributaries, and associated storm drains
- Topography (mild, medium, or steep slopes)
- Presence of vegetative buffers (filtering and reduced runoff velocities)
- Soil type (infiltration and adsorption)

- Documented spills
- Evidence of spills

Identified stormwater-related inventories in **Appendices D, G, H, I, K, L, M, N, P,** and **Q** have been assigned pollution potential ratings based on the above criteria. Note that while the same terms are used, this is a separate rating system than the one described in the Site Compliance Evaluation section pertaining to BMP recommendations.

Inventory of Outdoor Material Storage Areas

Appendix D depicts an inventory of outdoor material storage areas categorized by outfall or sheet flow drainage area, location/building number, drainage map page, type of storage (open, dumpster, covered, compressed gas cylinder, etc.), materials, quantity, whether or not the storage area is covered, material containment, and the stormwater pollution potential rating.

Inventory of Outdoor Aboveground Storage Tanks

Appendix E depicts an inventory of aboveground storage tanks (ASTs) categorized by outfall or sheet flow drainage area, location/building number, map page, material/fuel stored, intended use, volume, containment area description (double-walled, open top berm, etc.), and containment volume rating. A Containment Volume/Tank Volume ≥ 1 was deemed to be adequate. Any ratio greater than one was deemed adequate, while any ratio under one was deemed not adequate.

Inventory of Outdoor Liquid Transfer Operations

Appendix F depicts an inventory of outdoor liquid transfer operations categorized by outfall or sheet flow drainage area, building number, activity location map page, type of fuel operation, materials being transferred, maximum spill quantity, and containment type description (none, double-walled, concrete, etc.).

Vehicular Operations

The following sections present the specific industrial activities related to vehicular operations that occur at NSA-HR.

Vehicle and Associated Equipment Washing

Government-owned as well as private vehicles and equipment are washed as needed at designated locations around NSA-HR. Designated wash racks at these sites are equipped with either an OWS or a diversion valve to direct flow to the sanitary sewer and prevent non-permitted discharges. **Appendix K** provides a summary of the vehicle and equipment washing areas at NSA-HR, including outfalls, location/building numbers; map page numbers; discharge areas; the type of vehicle/equipment being washed; whether or not the wash area has containment curbing, is covered, detergent is used, and has an OWS; and the pollution potential.

Vehicle Maintenance and Storage

Preventative maintenance and general repair services on automobiles, vans, trucks, forklifts, mobile refuelers, and emergency vehicles are performed at various maintenance facilities at NSA-

HR. Related activities may include fluid changes, mechanical repairs, parts cleaning and replacement, sanding, refinishing, painting, and vehicle and equipment storage. These facilities may also store used parts, such as batteries, belts, hoses, tires, and other materials. Additionally, used/waste liquid storage may be onsite, including POLs, fuel, antifreeze, cleaners, and solvents.

Most vehicle maintenance activities at NSA-HR occur indoors and therefore are usually not exposed to stormwater. Spills may occur within these buildings during repair activities as a result of leaking, ruptured, and overturned containers, or leaking vehicles and associated equipment. Therefore, these facilities have spill response procedures and spill kits readily available. **Appendix L** provides a summary of the vehicle maintenance areas that includes outfalls, location/building numbers, map page numbers, a description of activities, and pollution potential.

Vehicle Fueling

Common activities at NSA-HR include motor vehicle and equipment fueling. During these activities, fuel products are transferred from bulk fueling sites, mobile refuelers, underground storage tanks (USTs), or ASTs to the serviced vehicle or equipment. Activities associated with fueling include delivery and transfer, storage, and dispensing. Primary fuel types used at NSA-HR are gasoline, and diesel.

To prevent or reduce accidental spills and overfills, leak detection systems and overfill alarms are installed on all USTs. ASTs have liquid level gauges, overflow alarms, and are typically located within secondary containment or have an environmental equivalent.

Appendix M contains a list of vehicle/equipment fueling areas at NSA-HR including associated outfalls, location/building numbers, map page numbers, activity descriptions, and pollution potential.

Hazardous Waste Accumulation Areas

Nine areas throughout NSA-HR are designated as hazardous waste storage sites, and associated activities are managed by the NAVFAC Mid-Atlantic Waste Department. These sites are characterized as either <90 day hazardous waste accumulations areas (HWAAs) or satellite accumulation areas (SAAs), as determined by the waste generated. Typically, these hazardous waste storage sites are utilized for the storage of used/waste POLs, waste paint, fluorescent bulbs, lithium or nicad batteries, and spent solvent. Personnel responsible for management of hazardous wastes must maintain training on an annual basis.

NSN is equipped with a Treatment, Storage, and Disposal (TSD) facility, located at Buildings LP-159 and LP-24, where all hazardous wastes generated throughout installations in the Norfolk/Hampton Roads region (including wastes from NSA-HR) are stored until shipment for final disposal. **Appendix O** contains a link and a tabulated list of each Resource Conservation and Recovery Act (RCRA) permitted facility, <90 day storage area, and SAA located at NSA-HR. Standard Operation Procedures (SOPs) for HWAAs have been created and can be found on the share drive located with Environmental.

Scrap and Waste Material

The DLA Disposition Services (DLADS) for NSN and NSA-HR is located in the southwestern portion of the base in the South Depot Annex (SDA) area. These storage warehouses contain used, damaged, recyclable parts, and equipment from maintenance and other operations.

Materials are commonly segregated into material types (e.g., tires, brass, steel, electrical parts, etc.) and stored inside the SDA warehouses until DLADS excesses or auctions them.

Other scrap and waste material located throughout NSA-HR include several covered and uncovered bins for recycling metal, wood, and cardboard managed by the installation's recycling program. Metal products collected for recycling are transported to Building Z-309, the NAVFAC Integrated Solid Waste-Recycling Yard, which is an indoor/outdoor accumulation area for scrap and waste recycling. Metals are typically sorted in the outdoor accumulation area and all other materials are separated and processed indoors. BMPs for scrap and waste material processing and recycling facilities are included in Department of Defense 4160.21-M, available at http://www.dispositionservices.dla.mil/. Refer to **Appendix P** for site-specific information on scrap and waste recycling facilities including associated outfalls, location/building numbers, map page numbers, type of material being processed, and pollution potential rating.

Land Transportation and Warehousing

Appendix Q lists the locations and supporting information of public warehousing areas including outfalls, location/building number, type of warehousing, whether or not there is outdoor material storage, and the pollution potential rating. Good housekeeping practices, including minimization of exposure are observed in and around these facilities to prevent stormwater pollution.

Salt Storage

In accordance with the VPDES Permit Number VA0004421, Part I, Section D.1.j (page 49 of 89), storage piles of salt or piles containing salt used for deicing or other purposes shall be enclosed or covered to prevent exposure to precipitation. All salt storage piles shall be located on an impervious surface and all runoff from the pile, and/or runoff that comes in contact with salt, including under drain systems, shall be collected and contained within impermeable containment, maintained in storage tank(s), or disposed of through a sanitary system. In no case shall salt-contaminated stormwater be allowed to discharge to the stormwater system.

Salt is stored at NSN for use in minimizing hazardous driving conditions caused by snowy and icy roads. Limited quantities of salt are stored in manufacturer sealed bags inside Building LP-22 and large quantities of salt are stored at Building NM-59A. When heavy snow and ice occurs in the Norfolk region, salt is transferred to a concrete pad behind Building LP-22 for temporary staging while it is being applied, and it is removed after the icy conditions have concluded.

Chemical Application Areas

Fertilizers, pesticides, and herbicides are applied routinely to various locations throughout NSA-HR. Pest-control activities are performed by the appropriately licensed personnel from the Public Works Center (PWC) Pest Control staff and independent contractors. Typical pesticide application consists of fogging for mosquitoes using Vectorbac-G, as well as small, isolated use of other insecticides as needed. Fogging is performed throughout peak season during four to five weeks of summer. Herbicide is applied in various areas to control or eliminate unwanted plant growth. The 10 chemicals used as herbicides are as follows:

- Lesco 2-4-D
- Turflon
- Glyphosate

- Pramitol 25E
- Trimec Classic
- ElancoSurflan
- Weedar 64
- Devrinol 50-WP
- Bromacil
- Gallery 75

NSA-HR has one golf course: an 18-hole golf course along the southwest corner of the base (Outfall 301, which discharges to an irrigation pond). The 18-hole golf course applies agriculture-grade fertilizer and broadleaf control each November, March, May, and August. Three separate agricultural formulations are used and applied at three pounds per one hundred square feet for the fairways, and five pounds per 1,000 square feet for the greens. The herbicide Trimec Plus and insecticide Sevin are used on an as-needed basis.

A summary of chemical application areas is provided in **Appendix R**, including the chemical type, area of application, purpose of the chemical, application rates, and any related comments.

Discharge Monitoring Report Data

In accordance with VPDES Permit Number VA0004421, Part I, Section D.2.b (5) (page 53 of 89), the SWPPP shall include a summary of existing stormwater discharge sampling data taken at the facility, including any data collected during the previous permit term. Sampling data collected during the previous and current permit term is summarized in **Appendix T**. Sampling requirements presented in **Appendix U** are consistent with the current compliance reporting required under VPDES Permit Number VA0004421. Copies of all data used to create eDMRs are kept on file at the NSA-HR Environmental office. **Appendices T** and **U** present the required testing parameters, frequency of required analyses, and minimum and maximum limit values for each parameter. If multiple samples were obtained during a single sampling period, the results from each sampling event are reported under the monitoring period when the samples were obtained.

Visual Examination and Analytical Monitoring

In accordance with the VPDES Permit Number VA0004421, NSA-HR is authorized to discharge stormwater associated with industrial activities from point sources. There are several activities at NSA-HR that are classified as regulated industrial activities. The outfalls corresponding to these regulated industrial activities, or similarly grouped representative outfalls, require analytical and visual monitoring. The regulated industrial activities at NSA-HR are listed below by the categories of regulated sectors and associated SIC codes:

- Sector AD: Designated by Director, Repair Shops and Related Services (SIC Code 7699)
- Sector N: Scrap Recycling and Waste Recycling (SIC Code 5093)
- Sector P: Land Transportation and Warehousing, General Warehousing, and Storage (SIC Code 4225)

Visual Examination

Part 1, Section D.1.f of VPDES Permit Number VA0004421 outlines the requirements for quarterly visual examinations of stormwater quality. Visual examinations of stormwater discharges associated with regulated industrial outfalls must be conducted and documented on a quarterly basis. Visual examination reports are maintained with the SWPPP and are referenced in **Appendix S**.

Whenever practicable, the visual examination should be made during daylight hours (e.g., normal working hours). If no storm event resulted in runoff from the facility during a monitoring quarter, the permittee is excused from visual monitoring for that quarter provided that documentation is included with the monitoring records indicating that no runoff occurred.

In accordance with Part 1, Section D.1.f (2) of VPDES Permit Number VA0004421 (page 45 of 89), visual examinations must be made of grab samples taken during the first hour the runoff or snowmelt begins discharging from the facility. No analytical tests are required to be performed on the samples. If the collection of a grab sample during the first hour is impractical, a grab sample can be taken during the first three hours of the discharge, and documented with a description of why a grab sample during the first hour was not available. The examination must document observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of stormwater pollution. The examination must be conducted in a well-lit area. All samples (except snowmelt samples) must be collected from the discharge resulting from a storm event that results in an actual discharge from the site from a "measurable storm event" that occurs at least 72 hours from the previously measurable storm event.

In accordance with Part 1, Section D.1.f (3) of VPDES Permit Number VA0004421 (page 46 of 89), the visual examination reports must be maintained onsite with the SWPPP. The report must include the following information: the outfall location, the examination date and time, examination personnel, the nature of the discharge (i.e., runoff or snow melt), visual quality of the stormwater discharge (including observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of stormwater pollution), and probable sources of any observed stormwater contamination.

Analytical Monitoring

Part I of VPDES Permit Number VA0004421 specifies the sampling and analytical monitoring program for stormwater discharges at NSA-HR. The monitoring parameters for each outfall identified within Part I, Section A of the permit may include any combination of the following parameters: flow, pH, temperature, cyanide, total Kjeldahl nitrogen, total organic carbon, total petroleum hydrocarbons, total recoverable silver, total recoverable aluminum, total recoverable arsenic, total recoverable cadmium, total recoverable chromium, total recoverable copper, total recoverable iron, total recoverable mercury, total recoverable lead, total recoverable selenium, total recoverable zinc, total suspended solids, dissolved copper, and dissolved zinc. In addition, wastewater process discharge samples may be analyzed for the following parameters: total phosphorus, hardness, ammonia-N, total residual chlorine, and effluent toxicity testing.

In accordance with Part I, Section D.1.e of VPDES Permit Number VA0004421 (page 44 of 89), when a facility has two or more outfalls that discharge substantially identical effluents, based on similarities of the industrial activities, significant materials, size of drainage areas, and stormwater management practices occurring within the drainage areas of the outfalls, the effluent of one such

outfall grouping may be tested as a representative outfall. The Navy has developed a representative outfall determination that has been approved by Virginia DEQ. This outfall grouping and explanation is located in **Appendix B.2** and the outfall associated with NSA-HR are highlighted in yellow. Historical and current monitoring records for these grouped outfalls are maintained by PWD NSN Environmental.

Appendix U lists the activity associated with each outfall, monitoring requirements, and the sampling frequency set by the permit.

Significant Leaks and Spills

In accordance with VPDES Permit Number VA0004421, Part I, Section D.2.b (4) (page 53 of 89), the SWPPP must identify areas where potential spills and leaks that may contribute pollutants to stormwater discharges can occur and their corresponding outfalls. The plan shall include a list of significant spills and leaks of toxic or hazardous pollutants that actually occurred at exposed areas or drained to a stormwater conveyance within the last three years. The list shall be updated if significant spills or leaks occur in exposed areas of the facility during the term of the permit. Significant spills and leaks include releases of oil or hazardous substances in excess of reportable quantities. As facility policy, releases of oil or hazardous substances that are not in excess of reporting requirements are reported internally to the NSA-HR Environmental Public Works Department.

Potential spills and leaks that may occur at NSA-HR include fuel, oil, paint, antifreeze, sewage, or other chemical spills related to liquid transfer operations, or material handling operations. A separate comprehensive program, which includes training and reporting, has been established to help mitigate and correct direct discharges. The United States Navy (USN) has implemented a policy that all spills and accidental releases must be reported internally. PWD NSA HAMPTON ROADS Environmental enters all spill events in an electronic regional spill log, tabbed out by installation, that documents all spill events in reverse chronological order, dating back to January 2008. The date, location, and description of each spill or leak are documented. These detailed spill reports provide environmental managers with useful information concerning sites where repetitive incidents occur so that these can be investigated and eliminated.

Appendix V presents a tabulated list of spill inventory data at NSA-HR. It should be noted that NSA-HR also documents all spills and leaks in accordance with the Spill Prevention, Control, and Countermeasure (SPCC) regulations, and not all of the identified/documented spills and leaks may have occurred at exposed areas or drained to potential stormwater conveyances.

Identification of Non-Stormwater Discharges

Allowable Non-Stormwater Discharges

Non-stormwater discharges are not authorized unless specifically permitted under Part I, Section D.1.g (page 47 of 89) of VPDES Permit Number VA0004421. Only specified non-stormwater discharges are authorized by the permit if they are identified within the SWPPP, the location of the discharge is identified, and appropriate BMPs are in place for each source. The following non-stormwater discharges are explicitly identified within the permit:

- Discharges from firefighting activities

- Fire hydrant flushing
- Potable water including water line flushing
- Uncontaminated air conditioning or compressor condensate
- Irrigation drainage
- Landscape watering provided all pesticides, herbicides, and fertilizer have been applied in accordance with manufacturer's instructions
- Pavement wash waters where no detergents are used and no spills or leaks of toxic or hazardous materials have occurred (unless all spilled material has been removed)
- Routine external building wash down which does not use detergents
- Uncontaminated ground water or spring water
- Foundation or footing drains where flows are not contaminated with process materials
- Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but NOT intentional discharges from the cooling tower (e.g., "piped" cooling tower blowdown or drains). If cooling tower windblown mist is included as one of the allowable non-stormwater discharges from the facility, the discharge must be evaluated for the presence of chemicals used in the cooling tower and included in the SWPPP. An inventory of cooling towers including related discharges and chemicals is identified in the CTBI report presented under a separate cover.
- Discharges from swimming pools in accordance with the provisions identified in Part 1, Section D.1.g (1)(l) (page 47 of 89) of VPDES Permit Number VA0004421

A summary of allowable non-stormwater discharges, including whether they are present at NSA-HR, pollution potential, location, and applicable BMPs is presented in **Table 3-1**.

Table 3-1
Summary of Allowable Non-Stormwater Discharges

Type of Discharge	Present at NSA-HR	Pollution Potential	Location	Appropriate BMPs
Discharges from firefighting activities	Yes	Low	Throughout	Firefighting activities should be performed in a manner to minimize discharge to the stormwater system, if possible. BMPs during an emergency may include: avoid directing firefighting effluents to erodible surfaces, if possible, avoid directing runoff to the stormwater system, if possible, apply fire-fighting flows so that runoff will flow over vegetated areas, and using drain blockers or inlet covers where applicable. Additional controls may be necessary in the event of a hazardous material release. Non-emergency, training, and simulated activities shall be conducted only in approved locations with appropriate runoff controls, if possible.
Fire hydrant flushing	Yes	Low	242 fire hydrant locations identified in the SWPPP Mapbook	Fire hydrant flushing activities are documented by NAVFAC Utilities as part of an active preventive maintenance program
Potable water including water line flushing	Yes	Low	Throughout (24 loops on base)	Water line flushing is documented by PWC
Uncontaminated air conditioning or compressor condensate	Yes	Low	Throughout	None
Irrigation drainage	No	N/A	N/A	N/A
Landscape watering provided all pesticides, herbicides, and fertilizer have been applied in accordance with manufacturer's instructions	Yes	Low	Throughout	NSA-HR has a Pesticide Discharge Management Plan (PDMP) which identifies the relevant BMPs for these activities
Pavement wash waters where no detergents are used and no spills or leaks of toxic or hazardous materials have occurred (unless all spilled material has been removed)	Yes	Low	Throughout	Procedures are in place to prohibit the use of detergents and all spills or leaks of toxic/hazardous materials are cleaned up

Table 3-1 Summary of Allowable Non-Stormwater Discharges				
Type of Discharge	**Present at NSA-HR**	**Pollution Potential**	**Location**	**Appropriate BMPs**
Routine external building wash down which does not use detergents	Yes	Low	Throughout	Procedures are in place to prohibit the use of detergents
Uncontaminated ground water or spring water	No	N/A	N/A	N/A
Foundation or footing drains where flows are not contaminated with process materials	Yes	Low	Throughout	None
Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility	Yes	Low	Throughout	Cooling towers are monitored to assess pollution potential and an annual inventory of cooling towers is performed
Discharges from swimming pools	No	N/A	N/A	N/A

Illicit Discharge Survey

Field investigations began in June 1997 to establish a baseline of non-stormwater discharge locations into the storm drainage system. Full facility Illicit Discharge Surveys (IDSs) are conducted at least once per each permit cycle. The last IDS was conducted in December 2014. As a part of an IDS, all outfalls, catch basins, drop inlets, and other stormwater infrastructure are observed during a period of dry weather for flows. In addition, buildings are also observed to identify potential illicit discharge points to the storm drainage system. **Appendix C** contains an inventory of dry weather flow observations from the previous IDSs.

Non-stormwater or illicit discharges are flows into the storm sewer system that are not related to runoff from rainfall or snowmelt. Examples of non-stormwater discharges include cross connections with the sanitary sewer, fuel spills, contaminated groundwater infiltration, and dumping of hazardous materials. Non-stormwater discharges are not authorized unless explicitly identified in Part I, Section D.1.g (page 47 of 89) of VPDES Permit Number VA0004421.

Cooling Towers and Boilers

Cooling towers are a stormwater concern when chemical additives, such as micro-biocides and pH balancers are used for regular operations and maintenance activities. Cooling towers and boilers have the potential to repeatedly discharge wastewaters when they are in operation. Accordingly, VPDES Permit Number VA0004421, Part I, Section B.6 (page 32 of 89) has provisions for all non-contact cooling water units, boiler systems, or heating, ventilation, and air conditioning (HVAC) systems that use chemical additives, other than those on file with Virginia DEQ, to identify the chemical additives and schedule of usage.

In addition to identification of the chemicals and schedule of usage, there are provisions for characterization of the wastewater discharge identified within VPDES Number VA0004421, Part I, Section B.6.d (page 33 of 89). A representative grab sample of the wastewater shall be collected to adequately characterize the wastewater from select units with a conveyance to

surface waters. This wastewater characterization is conducted annually as required by permit, presented under a separate cover, submitted to the Virginia DEQ Tidewater Regional Office, maintained on file at the NAVFAC Mid-Atlantic Environmental Office, and included in **Appendix T** of this report.

NSA-HR conducts an annual evaluation of cooling towers and boilers. Field investigations include visual inspections of the cooling towers and boilers to determine ultimate discharge disposition and potential conveyances to the stormwater system. The 2019 CTBI identified 14 cooling towers, with two identified as draining to the storm system. The 2019 CTBI identified 88 boiler units, 87 noted as in-service and three noted as out-of-service with 11 identified as draining to the storm system. A summary of the chemicals used on the cooling tower and boiler units is presented as an appendix to the CTBI Report. The CTBI Report is presented under a separate cover and annual reports are submitted to the Virginia DEQ Tidewater Regional Office and maintained on file at the NAVFAC Mid-Atlantic Environmental Office.

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4. NSA-HR Stormwater Conditions and Controls

Regardless of the activity-specific measures and controls, all sectors include existing structural and nonstructural BMPs to ensure the protection of NSA-HR waters from adverse water quality impacts resulting from chemical spills and/or contaminated stormwater runoff. Site-specific management practices may be recommended for locations requiring additional control measures, and are identified in the SCE report provided under separate cover. The following sections present a general description of existing structural and nonstructural BMPs at NSA-HR. In addition, this section presents sector-specific recommendations based on the VPDES permit.

Existing Structural BMPs

Current existing and recommended structural BMPs are identified within the NSA-HR SCE. **Appendix X** describes particular structural BMPs recommended for implementation. The following are structural BMPs that may be implemented at NSA-HR:

- Secondary containment is used to minimize stormwater contamination for ASTs and other bulk material storage.
- Roofing structures are used to reduce exposure of materials. Storing materials under or within roofed structures reduces the potential for stormwater contamination via runoff. In addition, these structures can reduce storage drum corrosion and ultraviolet deterioration of plastic containment and storage structures.
- Riprap is used to minimize erosion where there is potential for rapid flow in drainage systems.
- OWSs are used to prevent petroleum-type, phase-separated pollutant discharges to the sanitary and storm sewer systems. An inventory of the OWSs is listed in **Appendix W,** including outfall, location/building number, device number, map page number, process being used, and to where the OWS discharges.
- Spill control valves are used to control stormwater releases and prevent potential discharge of pollutants. These valves are primarily located at containment berms and fuel transfer areas.
- Modular storage buildings, conex boxes, and hazardous materials lockers are structures that provide cover and containment for materials, minimizing exposure of stormwater to the materials stored. They also reduce the rate of drum and package deterioration, thus decreasing the potential for spills and leaks to the environment.
- “No Dumping” placards have been installed on storm drains throughout NSA-HR.
- Roof runoff treatment barrels function to remove heavy metal pollutants. This site-specific technology reduces potential copper and zinc concentrations in stormwater discharge.

Existing Nonstructural BMPs

The existing environmental management plans establish a coordinated program of non-structural control measures for the management of hazardous materials/hazardous waste/POLs and other

materials exposed to stormwater, operation and maintenance of pollution abatement equipment, and spill response cleanup. **Appendix Y** describes the non-structural BMPs recommended for implementation and include the associated outfall, location/building number, map page number, associated industrial activity, current compliance, and a list of recommendations.

Baseline Best Management Practices

In addition to structural and nonstructural BMPs, NSA-HR implements the following baseline BMPs as identified in Part I, Section D.2.b.6 (b) of VPDES Permit Number VA0004421 (page 54 of 89), as applicable.

- Good housekeeping measures require maintaining areas that may contribute pollutants to stormwater discharges by making sure they stay in a clean and orderly state. Particular attention is paid to areas with raw material stockpiles, material handling areas, storage areas, liquid storage tanks, and loading/unloading areas.
- Eliminating and minimizing exposure, as practicable, ensures industrial materials and activities are located inside or protected by a storm-resistant covering to prevent exposure to runoff.
- The preventative maintenance program involves inspection and maintenance of stormwater management devices. The NSA-HR EPS inspects and tests the facility equipment and systems to uncover any conditions that could cause breakdowns or failures that result in discharges of pollutants to surface waters.
- Spill Prevention and Response Procedures, upon detection of a spill at NSA-HR, procedures for reporting and cleanup of fuel and oil spills are located in the NSA-HR Spill Reporting and Documentation SOP. Immediate notification must be sent to the Emergency Communications Center (ECC) at (757) 444-3333. The appropriate stakeholders are then notified of the spill situation and they provide direction of the oil recovery cleanup services depending on the extent of impact.
- Routine facility inspections ensure that elements of the SWPPP are operating as planned. NSA-HR EPSs are tasked with routine inspections of industrial facilities with at least one inspection conducted during a period when stormwater discharge is occurring. In addition, some facilities may have to be inspected more frequently in accordance with the permit requirements. Tenants may perform these more frequent routine facility inspections. All inspections are maintained in the facility's online Environmental Management System (EMS) with a records of inspection maintained within three-ring binders. All deficiencies found during routine inspections should be corrected within 30 days unless written permission has been authorized by the Virginia DEQ. **Appendix Z** contains the list of buildings that require routine inspections to include the building number, associated outfall, map page number, and industry activity at the site.
- Employee training for stormwater pollution prevention is provided through the web-based training system, Environmental Compliance Assessment Training and Tracking System (ECATTS), which addresses the following topics: SWPPP requirements as they relate to individual personnel job functions, BMPs, spill prevention and response procedures for spills, leaks, or breaks in structural control, and proper material/scrap inspection, handling, and storage procedures. Annual stormwater employee training is required for all employees who work in areas where industrial materials or activities are exposed to storm water and for all employees who are responsible for implementing activities identified in

this SWPPP. Training records are administered and maintained by the NSA-HR Public Works Environmental office.

- Sediment and erosion control, no areas at NSA-HR exhibit a high potential for significant erosion due to the very low differences in elevation across the facility. No additional erosion control measures are implemented unless construction/demolition activities are taking place.
- Management of runoff, including stormwater runoff management practices (i.e., permanent structural BMPs) that are typically used to divert, infiltrate, reuse, or otherwise reduce pollutants in stormwater discharges from the site.

Sector-Specific Measures and Controls

The following sections provide the sector-specific measures and controls as presented in VPDES Permit Number VA0004421.

Measures and Controls for Scrap Recycling and Waste Recycling Facilities (Sector N)

Part I, Section D.3 (page 62 of 89) of VPDES Permit Number VA0004421 identifies the permit requirements for stormwater discharges associated with industrial activity for scrap recycling and waste recycling facilities that are engaged in the processing, reclaiming, and wholesale distribution of scrap and waste materials, such as ferrous and nonferrous metals, paper, plastic, cardboard, and glass; activities that are identified as SIC Code 5093; as well as facilities that are engaged in reclaiming and recycling liquid wastes such as used oil, antifreeze, mineral spirits, and industrial solvents.

One site is currently identified as Sector N, SIC 5093 and includes SDA-210.

Site Map

The site mapping, per Part I, Section D.3.e (1) (a) (page 63 of 89), requires the location of the following activities to be identified: scrap and waste material storage, outdoor scrap and waste processing equipment, and containment areas for turnings exposed to cutting fluids. Site mapping is presented in the NSA-HR Mapbook provided under a separate cover. In addition, the NSA-HR Mapbook provides outfall delineation and storm drainage manhole and drop inlet locations. Field investigations are conducted periodically to update existing and identify new locations.

Stormwater Controls

A comprehensive list of the stormwater controls related to scrap and waste recycling facilities at NSA-HR is presented in the following sections. The list includes both structural and non-structural BMPs utilized to prevent the contamination of stormwater from related industrial activities.

Inbound Recyclable and Waste Material Control Program

NSA-HR has an active recycling program the processes various materials including: glass, plastic, cardboard, metals, paper, and other goods.

A recyclable and waste material inspection program is required to minimize the likelihood of receiving materials that may be significant pollutant sources to stormwater discharges. Expectations of the NSA-HR's inbound recyclable and waste material control program include the following BMP options:

- Provide information/education flyers, brochures, and pamphlets to suppliers of scrap and recyclable waste materials on draining and properly disposing of residual fluids prior to delivery to the facility (e.g., from vehicles and equipment engines, radiators, and transmissions, oil-filled transformers, and individual containers or drums), and on removal of mercury switches prior to delivery to the facility
- Establish procedures to minimize the potential of any residual fluids from coming in contact with precipitation/runoff
- Establish procedures for accepting scrap lead-acid batteries, including requirements for handling storage and disposal or recycling of batteries
- Provide training targeted to those personnel engaged in the inspection and acceptance of inbound recyclable materials
- Establish procedures to ensure that liquid waste, including used oil, are stored in materially-compatible and non-leaking containers and are properly disposed or recycled in accordance with RCRA, federal, state, and local requirements

Outdoor Scrap and Waste Material Stockpiles/Storage

Appropriate measures and controls are utilized to minimize contact of stormwater runoff with exposed scrap and waste material stockpiles and storage areas, where practicable, at NSA-HR. These practices also work to minimize the extent of stormwater contamination for these areas:

- Utilize permanent or semi-permanent covers
- Divert run-on and runoff away from storage areas using dikes, berms, containment trenches, culverts, and/or surface grading
- Vegetative swales and strips or sediment traps to facilitate settling or filtering of pollutants
- Media filtration such as catch basin and sand filters
- Silt fencing
- OWSs, sumps, and dry absorbents in stockpile areas that have potential sources of residual fluids (e.g., oil or fuel)

Covered or Indoor Storage of Scrap and Waste Material Stockpiles

The following measures and controls are utilized to minimize residual liquids and accumulated particulate matter, originating from scrap and recyclable waste materials stored indoors or under cover, from coming in to contact with stormwater runoff. BMP options include:

- Provide good housekeeping measures, including the use of dry absorbents or wet vacuum cleanup methods to collect, handle, store, and dispose or recycle residual liquids originating from recyclable containers
- Prohibit the practice of allowing tipping floors or other processing areas from discharging to the stormwater drainage system
- Disconnect or seal off all existing floor drains connected to the stormwater sewer system

Scrap and Recyclable Waste Processing Areas

Measures and controls are provided for areas where scrap and waste processing equipment are located to minimize exposure of precipitation and runoff from the scrap processing equipment. Some scrap and recyclable waste processing equipment, including shredding facilities, generate visible amounts of particulate residue. Good housekeeping and preventative maintenance measures should be implemented to minimize contact of precipitation and runoff with residual fluid and accumulated particulate matter. The following BMP options include:

- Establish a schedule of periodic inspections of equipment for leaks, spills, malfunctioning parts, or worn/corroded equipment
- Implement preventative maintenance to maintain and/or repair processing equipment
- Remove all mercury switches from vehicle hood and trunk lighting units as well as anti-lock brake system units containing mercury switches
- Utilize dry absorbents or other cleanup practices to collect and dispose of or recycle spilled fluid
- Install low-level alarms or similar protection devices on unattended hydraulic reservoirs (over 150-gallon capacity) or provide adequate secondary containment
- Divert run-on and runoff away from scrap processing areas using diversion dikes, berms, culverts, containment trenches, elevated concrete pads, and/or surface grading
- Install OWSs, sumps, or similar devices in scrap processing areas that are potential sources of residual fluids, including grease
- Mount permanent or semi-permanent covers
- Install retention and detention basins or ponds, vegetative swales and strips, or sediment traps to facilitate settling or filtering of pollutants in runoff from scrap processing areas
- Install media filtration such as catch basins or sand filters

Inbound Recyclable Material Control

In accordance with VPDES Permit Number VA0004421, Part I, Section D.3.e (1) (d) i (page 70 of 89), industrial facilities that perform recycling of source-separated materials should provide an inbound materials inspection program to minimize the likelihood of receiving non-recyclable materials that may be a significant source of pollutants in surface runoff. The inspection program should include the following:

- Information and education measures to inform suppliers of recyclable materials about the types of materials that are acceptable and those that are not recyclable
- Description of training measures for drivers responsible for pickup of recyclable materials
- Required rejection of non-recyclable wastes or household hazardous waste at the source
- Procedures for handling and disposing of non-recyclable materials

Outdoor Storage of Source Separated Materials

In accordance with VPDES Permit Number VA0004421, Part I, Section D.3.e (1) (d) ii (page 71 of 89), facilities conducting a related industrial activity must minimize the exposure of recyclable materials to surface runoff and precipitation. This includes good housekeeping measures to

prevent accumulation of particulate matter and fluids in high-traffic areas, as well as the following options:

- Provide totally enclosed drop-off containers for the public
- Install a sump pump with each containment pit and discharge collected fluids to a sanitary sewer
- Provide dikes and curbs for secondary containment
- Divert surface runoff away from outside material storage areas
- Provide covers over containment bins, dumpsters, and roll-off boxes
- Store the equivalent of one day's volume of recyclable materials indoors

Indoor Storage and Material Processing

In accordance with VPDES Permit Number VA0004421, Part I, Section D.3.e (1) (d) iii (page 71 of 89), industrial facilities conducting a related industrial activity must minimize the release of pollutants from indoor storage and processing areas. This is achieved by using the following BMPs:

- Schedule routine good housekeeping measures for all storage and processing areas
- Prohibit the practice of allowing tipping floor wash waters from draining to any portion of the storm sewer system
- Provide employee training on pollution prevention practices through ECATTS online training program

Vehicle and Equipment Maintenance

In accordance with VPDES Permit Number VA0004421, Part I, Section D.3.e (1) (d) iv (page 72 of 89), industrial facilities must provide BMPs for all outside areas where vehicle and equipment maintenance is performed relating to source separated recycling. These BMPs include the following options:

- Prohibit vehicle and equipment wash water from discharging to the storm sewer system
- Minimize or eliminate outdoor maintenance areas wherever possible
- Establish spill prevention and cleanup procedures in fueling areas
- Avoid topping off fuel tanks
- Divert runoff from fueling areas
- Store lubricants and hydraulic fluids indoors
- Provide employee training on proper handling and storage of hydraulic fluids and lubricants through the ECATTS online training program

Measures and Controls for Various Transportation and Warehousing Facilities (Sector P)

Part I, Section D.4 (page 72 of 89) of VPDES Permit Number VA0004421 identifies the permit requirements for stormwater discharges associated with industrial activity from facilities that are

engaged in land transportation and warehousing activities. The requirements listed under this section apply to stormwater discharges from the facilities on NSA-HR identified by SIC Codes 40, 41, 42, 43, and 5171, and having vehicle and equipment maintenance shops and/or equipment cleaning operations. Also covered under this section are facilities found under SIC Codes 4221 through 4225 that do not have vehicle and equipment maintenance shops and/or equipment cleaning operations, but have areas where material handling equipment or activities, raw materials, intermediate products, final products, waste materials, by-products, or industrial machinery are exposed to stormwater.

The discharge of vehicle and equipment wash waters, including tank cleaning operations, is not authorized by VPDES Permit Number VA0004421. Such discharges are discharged to the sanitary sewer system in accordance with the Hampton Roads Sanitation District (HRSD) industrial pretreatment requirements. Vehicle and equipment wash waters not accepted by HRSD are characterized and properly disposed of through the waste program.

A total of three sites are currently identified as Sector P, including the following buildings: SDA-204, SDA-205, and SDA-210.

Site Map

In accordance with VPDES Permit Number VA0004421, Part I, Section D.4.e (1) (a) (page 73 of 89), the site mapping provides a visual indication of fueling stations, vehicle/equipment maintenance and cleaning areas, storage areas for vehicles/equipment with actual or potential fluid leaks, loading/unloading areas, TSD areas, liquid storage tanks, and processing areas. Field investigations are conducted periodically to update existing and identify new locations. Site mapping is presented in the NSA-HR Mapbook provided under a separate cover.

Non-Stormwater Discharges

In accordance with VPDES Permit Number VA0004421, Part I, Section D.4.d (page 73 of 89), NSA-HR has notified HRSD of facilities that discharge vehicle and equipment wash waters to the sanitary sewer system. These facilities are inventoried in the pretreatment device management plan.

Inspection Program

In accordance with VPDES Permit Number VA0004421, Part I, Section D.4.e (2) (b) (page 76 of 89), the facilities covered under this industry are inspected quarterly. Inspections include a review of storage areas for vehicles and equipment awaiting maintenance, fueling areas, vehicle and equipment maintenance areas (both indoors and outdoors), material storage areas, vehicle and equipment cleaning areas, and loading and unloading areas.

Employee Training

In accordance with VPDES Permit Number VA0004421, Part I, Section D.4.e (2) (c) (page 76 of 89), employee training is provided by annual use of the web-based ECATTS training system and addresses the following topics:

- Used oils
- Spent solvent management

- Fueling procedures
- Good housekeeping practices
- Proper painting procedures
- Used battery management

Stormwater Controls

A comprehensive list of the stormwater controls related to motor vehicle and rail transportation services at NSA-HR is presented. In accordance with VPDES Permit Number VA0004421, Part I, Section D.4.e (1) (b) (page 73 of 89), the potential pollutant sources that may contribute to the contamination of stormwater discharges may include bulk petroleum storage, vehicle and equipment maintenance, vehicle and equipment washing, hazardous waste storage, outdoor material storage, dirt/gravel parking areas for vehicles awaiting maintenance, and fueling areas.

Good Housekeeping: Vehicle and Equipment Storage Areas

- Confine storage of vehicles and equipment awaiting maintenance to designated areas
- Store vehicles and equipment indoors where practicable
- Utilize drip pans, berms, dikes, absorbent materials, roofs, or covered storage areas to minimize contamination of the stormwater runoff from these areas
- Clean pavement surface to remove oil and grease

Good Housekeeping: Fueling Areas

- Provide cover over the fueling area
- Utilize spill and overflow protection and cleanup equipment
- Minimize run-on/runoff of stormwater to the fueling area
- Utilize dry cleanup methods
- Treat and/or recycle collected stormwater runoff where practicable

Good Housekeeping: Material Storage Areas

- Storage vessels must be maintained in good condition with proper labeling
- Provide indoor storage for materials where practicable
- Install berms or dikes to minimize run-on/runoff of stormwater to these areas
- Use dry cleanup methods
- Treat and/or recycle collected stormwater runoff where practicable

Good Housekeeping: Vehicle and Equipment Cleaning Areas

- Perform cleaning operations indoors were practicable
- Provide cover over the cleaning operation
- Ensure all wash waters drain to the appropriate collection system

- Treat and/or recycle the collected stormwater runoff were practicable

Good Housekeeping: Vehicle and Equipment Maintenance Areas

- Perform maintenance activities indoors were practicable
- Utilize drip pans under vehicles
- Maintain an organized inventory of materials used in the shop
- Thoroughly drain all parts of fluids prior to disposal
- Prohibit wet cleanup practices that would result in the discharge of pollutants to the stormwater drainage system
- Utilize dry cleanup methods
- Treat and/or recycle the collected stormwater runoff where practicable
- Minimize the run-on/runoff of stormwater to the maintenance areas

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5. References

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Virginia Pollutant Discharge Elimination System and the Virginia State Water Control Law, Permit Number VA0004421. May 2011.

Appendix A.1
Regulated Monitored Stormwater Outfalls

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APPENDIX A.1

REGULATED MONITORED STORMWATER OUTFALLS

OUTFALL NO. *(Permitted under VPDES Permit No. VA0004421)*	LATITUDE	LONGITUDE	TOTAL AREA (ACRES)	IMPERVIOUS AREA (ACRES)	RECEIVING STREAM	PERMITTED ACTIVITIES	ASSOCIATED BUILDINGS/COMMENTS
205	N36°55'22"	W76°19'10"	48.34	31.74	Elizabeth River	Permitted under VPDES Permit No. VA0004421 for stormwater runoff from regulated industrial activities, general warehousing and storage; SIC codes 4225, 4226, 9711.	No regulated industrial activities identified
206	N36°55'20"	W76°19'13"	7.58	3.79	Elizabeth River	Permitted under VPDES Permit No. VA0004421 for stormwater runoff from regulated industrial activities, general warehousing and storage; SIC codes 4225, 4226, 9711.	No regulated industrial activities identified
207	N36°55'08"	W76°19'12"	3.52	2.8	Elizabeth River	Permitted under VPDES Permit No. VA0004421 for stormwater runoff from multiple regulated industrial activities; SIC codes 4225, 5093, 7699, 9711.	SDA-205 (4225), SDA-210 (4225, 5093)
208	N36°55'02"	W76°19'05"	35.4	17.78	Elizabeth River	Permitted under VPDES Permit No. VA0004421 for stormwater runoff from regulated industrial activities, general warehousing and storage; SIC codes 4225, 4226, 5093, 9711.	SDA-204 (4225), SDA-205 (4225), SDA-210 (4225, 5093)

APPENDIX A.1

REGULATED MONITORED STORMWATER OUTFALLS

OUTFALL NO. *(Permitted under VPDES Permit No. VA0004421)*	**LATITUDE**	**LONGITUDE**	**TOTAL AREA (ACRES)**	**IMPERVIOUS AREA (ACRES)**	**RECEIVING STREAM**	**PERMITTED ACTIVITIES**	**ASSOCIATED BUILDINGS/COMMENTS**
605	N36°55'39"	W76°17'47"	49.04	20.91	Bousch Creek	Permitted under VPDES Permit No. VA0004421 as an outfall that discharges only stormwater runoff not associated with a regulated industrial activity where no chemical monitoring is required. Quarterly visual monitoring is required. SIC code 7699.	MCA-612 (Wash Rack at MCA-612) (7699)
611	N36°55'35"	W76°18'18"	13.97	12.63	Bousch Creek	Permitted under VPDES Permit No. VA0004421 as an outfall that discharges only stormwater runoff not associated with a regulated industrial activity where no chemical monitoring is required. Quarterly visual monitoring is required. SIC code 7699.	NH-31A (Wash Rack at NH-31A) (7699)

Appendix A.2
Regulated Non-Monitored Stormwater Outfalls

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APPENDIX A.2

REGULATED NON-MONITORED STORMWATER OUTFALLS

OUTFALL NO. *(Permitted under VPDES Permit No. VA0004421)*	LATITUDE	LONGITUDE	TOTAL AREA (ACRES)	IMPERVIOUS AREA (ACRES)	RECEIVING STREAM	ASSOCIATED BUILDINGS/COMMENTS
200	Unknown GIS Location		0	0	Elizabeth River	No regulated industrial activities identified
201	N36°55'15"	W76°19'23"	5.8	5.23	Elizabeth River	No regulated industrial activities identified
202	N36°55'20"	W76°19'26"	0.3	0.19	Elizabeth River	No regulated industrial activities identified
203	N36°55'14"	W76°19'28"	3.78	3.51	Elizabeth River	No regulated industrial activities identified
204	N36°55'20"	W76°19'18"	1.43	1.14	Elizabeth River	No regulated industrial activities identified
600	N36°55'56"	W76°17'57"	8.66	4.96	Bousch Creek	No regulated industrial activities identified
601	N36°55'56"	W76°17'57"	32.61	28.87	Bousch Creek	No regulated industrial activities identified
602	N36°55'53"	W76°17'48"	11.44	3.4	Bousch Creek	No regulated industrial activities identified
603	N36°55’51"	W76°17'48"	0.83	0.56	Bousch Creek	No regulated industrial activities identified
604	N36°55’49"	W76°17'48"	3.88	2.45	Bousch Creek	No regulated industrial activities identified
606	N36°55’37"	W76°17'49"	36.74	11.11	Bousch Creek	No regulated industrial activities identified
607	N36°55''36"	W76°18'02"	6.75	1.25	Bousch Creek	No regulated industrial activities identified
608	N36°55'34"	W76°18'06"	7.94	1.72	Bousch Creek	No regulated industrial activities identified
609	N36°55'30"	W76°18'06"	3.24	1.4	Bousch Creek	No regulated industrial activities identified
610	N36°55’36"	W76°18'09"	80.47	38	Bousch Creek	No regulated industrial activities identified
612	N36°56’30"	W76°18'30"	74.86	42.89	Bousch Creek	NH-31A (Wash Rack at NH-31A) (7699)
613	N36°56’30"	W76°18'30"	67.67	33.41	Bousch Creek	No regulated industrial activities identified
614	N36°55’44"	W76°18'14"	1.59	1.48	Bousch Creek	No regulated industrial activities identified
615	N36°55'33"	W76°18'28"	2.6	1.21	Bousch Creek	No regulated industrial activities identified
616	N36°55’34"	W76°18'30"	3.09	1	Bousch Creek	No regulated industrial activities identified
617	N36°55'35"	W76°18'31"	2.44	0.66	Bousch Creek	No regulated industrial activities identified

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Appendix A.3
Non-Industrial Permitted Stormwater Outfalls

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APPENDIX A.3

NON-INDUSTRIAL PERMITTED STORMWATER OUTFALLS

OUTFALL NO.	LATITUDE	LONGITUDE	PERMITTED ACTIVITIES	ASSOCIATED BUILDINGS/COMMENTS
NP-618	N36°56'00"	W76°18'00"	Not presently permitted under VPDES Permit No. VA0004421	Proposed outfall to be constructed
NP-619	N36°56'00"	W76°18'00"	Not presently permitted under VPDES Permit No. VA0004421	Proposed outfall to be constructed
NP-620	N36°56'00"	W76°18'00"	Not presently permitted under VPDES Permit No. VA0004421	Outfall near CA-230
NP-621	N36°55'13"	W76°17'57"	Not presently permitted under VPDES Permit No. VA0004421	Outfall near CA-230

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Appendix A.4
MS4 Stormwater Outfalls

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APPENDIX A.4

MS4 STORMWATER OUTFALLS

MS4 Outfall ID	Receiving Water	HUC	Area (ac)	Impaired (Y/N)	Cause of Impairment
201	Elizabeth River	20802080302	5.80	Y	Estuarine Bioassessments, Dissolved Oxygen, PCB in Fish Tissue
202	Elizabeth River	20802080302	0.30	Y	Estuarine Bioassessments, Dissolved Oxygen, PCB in Fish Tissue
203	Elizabeth River	20802080302	3.78	Y	Estuarine Bioassessments, Dissolved Oxygen, PCB in Fish Tissue
204	Elizabeth River	20802080302	1.43	Y	Estuarine Bioassessments, Dissolved Oxygen, PCB in Fish Tissue
600	Bousch Creek	20802080302	1.26	N	NA
601	Bousch Creek	20802080302	20.68	N	NA
602	Bousch Creek	20802080302	4.97	N	NA
603	Bousch Creek	20802080302	1.36	N	NA
604	Bousch Creek	20802080302	2.81	N	NA
605	Bousch Creek	20802080302	47.27	N	NA
606	Bousch Creek	20802080302	35.41	N	NA
607	Bousch Creek	20802080302	1.53	N	NA
608	Bousch Creek	20802080302	6.77	N	NA
609	Bousch Creek	20802080302	3.33	N	NA
610	Bousch Creek	20802080302	99.05	N	NA
613	Bousch Creek	20802080302	97.09	N	NA
614	Bousch Creek	20802080302	5.73	N	NA
615	Bousch Creek	20802080302	1.67	N	NA
616	Bousch Creek	20802080302	36.24	N	NA
617	Bousch Creek	20802080302	24.25	N	NA

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Appendix B.1
Industrial Activities by Outfall

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APPENDIX B.1

INDUSTRIAL ACTIVITIES BY OUTFALL

Outfall	Oil/Water Separator	Aircraft Washing	Aircraft Maintenance	Aircraft Fueling/ Defueling	Aircraft Deicing	Vehicle Washing	Vehicle Maintenance	Vehicle Fueling	Boat/Ship Maintenance and Repair	Hazardous Material/ Waste Storage	Scrap and Waste Recycling Facilities	Hazardous Waste Treatment, Storage, or Disposal Facilities	Outdoor Material Storage	Outdoor Aboveground Storage Tank	Outdoor Liquid Transfer
INDUSTRIAL REGULATED MONITORED OUTFALLS															
205													X	X	X
206															
207													X	X	X
208											X		X	X	X
605	X					X	X			X			X		X
611								X					X	X	X
REGULATED NON-MONITORED OUTFALLS															
200															
201													X	X	X
202													X		X
203													X	X	X
204													X		
600															
601															
602													X	X	X
603															
604															
606													X	X	X
607															
608															
609															
610	X					X	X	X					X	X	X
612	X						X			X			X	X	X
613	X					X	X	X					X	X	X
614															
615															
616								X					X	X	X
617															
NON-PERMITTED OUTFALLS															
NA															
SHEET FLOW															
SF-028[3]															
SF-029[4]															

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Appendix B.2
Outfall Grouping Justification

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APPENDIX B.2

OUTFALL GROUPING JUSTIFICATION

Data highlighted is associated with NSA-HR

							Industrial Activities															
Group No.	**Representative Outfall**	**Outfall Grouping**	**Drainage Area (acres)**	**Sector**	**Sector Description**	**Associated Buildings/Sites (Industrial Regulated)**	**3724 - Aircraft Engines and Engine Parts**	**3731 - Ship Building and Repairing**	**3732 - Boat Building and Repairing**	**4212 - Local Trucking Without Storage**	**4222 - Refrigerated Warehousing and Storage**	**4225 - General Warehousing and Storage**	**4226 - Special Warehousing and Storage**	**4581 -Airports, Flying Fields, and Airport Terminal Services**	**4953 - Refuse Systems**	**4961 - Steam and Air Conditioning Supply**	**5093 - Scrap and Waste Materials**	**5171 - Petroleum Bulk Stations and Terminals**	**7699 - Repair Shops and Related Services, Not Elsewhere Classified**	**4581 - Airfield Operations (description as applicable)**	**Comments**
1	003	003	55.01	R	Ship and Boat Building and Repair Yards	CEP-204		3731													Single outfall.
				P	Land Transportation and Warehousing Facilities	CEP-126						4225									Bulk fuels with warehousing and ship building and repair.
				AD	Non-Classified Facilities	CEP-1, CEP-2, CEP-3, CEP-11												5171			
2	135	008	1.40	P	Land Transportation and Warehousing Facilities	CEP-126						4225									Warehousing and distribution.
		017	9.15	P	Land Transportation and Warehousing Facilities	CEP-156					4222										
		031	13.45	P	Land Transportation and Warehousing Facilities	W-135, W-143						4225									
		033	6.89	P	Land Transportation and Warehousing Facilities	W-135						4225									
		091	2.44	P	Land Transportation and Warehousing Facilities	V-88 (East)						4225									
		135	53.13	P	Land Transportation and Warehousing Facilities	SP-86 (A, B, D, E), SP-236, SP-237						4225									
		161	TBD	P	Land Transportation and Warehousing Facilities	CD-1						4225									
3	105	011	5.54	R	Ship and Boat Building and Repair Yards	CEP-198		3731													Ship and boat repair.
		014	26.24	R	Ship and Boat Building and Repair Yards	CEP-198, CEP-209		3731													
		015	31.01	R	Ship and Boat Building and Repair Yards	CEP-209		3731													
		020	5.31	R	Ship and Boat Building and Repair Yards	CEP-203 & Pier 5T Boat Basin			3732												
		021	0.24	R	Ship and Boat Building and Repair Yards	CEP-203 & Pier 5T Boat Basin			3732												
		083	6.27	R	Ship and Boat Building and Repair Yards	V-88 (West)			3732												
		087	1.13	R	Ship and Boat Building and Repair Yards	V-88 (West)			3732												
		105	1.43	R	Ship and Boat Building and Repair Yards	V-47			3732												
		110	2.64	R	Ship and Boat Building and Repair Yards	V-47			3732												
4	016	016	62.47	P	Land Transportation and Warehousing Facilities	CEP-156					4222										Refrigerated storage and warehousing with boat and ship repair.
						CEP-201						4225									
				R	Ship and Boat Building and Repair Yards	CEP-200, CEP-209		3731													
		023	14.25	P	Land Transportation and Warehousing Facilities	CEP-156					4222										
				R	Ship and Boat Building and Repair Yards	CEP-203 & Pier 5T Boat Basin			3732												
5	024	024	9.90	R	Ship and Boat Building and Repair Yards	CEP-165			3732												Single outfall. Steam generation with scrap and waste materials and ship repair
				K	Scrap Recycling and Waste Recycling Facilitie	Z-309 (South)									4953						
				AD	Non-Classified Facilities	CEP-165, Z-312										4961					
6	029	029	79.14	P	Land Transportation and Warehousing Facilities	W-143, W-148, Y-109						4225									Large-scale warehousing and distribution with scrap and waste materials.
				N	Scrap Recycling and Waste Recycling Facilitie	Z-309 (North)											5093				
		207	**20.21**	**P**	**Land Transportation and Warehousing Facilities**	**SDA-205, SDA-210**						**4225**									
				N	**Scrap Recycling and Waste Recycling Facilities**	**SDA-210**											**5093**				
		208	**27.77**	**P**	**Land Transportation and Warehousing Facilities**	**SDA-204, SDA-205, SDA-210**						**4225**									
				N	**Scrap Recycling and Waste Recycling Facilities**	**SDA-210**											**5093**				
7	034	034	20.90	P	Land Transportation and Warehousing Facilities	W-135, W-148						4225									Single outfall. Warehousing with bulk fuels
				AD	Non-Classified Facilities	W-66												5171			
8	055	055	6.49	N	Scrap Recycling and Waste Recycling Facilitie	Q-50 (including Q-50C)											5093				Single outfall. Boat building and repair with recycling
				R	Ship and Boat Building and Repair Yards	Q-50 (including Q-50C)			3732												
9	058	058	201.84	P	Land Transportation and Warehousing Facilities	X-134, X-136, X-137, W-127, W-131, W-148						4225									Single outfall. Warehousing with heavy machine repair
				AD	Non-Classified Facilities	A-80, A-127, W-131													7699		
10	059	059	38.41	AD	Non-Classified Facilities	A-127													7699		Repair shops and related services. Boom/lifts repair, heavy truck repair, ground vehicle repair and maintenance.
		089	1.20	AD	Non-Classified Facilities	V-88 (Center)													7699		
		605	**47.27**	**AD**	**Non-Classified Facilities**	**MCA-612**													**7699**		
		611*	**27.17**	**AD**	**Non-Classified Facilities**	**NH-31A**													**7699**		
		612*	**61.68**	**AD**	**Non-Classified Facilities**	**NH-31A**													**7699**		
11	425	069	26.94	S	Air Transportation Facilities	LF-60								4581						Apron, Taxiway	Airports, flying fields, and airport terminal services with airfield operations. Note: Warehousing is limited at OF 104.
		073	7.82	S	Air Transportation Facilities	LF-60								4581						Apron, Taxiway	
		075	21.34	S	Air Transportation Facilities	LF-59, LF-60								4581						Apron. Helipad, Runway	
		082	35.03	S	Air Transportation Facilities	LF-53, LF-59, LF-66								4581						Apron	
		104	1.85	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Helipad	
				P	Land Transportation and Warehousing Facilities	V-29						4225									
		116	13.81	S	Air Transportation Facilities	LP-33, LP-34								4581						Aircraft Parking	
		117	2.62	S	Air Transportation Facilities	LP-27								4581						Aircraft Parking	
		120	2.12	S	Air Transportation Facilities	LP-35								4581						Apron, Helipad, Aircraft Parking, Taxiway	
		133	16.22	S	Air Transportation Facilities	SP-35, SP-36, SP-40								4581						Apron	
		134	57.51	S	Air Transportation Facilities	SP-35, SP-40								4581						Apron	
		144	34.53	S	Air Transportation Facilities	LP-33, LP-34								4581						Apron, Helipad, Aircraft Parking, Runway, Taxiway	
		329	3.03	S	Air Transportation Facilities	LP-167								4581						Aircraft Parking, Taxiway	
		331	8.87	S	Air Transportation Facilities	LP-167								4581						Aircraft Parking	
		332	7.71	S	Air Transportation Facilities	LP-167, LP-205 & LP-205A, Airfield Operations								4581						Aircraft Parking	
		343	3.11	S	Air Transportation Facilities	LP-210								4581						Aircraft Parking	
		344	10.49	S	Air Transportation Facilities	LP-210								4581						Aircraft Parking	
		352	7.69	S	Air Transportation Facilities	LP-167								4581							
		425	32.53	S	Air Transportation Facilities	LP-21, LP-48, LP-123								4581						Apron, Aircraft Parking, Runway, Taxiway	

APPENDIX B.2

OUTFALL GROUPING JUSTIFICATION

Data highlighted is associated with NSA-HR

							Industrial Activities															
Group No.	**Representative Outfall**	**Outfall Grouping**	**Drainage Area (acres)**	**Sector**	**Sector Description**	**Associated Buildings/Sites (Industrial Regulated)**	**3724 - Aircraft Engines and Engine Parts**	**3731 - Ship Building and Repairing**	**3732 - Boat Building and Repairing**	**4212 - Local Trucking Without Storage**	**4222 - Refrigerated Warehousing and Storage**	**4225 - General Warehousing and Storage**	**4226 - Special Warehousing and Storage**	**4581 -Airports, Flying Fields, and Airport Terminal Services**	**4953 - Refuse Systems**	**4961 - Steam and Air Conditioning Supply**	**5093 - Scrap and Waste Materials**	**5171 - Petroleum Bulk Stations and Terminals**	**7699 - Repair Shops and Related Services, Not Elsewhere Classified**	**4581 - Airfield Operations (description as applicable)**	**Comments**
12	409	076	7.40	S	Air Transportation Facilities	Airfield Operations								4581						Helipad, Runway, Taxiway	Airfield operations, no buildings. Outfall 409 - Internal to 115; Very small portion of AST berm in drainage area.
		077	3.92	S	Air Transportation Facilities	Airfield Operations								4581						Helipad, Runway	
		100	6.03	S	Air Transportation Facilities	Airfield Operations								4581						Apron	
		103	2.00	S	Air Transportation Facilities	Airfield Operations								4581						Apron	
		112	7.66	S	Air Transportation Facilities	Airfield Operations								4581						Apron	
		122	5.18	S	Air Transportation Facilities	Airfield Operations								4581						Taxiway	
		124	0.66	S	Air Transportation Facilities	Airfield Operations								4581						Taxiway	
		129	0.31	S	Air Transportation Facilities	Airfield Operations								4581						Taxiway	
		131	3.93	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Taxiway	
		301	522.80	S	Air Transportation Facilities	Airfield Operations								4581						Taxiway, Aircraft Parking	
		303	20.58	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Taxiway	
		304	11.07	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Runway, Taxiway	
		305	8.19	S	Air Transportation Facilities	Airfield Operations								4581						Runway, Taxiway	
		306	1.06	S	Air Transportation Facilities	Airfield Operations								4581						Runway, Taxiway	
		307	33.19	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Runway, Taxiway	
		308	1.04	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Taxiway	
		309	35.06	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Taxiway	
		326	0.54	S	Air Transportation Facilities	Airfield Operations								4581						Taxiway	
		327	18.18	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Runway, Taxiway	
		328	13.23	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Runway, Taxiway	
		330	10.04	S	Air Transportation Facilities	Airfield Operations								4581						Runway, Taxiway	
		409	47.01	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Taxiway, Runway	
				P	Land Transportation and Warehousing Facilities	LP-37 (Fuel Farm), AST LP-42												5171			
13	078	078	18.22	P	Land Transportation and Warehousing Facilities	LF-18 (West)							4226								Single outfall. Special Storage (boat storage) with aircraft
				S	Air Transportation Facilities	LF-59, LF-66, Airfield Operations								4581						Apron, Helipad, Runway, Taxiway	
14	149	094	7.07	AB	Transportation Equipment, Industrial or Commercial Machinery	V-146	3724					4225									Depot-level aircraft maintenance and heavy machine repair with warehousing, and airfield operations areas.
				P	Land Transportation and Warehousing Facilities	V-88 (East)						4225									
				S	Air Transportation Facilities	Airfield Operations								4581						Apron	
		123	63.77	S	Air Transportation Facilities	Airfield Operations								4581						Taxiway	
				AB	Transportation Equipment, Industrial or Commercial Machinery	SP-396	3724													
		149	10.72	P	Land Transportation and Warehousing Facilities	SP-86 (A, B, D, E)						4225									
				S	Air Transportation Facilities	Airfield Operations								4581						Apron	
				AB	Transportation Equipment, Industrial or Commercial Machinery	SP-300 and SP-301, SP-303 and SP-304	3724													
		422	5.17	AB	Transportation Equipment, Industrial or Commercial Machinery	V-147	3724													
		423	5.54	AB	Transportation Equipment, Industrial or Commercial Machinery	V-147	3724													
		424	9.08	AB	Transportation Equipment, Industrial or Commercial Machinery	V-147	3724													
15	114	114	112.18	AD	Non-Classified Facilities	P-1 (P Compound)										4961					Single outfall. Steam generation with some airfield operations
				S	Air Transportation Facilities	Airfield Operations								4581						Apron	
Reference	N/A	115	80.20	AB	Transportation Equipment, Industrial or Commercial Machinery	V-147	3724														OF 115: Included for reference, internal outfalls captured in groups 12, 19 and 20. Outfalls for depot-level aircraft maintenance and forklift repair with hazardous materials storage, fuel farm, and air operations. OF 400: Included for reference, head of the
				K	Hazardous Waste Treatment, Storage, or Disposal Facilities	LP-24, LP-159									4953					
				P	Land Transportation and Warehousing Facilities	LP-26							4226								
						LP-37 (Fuel Farm)												5171			
				S	Air Transportation Facilities	LP-21, LP-48, Airfield Operations								4581						Apron, Aircraft Parking, Runway, Taxiway	
		400	811.72	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Helipad, Runway	
				P	Land Transportation and Warehousing Facilities	CD-1						4225									
16	132	132	0.74	S	Air Transportation Facilities	SP-36								4581							Boat repair with air transportation and local trucking with maintenance.
				R	Ship and Boat Building and Repair Yards	SP-37			3732												
				AD	Non-Classified Facilities	SP-37													7699		
		159	TBD	S	Air Transportation Facilities	V-70 (parking area)								4581							
				R	Ship and Boat Building and Repair Yards	V-71			3732												
		160	TBD	S	Air Transportation Facilities	V-70								4581							
				R	Ship and Boat Building and Repair Yards	V-71			3732												
17	334	333	34.76	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Hot Cargo Pad, Taxiway	Airfield operations with de-icing activities.
		334	56.90	S	Air Transportation Facilities	Airfield Operations								4581						Apron, Helipad, Runway, Taxiway	
		335	8.78	S	Air Transportation Facilities	LP-167, LP-205 & LP-205A, LP-210								4581						Apron, Aircraft Parking, Taxiway	
		336	15.22	S	Air Transportation Facilities	LP-167, LP-205 & LP-205A, LP-210								4581						Apron, Aircraft Parking, Taxiway	
		338	52.73	S	Air Transportation Facilities	LP-167, LP-205 & LP-205A, LP-210								4581						Apron, Helipad, Aircraft Parking, Runway, Taxiway	
		339	9.18	S	Air Transportation Facilities	LP-167, LP-205 & LP-205A, LP-210, Airfield Operations								4581						Aircraft Parking	
				P	Land Transportation and Warehousing Facilities	LP-117						4225									

APPENDIX B.2

OUTFALL GROUPING JUSTIFICATION

Data highlighted is associated with NSA-HR

							Industrial Activities															
Group No.	**Representative Outfall**	**Outfall Grouping**	**Drainage Area (acres)**	**Sector**	**Sector Description**	**Associated Buildings/Sites (Industrial Regulated)**	**3724 - Aircraft Engines and Engine Parts**	**3731 - Ship Building and Repairing**	**3732 - Boat Building and Repairing**	**4212 - Local Trucking Without Storage**	**4222 - Refrigerated Warehousing and Storage**	**4225 - General Warehousing and Storage**	**4226 - Special Warehousing and Storage**	**4581 -Airports, Flying Fields, and Airport Terminal Services**	**4953 - Refuse Systems**	**4961 - Steam and Air Conditioning Supply**	**5093 - Scrap and Waste Materials**	**5171 - Petroleum Bulk Stations and Terminals**	**7699 - Repair Shops and Related Services, Not Elsewhere Classified**	**4581 - Airfield Operations (description as applicable)**	**Comments**
18	404	401	7.11	AD	Non-Classified Facilities	CEP-1, CEP-2, CEP-3, CEP-11												5171			AST berm water outfalls. 401 - Internal to 003; 402 - Internal to 024; 404 - Internal to 034; 410, 411, 412, 413, 417, 419, 420 - Internal to 115.
		402	0.50	AD	Non-Classified Facilities	Z-312 (AST berm only)												5171			
		404	12.02	AD	Non-Classified Facilities	W-66												5171			
		410	0.64	P	Land Transportation and Warehousing Facilities	LP-37 (Fuel Farm)												5171			
		411	1.83	P	Land Transportation and Warehousing Facilities	LP-37 (Fuel Farm)												5171			
		412	1.33	P	Land Transportation and Warehousing Facilities	LP-37 (Fuel Farm)												5171			
		413	0.53	P	Land Transportation and Warehousing Facilities	LP-37 (Fuel Farm)												5171			
		417	1.91	P	Land Transportation and Warehousing Facilities	LP-37 (Fuel Farm)												5171			
		419	0.37	P	Land Transportation and Warehousing Facilities	LP-37 (Fuel Farm)												5171			
		420	1.26	P	Land Transportation and Warehousing Facilities	LP-37 (Fuel Farm)												5171			
19	408	408	52.93	P	Land Transportation and Warehousing Facilities	LP-20				4212											Hazardous materials storage with some special warehousing. 408 - Internal to 115.
						LP-26							4226								
				K	Hazardous Waste Treatment, Storage, or Disposal Facilities	LP-24									4953						
		421	0.90	K	Hazardous Waste Treatment, Storage, or Disposal Facilities	LP-159									4953						

*Outfall 613 will be added to the outfall justification list of outfalls to represent the industrial regulated activity associated with building NH31A as a result of theupdated survey and basin re-delineation completed in 2018.

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Appendix C
Dry-Weather Flow Observations

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APPENDIX C

DRY-WEATHER FLOW OBSERVATIONS

OUTFALL NO.	BUILDING/ OUTFALL	LOCATION	IDS 2007	COMMENTS	IDS 2010	COMMENTS	IDS 2014	COMMENTS
200	Outfall 200				N/A	Not found.	No	No flow observed
201	Outfall 201				N/A	Unable to observe due to security issues with NIT.	N/A	NIT
202	Outfall 202				N/A	Unable to observe due to security issues with NIT.	N/A	NIT
203	Outfall 203				N/A	Unable to observe due to security issues with NIT.	N/A	NIT
203	SDA 340	West of Building	No	Permitted discharge.	No	No flow observed.		
204	Outfall 204				N/A	Unable to observe due to security issues with NIT.	N/A	NIT
205	Outfall 205				No	No observed discharge.	No	No flow observed
205	SDA213				N/A	Unable to locate opening.	No	No flow observed
206	Outfall 206				No	No observed discharge.	No	No flow observed
207	Outfall 207				No	Drop-inlet under property fence line - no observed discharge.	No	No flow observed
208	SDA202				N/A	Building demolished		
208	Outfall 208				No	No observed discharge.	No	No flow observed
208	SDA210				No	No flow observed from 1/2" or 4" pipe.	No	No flow observed
600	Outfall 600				No	No flow observed.	No	No flow observed
601	Outfall 601				No	No observed discharge.	No	No flow observed
602	Outfall 602				No	No observed discharge.	No	No flow observed
603	Outfall 603				No	No observed discharge.	No	No flow observed
603	MCA600	Northwest of Building	N/A	Sink not found.	N/A	----------	No	No flow observed
603	MCA600	Southeast of Building	No	Unit has been removed and replaced with chiller.	N/A	----------	No	No flow observed
604	Outfall 604				No	No observed discharge.	No	No flow observed
605	Outfall 605				No	Mud observed due to construction.	No	No flow observed
605	MCA614	West of Building	No	Permitted discharge.			No	Permitted discharge

Note: Inspections are completed once every three years

APPENDIX C

DRY-WEATHER FLOW OBSERVATIONS

OUTFALL NO.	BUILDING/ OUTFALL	LOCATION	IDS 2007	COMMENTS	IDS 2010	COMMENTS	IDS 2014	COMMENTS
605	CA12	South of Building	N/A	Building demolished.	N/A	----------		
605	CA7	North of Building	No	Building demolished.	N/A	----------		
606	Outfall 606				No	No observed discharge.	No	No flow observed
607	Outfall 607				No	No observed discharge.	No	No flow observed
608	Outfall 608				No	No observed discharge.	No	No flow observed
609	Outfall 609				No	No observed discharge.	No	No flow observed
610	Outfall 610				No	No observed discharge.	No	No flow observed
610	MCE224		No	Remodeled building. OWS is no longer present.			No	No flow observed
610	NH142	East of Building	No	No water or sheen observed.	No	No flow or sheen observed.	No	No flow observed
610	NH142	Southwest of Building	No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
611	Outfall 611				No	No observed discharge.	No	No flow observed
611	NH41	West of Building	No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
611	NH41	North of Building	No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
611	NH41	North of Building			No	No flow observed.	No	No flow observed
611	NH41	North of Building			No	No flow observed.	No	No flow observed
611	NH45	North of Building	No	Permitted discharge.	No	Nothing observed.	No	No flow observed
611	NH5	West of Building	No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
611	NH5	North of Building			No	Nothing found, O07-NMR-043 not on stormwater maps.	No	No flow observed
611	NH5	North of Building	No	Permitted discharge.	No	No flow observed from 2" galvanized pipe.	No	Permitted discharge
612	Outfall 612						No	No flow observed
612	NH18	South of Building	No	Permitted discharge.	No	No 4" cip into 007-NMR-059 found.	No	Permitted discharge
612	NH18	South of Building			No	No flow observed.	No	No flow observed
612	NH19	South of Building			No	No flow observed.	No	No flow observed
612	NH19	South of Building	No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
612	NH19	West of Building	No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
612	NH19	West of Building	No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
612	NH1A	East of Building	No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
612	NH25	West of Building			No	No flow observed.	No	No flow observed

Note: Inspections are completed once every three years

APPENDIX C

DRY-WEATHER FLOW OBSERVATIONS

OUTFALL NO.	BUILDING/ OUTFALL	LOCATION	IDS 2007	COMMENTS	IDS 2010	COMMENTS	IDS 2014	COMMENTS
612	NH25	West of Building			No	No pipes or flow observed, catch basin partially dirt-filled.	No	No flow observed
612	NH36	South of Building	No	Permitted discharge.	No	No flow observed.	No	Permitted discharge
612	NH39	West of Building			No	No flow observed in catch basin 007-NMR-056.	No	No flow observed
612	NH6	North of Building			No	No flow observed.	No	No flow observed
612	NH85	West of Building					No	No flow observed
612	NH95	West of Building	No	Both drains to sanitary inside building.	No	No flow observed.	No	No flow observed
612	NH95	North of Building			No	Permitted discharge - a/c condensate.	No	Permitted discharge
612	NH95	North of Building	No	Permitted discharge.	No	Permitted discharge (changed from west to north of bldg).	No	Permitted discharge
612	NH95	East of Building			No	Permitted discharge.	No	Permitted discharge
612	NH95	North of Building			No	Structure 007-NMR-026 not found, not on maps.	No	No flow observed
612	NH21		No	Permitted discharge.	No	Building demolished.		
612	NH21		No	Permitted discharge.	No	Building demolished.		
612	NH21				No	Building demolished.		
612	NH21		No	Permitted discharge.	No	Building demolished.		
612	NH27	West of Building	N/A	Building demolished.	N/A	----------		
613	Outfall 613				No	No flow observed.	No	No flow observed
613	SC1	East of Building	No	Previous observations remain relevant.	No	No flow observed.	No	No flow observed
613	SC1	North of Building			No	No flow observed.	No	No flow observed
613	SC1	North of Building			No	No flow observed.	No	No flow observed
613	SC1	West of Building			No	No flow observed.	No	No flow observed
613	SC1	West of Building	No	Permitted discharge.	No	No flow observed.	No	No flow observed
613	SC111	South of Building	No	Permitted discharge.	No	No flow observed.	No	Permitted discharge
613	SC111	South of Building	No	Permitted discharge.	No	No flow observed.	No	Permitted discharge
613	SC112	South of Building	No	Permitted discharge.	No	No flow observed.	No	Permitted discharge
613	SC112	Southeast of Building	No	Permitted discharge.	No	No flow observed.	No	Permitted discharge
613	SC115	Southeast of Building	No	Permitted discharge.	No	Nothing found.	No	Permitted discharge

Note: Inspections are completed once every three years

APPENDIX C

DRY-WEATHER FLOW OBSERVATIONS

OUTFALL NO.	BUILDING/ OUTFALL	LOCATION	IDS 2007	COMMENTS	IDS 2010	COMMENTS	IDS 2014	COMMENTS
613	SC129	Southwest of Building	No		No	No flow observed.	No	No flow observed
613	SC319	South of Building	No		No	No flow observed.	No	No flow observed
613	SC4	South of Building	No	Permitted discharge.	No	No flow observed.	No	Permitted discharge
613	SC400A		No	Permitted discharge.	No	Permitted discharge.	No	Permitted discharge
613	SC401	West of Building	No	Permitted discharge.	No	No flow observed.	No	Permitted discharge
614	Outfall 614				No	No flow observed.	No	No flow observed
615	Outfall 615				No	No observed discharge.	No	No flow observed
616	Outfall 616				No	No observed discharge.	No	No flow observed
617	Outfall 617				No	No observed discharge.	No	No flow observed
618	Outfall 618				N/A	Not constructed at time of 2010 survey.	N/A	No IDS performed in 2014.
619	Outfall 619				N/A	Not constructed at time of 2010 survey.	N/A	No IDS performed in 2014.
620	Outfall 620				No	No flow observed.	No	No flow observed
621	Outfall 621				No	No flow observed.	No	No flow observed

Note: Inspections are completed once every three years

Appendix D
Inventory of Outdoor Storage Areas

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APPENDIX D

INVENTORY OF OUTDOOR STORAGE AREAS

Outfall	Location	Map	Type of Storage	Materials	Quantity	Cover	Containment	Pollution Potential
205	SDA-332A	T-5	Aboveground Storage Tank(s)	POL	2	No	Double Walled	Low
205	SDA-332	T-5	Open	Storage Container	Varies	No	N/A	Low
205	SDA-332, SDA-344	S-4, T-5	Dumpster(s)	Solid Waste	2	No	N/A	Low
205	SDA-337	S-5	Cabinet	Flammables	1	No	Cabinet	Low
205	SDA-344	S-4	Dumpster(s)	Recyclable Cardboard/Solid Waste	2	No	N/A	Low
206, 207	SDA-214	S-4, T-4	Open	Storage Container	Varies	Yes	N/A	Low
207	SDA-216	T-4	Open	Non-Fueled Equipment	Varies	No	Designated Area	Low
207	SDA-216	T-4	Dumpster(s)	Solid Waste	1	No	N/A	Low
207	SDA-216	T-4	Open	Wood/Lumber	Varies	No	N/A	Low
207	SDA-216	T-4	Open	Miscellaneous Metal	Varies	No	N/A	Low
207	SDA-216	T-4	Dumpster(s)	Recyclable Cardboard	1	No	N/A	Low
207, 208	SDA-204, SDA-205, SDA-210, SDA-218	T-4, T-5, U-4, U-5	Open	Miscellaneous Equipment	Varies	No	N/A	Low
207, 208	SDA-204, SDA-205, SDA-210, SDA-218	T-4, T-5, U-4, U-5	Open	Non-Fueled Equipment	Varies	No	Designated Area	Low
207, 208	SDA-205, SDA-210	T-4, U-4, U-5	Open	Miscellaneous Metal	Varies	No	N/A	Low
207, 208	SDA-210	T-4, U-4	Open	Wood/Lumber	Varies	No	N/A	Low
207, 208	SDA-218	U-4, U-5	Open	Storage Container	Varies	No	N/A	Low
207, 208	SDA-205, SDA-210	T-4, U-4	Dumpster(s)	Scrap Metal	4	No	N/A	Low
207, 208	SDA-205, SDA-210	T-4, U-4	Dumpster(s)	Recyclable Cardboard	2	No	N/A	Low
207, 208	SDA-205, SDA-216, SDA-218	T-4, T-5, U4	Open	Vehicle Storage	Varies	No	Designated Area	Low
207, 208	SDA-205, SDA-210, SDA-216, SDA-218	T-4, U-4, U-5	Dumpster(s)	Solid Waste	Varies	No	N/A	Low
207, 208	SDA-210, SDA-215	T-4, U-4	Compressed Gas	Compressed Gas	Varies	No	Cylinder Cage	Low
207, 208	SDA-210, SDA-218	T-4, U-4	Open	Other Open Storage	Varies	No	N/A	Low
207, 208	SDA-218	U-4	Cabinet	Flammables	1	No	Cabinet	Low

APPENDIX D

INVENTORY OF OUTDOOR STORAGE AREAS

Outfall	Location	Map	Type of Storage	Materials	Quantity	Cover	Containment	Pollution Potential
207, 208	SDA-218, SDA-313, SDA-332	T-5, U-4	Aboveground Storage Tank(s)	POL	3	No	Double Walled	Low
207, 208	SDA-218	U-4	Open	Wood Chips/Mulch	Varies	No	N/A	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Open	Other Open Storage	Varies	No	N/A	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Open	Storage Container	Varies	Yes	N/A	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Open	Non-Fueled Equipment	Varies	No	Designated Area	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Dumpster(s)	Solid Waste	1	No	N/A	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Open	Wood/Lumber	Varies	No	N/A	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Open	Miscellaneous Equipment	Varies	No	N/A	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Aboveground Storage Tank(s)	POL	3	No	Double Walled	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Cabinet	Flammables	2	No	Cabinet	Low
301	CA-500, CA-501 (including CA-477 & 499)	T-11	Drums	Cooking Oil	Varies	Yes	Drum Containment	Low
605	CA-7	R-10	Open	Wood Chips/Mulch	Varies	No	N/A	Low
605	CA-10, CA-495, CA-505, MCA-9, MCA-614	P-9, P-10, Q-10	Dumpster(s)	Solid Waste	12	No	N/A	Low
605	CA-505	P-9	Dumpster(s)	Recyclable Cardboard	1	No	N/A	Low
605	MCA-9	P-10	Drums	Solvents & Degreasers	1	No	N/A	Medium
605	MCA-9, MCA-612	P-9, P-10	Cabinet	Flammables	4	No	Cabinet	Low
605	MCA-9, MCA-604, MCA-612, MCA-614	P-10, Q-10	Locker	Hazardous Materials	Varies	No	Locker	Low
605	MCA-9, MCA-612, MCA-614	P-9, P-10, Q-10	Open	Storage Container	Varies	No	N/A	Low
605	MCA-604	P-10	Open	Wood/Lumber	Varies	No	N/A	Low
605	MCA-612	P-9, P-10	Open	Miscellaneous Equipment & Construction Material	Varies	No	N/A	Low
605	MCA-612	P-9, P-10	Aboveground Storage Tank(s)	Waste Oil	1	No	Double Walled	Low
605	MCA-612	P-9, P-10	Open	Vehicle Storage	Varies	No	Designated Area	Low
605	MCA-614	P-10	Open	Non-Fueled Equipment	Varies	No	Designated Area	Low

APPENDIX D

INVENTORY OF OUTDOOR STORAGE AREAS

Outfall	Location	Map	Type of Storage	Materials	Quantity	Cover	Containment	Pollution Potential
605	MCA-614	P-10	Compressed Gas	Compressed Gas	Varies	No	Cylinder Cage	Low
611, 612	BEN-155, NH-36, NH-94, SC-400, SC-407	R-6, R-8, S-6, T-6, T-7	Open	Vehicle Storage	Varies	No	Designated Area	Low
611, 612	BEN-208, NH-12, NH-41, NH-95, SC-400, SC-401, SC-422	Q-7, R-7	Dumpster(s)	Solid Waste	9	No	N/A	Low
611, 612	NH-5, SC-401	S-6, R-7	Open	Miscellaneous Equipment & Construction Material	Varies	No	N/A	Low
611, 612	NH-35, NH-41, NH-94, NH-95, SC-1	R-6, R-7, R-8, S-7, T-6	Aboveground Storage Tank(s)	POL	7	No	Double Walled	Low
611, 612	NH-35, SC-401	R-8, S-6	Open	Wood/Lumber	Varies	No	N/A	Low
611, 612	NH-36, NH-95	R-8, S-7	Cabinet	Flammables	3	No	Cabinet	Low
611, 612	NH-36, SC-1	Q-8, R-8, T-6	Open	Storage Container	Varies	No	N/A	Low
611, 612	NH-36, SC-401	R-8, S-8	Open	Miscellaneous Metal	Varies	No	N/A	Low
611, 612	SC-131, SC-401, SCG	S-6, T-6	Open	Other Open Storage	Varies	No	N/A	Low
611, 612	SC400, SC-401	S-6, T-6	Dumpster(s)	Recyclable Cardboard	2	No	N/A	Low
612	SC-1	T-6	Drums	Cooking Oil	Varies	Yes	Drum Containment	Low
612	NH-95	S-7	Locker	Hazardous Materials	1	No	Locker	Low
613	NH-31A	S-8, T-8	Drums	Cooking Oil	Varies	Yes	Drum Containment	Low
613	NH-31A	S-8, T-8	Dumpster(s)	Recyclable Cardboard	1	No	N/A	Low
613	NH-31A	S-8, T-8	Dumpster(s)	Solid Waste	1	No	N/A	Low
613	NH-31A	S-8, T-8	Open	Vehicle Storage	Varies	No	Designated Area	Low

Industrial Regulated sites are highlighted.

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Appendix E
Inventory of Aboveground Storage Tanks

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APPENDIX E

INVENTORY OF ABOVEGROUND STORAGE TANKS

Outfall	Location	Map	Substance	Use	Tank Volume (Gallons)	Containment Type	Containment Volume
REGULATED MONITORED OUTFALLS							
205	SDA-213	T-5	No. 2 Fuel Oil	Heating System Supply	1,000	Double Walled	Adequate
205	SDA-313A	T-5	Diesel	Emergency Power Generator	278	Double Walled	Adequate
205, 206	SDA-218	U-4	Diesel	Product Dispenser	Unknown	Unknown	Unknown
207	SDA-332	T-5	Diesel	Emergency Power Generator	1,000	Containment Berm	Adequate
207	SDA-332	T-5	Diesel	Emergency Power Generator	196	Double Walled	Adequate
605	MCA-612	P-10	Used Oil	Bulk Storage	500	Double Walled	Adequate
611	NH-41	R-7	Diesel	Emergency Power Generator	245	Single Walled	N/A
611	NH-41	R-7	Diesel	Emergency Power Generator	75	Double Walled	Adequate
611, 612*	NH-31	S-8, T-8	Diesel	Emergency Power Generator	150	Double Walled	Adequate
611, 612*	NH-31	S-8, T-8	Diesel	Emergency Power Generator	150	Double Walled	Adequate
611, 612*	NH-31	S-8, T-8	Diesel	Emergency Power Generator	500	Double Walled	Adequate
612*	NH-8	S-7	Diesel	Emergency Power Generator	200	Double Walled	Adequate
612*	NH-8	S-7	Diesel	Emergency Power Generator	200	Double Walled	Adequate
612*	NH-8	S-7	Diesel	Emergency Power Generator	100	Single Walled	Inadequate
612*	NH-12	S-8	Diesel	Emergency Power Generator	500	Containment Berm	Adequate
612*	NH-19	R-7	Unknown	Unknown	Unknown	Unknown	Unknown
612*	NH-31B	S-8	Diesel	Emergency Power Generator	500	Double Walled	Adequate
612*	NH-33	S-7, S-8, T-7, T-8	Diesel	Emergency Power Generator	1,250	Double Walled	Adequate
612*	NH-46G	S-7	Diesel	Emergency Power Generator	Unknown	Unknown	Unknown
612*	NH-95	R-7, S-7	Diesel	Emergency Power Generator	200	Single Walled	N/A
NON-MONITORED REGULATED OUTFALLS							
301	CA-501	T-11	Waste Oil	Bulk Storage	250	Double Walled	Adequate
301	CA-501	T-11	Diesel	Product Dispenser	500	Double Walled	Adequate
301	CA-501	T-11	Gasoline	Product Dispenser	1,000	Double Walled	Adequate
606	CA-6	R-10	Diesel	Emergency Power Generator	500	Double Walled	Adequate
610	MCE-1	T-9	Diesel	Emergency Power Generator	Unknown	Unknown	Unknown
610	MCE-1	T-9	Diesel	Emergency Power Generator	Unknown	Unknown	Unknown
610	MCE-224	T-9	Used Oil	Bulk Storage	250	Double Walled	Adequate
610	MCE-225A	T-9	Diesel	Emergency Power Generator	100	Double Walled	Adequate
610	NH-32	T-8	Diesel	Emergency Power Generator	898	Double Walled	Adequate
610	NH-74	T-8	Diesel	Emergency Power Generator	100	Double Walled	Adequate
610	NH-75	T-9	Diesel	Emergency Power Generator	255	Double Walled	Adequate

APPENDIX E

INVENTORY OF ABOVEGROUND STORAGE TANKS

Outfall	Location	Map	Substance	Use	Tank Volume (Gallons)	Containment Type	Containment Volume
NON-MONITORED REGULATED OUTFALLS							
610	NH-142	S-8	Diesel	Emergency Power Generator	500	Double Walled	Adequate
610	NH-36	R-8	Diesel	Emergency Power Generator	100	Double Walled	Adequate
613*	NH-94	R-7	Diesel	Emergency Power Generator	500	Double Walled	Adequate
613*	NH-94	R-7	Diesel	Emergency Power Generator	500	Double Walled	Adequate
613*	NH-94	R-7	Diesel	Emergency Power Generator	500	Double Walled	Adequate
613*	NH-94	R-7	Used Oil	Bulk Storage	1,000	Double Walled	Adequate
613*	NH-94	R-6	Used Oil	Bulk Storage	1,000	Double Walled	Adequate
613*	SC-1	T-6	Diesel	Emergency Power Generator	Unknown	Unknown	Unknown
613*	BEN-154	R-5	Diesel	Emergency Power Generator	70	Containment Berm	N/A
613*	BEN-154	R-5	Diesel	Product Dispenser	250	Double Walled	Adequate

Appendix F
Inventory of Outdoor Liquid Transfer Operations

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APPENDIX F

INVENTORY OF OUTDOOR LIQUID TRANSFER OPERATIONS

Outfall	Location	Activity Location	Map	Operation	Materials	Maximum Spill Quantity	Containment Type
301	CA-501	NW of Building	T-11	AST Fuel Transfer	Gasoline	1,000 gallons (Tank rupture/failure) 125 gpm (est tank overfill) 30 gpm (est. tank discharge overfill)	Double walled, AST fill port spill containment, Environmental equivalent
301	CA-501	NW of Building	T-11	AST Fuel Transfer	Diesel	500 gallons (Tank rupture/failure) 125 gpm (est tank overfill) 30 gpm (est. tank discharge overfill)	Double walled, AST fill port spill containment, Environmental equivalent
610	MCE-224	Around Building	T-9	UST Fuel Transfer	Gasoline	125 gpm (est. tank overfill)	Spill bucket, Overfill/ High-level alarms
610	MCE-224	Around Building	T-9	Used Oil Transfer	Used Oil	250 gallons (Volume of AST)	None
612	NH-94	S of Building	R-7	UST Fuel Transfer	Diesel	125 gpm (est. tank overfill)	Spill bucket, Overfill/ High-level alarms
612	NH-94	E of Building	R-7	UST Fuel Transfer	Diesel	125 gpm (est. tank overfill)	Spill bucket, Overfill/ High-level alarms
612	NH-94	W and S of Building	R-7	Used Oil Transfer	Used Oil	1,000 gallons (Volume of storage tank)	None
612	NH-94	E of Building	R-7	UST Fuel Transfer	Diesel	125 gpm (est. tank overfill)	Spill bucket, Overfill/ High-level alarms
613	NH-139	N of Building	R-8	UST Fuel Transfer	Diesel	125 gpm (est. tank overfill)	Spill bucket, Overfill/ High-level alarms
616	BEN-154	N of Building	R-5	AST Fuel Transfer	Diesel	250 gallons (Tank rupture/failure) 125 gpm (est tank overfill) 30 gpm (est. tank discharge overfill)	Double walled, AST fill port spill containment, Environmental equivalent

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Appendix G
Inventory of Aircraft Wash Rack Areas

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APPENDIX G

INVENTORY OF AIRCRAFT WASH RACK AREAS

Michael Baker International performed a comprehensive Site Compliance Evaluation (SCE) at NSA Hampton Roads from November 7, 2019 through December 9, 2019 and found no Aircraft Wash Rack Areas.

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Appendix H
Inventory of Aircraft Maintenance Areas

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APPENDIX H

INVENTORY OF AIRCRAFT MAINTENANCE AREAS

Michael Baker International performed a comprehensive Site Compliance Evaluation (SCE) at NSA Hampton Roads from November 7, 2019 through December 9, 2019 and found no Aircraft Maintenance Areas.

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Appendix I
Inventory of Aircraft Fueling/Defueling Areas

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APPENDIX I

INVENTORY OF AIRCRAFT FUELING/DEFUELING AREAS

Michael Baker International performed a comprehensive Site Compliance Evaluation (SCE) at NSA Hampton Roads from Nobember 7, 2019 through December 9, 2019 and found no Aircraft Fueling/Defueling Areas.

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Appendix J
Inventory of Aircraft Deicing Areas

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APPENDIX J

INVENTORY OF AIRCRAFT DEICING AREAS

Michael Baker International performed a comprehensive Site Compliance Evaluation (SCE) at NSA Hampton Roads from November 7, 2019 through December 9, 2019 and found no Aircraft Deicing Areas.

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Appendix K
Inventory of Vehicle Wash Rack Areas

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APPENDIX K

INVENTORY OF VEHICLE WASH RACK AREAS

Outfall	Location	Map	Discharge To	Type	Curbing	Cover	Detergent In Use	OWS	Pollution Potential
605	MCA-612, West of Building	P-9, P-10	Both *	POV	Yes	Yes	No	Yes	Low
610	MCE-1, West of Building	T-9	Both *	POV	Yes	No	Yes	Yes	Low
610	MCE-3, Four Car Wash Bays	S-9, T-9	Both *	POV	Yes	Yes	Yes	Yes	Low
610	MCE-224, North of Building	T-8	Both *	POV	Yes	Yes	Yes	Yes	Low
613	NH-31A, Northeast of Building	S-8	Both *	GOV	No	No	Yes	Yes	Low

* Diversion valve/automatic valve washing operations have the valve position set to discharge flow to the sanitary sewer.
POV - Privately Owned Vehicle; **GOV** - Government Owned Vehicle

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Appendix L
Inventory of Vehicle Maintenance Areas

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APPENDIX L

INVENTORY OF VEHICLE MAINTENANCE AREAS

Outfall	Location	Map	Description of Activities	Pollution Potential
605	MCA612	P-10	Industrial Truck Repair	Low
610	MCE-224	T-9	Minor POV Maintenance	Medium
612	SC-400A	T-6, T-7	Vehicle Storage, Maintenance, & Ground Equipment Storage	Low
613	NH-31B	S-8, T-8	NATO Garage, Operational level vehicle maintenance and repair	Low

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Appendix M
Inventory of Vehicle/Equipment Fueling Areas

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APPENDIX M

INVENTORY OF VEHICLE/EQUIPMENT FUELING AREAS

Outfall	Location	Map	Description of Activities	Pollution Potential
301	CA-501	T-11	Equipment Fueling	Low
610	MCE-224	T-9	Vehicle Fueling	Low
611, 613	NH-139	R-8	Equipment Fueling	Low
613	NH-94	R-7	Equipment Fueling	Low
616	BEN-154	R-5	Equipment Fueling	Low

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Appendix N
Inventory of Ship Maintenance/Repair Areas

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APPENDIX N

INVENTORY OF SHIP MAINTENANCE/REPAIR AREAS

Michael Baker International performed a comprehensive Site Compliance Evaluation (SCE) at NSA Hampton Roads from November 7, 2019 through December 9, 2019 and found no Ship Maintenance/Repair Areas.

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Appendix O
Hazardous Waste Accumulation Storage Areas

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APPENDIX O
INVENTORY OF HAZARDOUS WASTE ACCUMULATION STORAGE AREAS

NSA HR Headquarters Hazardous Waste Site List
(EPA ID #: VAR000533216 - LQG)

Satellite Accumulation Area Name/ID	Location	Waste Being Collected	Operation/Activity	Disposal Code	Waste Profile #	Haz Class Label	Primary POC	Primary Phone #	Training Date	Secondary POC	Secondary Phone #	Training Date	Notes/Comments
NSAHQ-CA490-SAA-01	Building CA490	30 gallon steel drum (gasoline fuel filters)	MWR Sewell's Point Golf Course Maintenance	D001, D018	FUELFIL-WET	Flammable Solid (4.1)	Tony Gardner	757-444-1945	OJT 11/14/2019	John Moore	757-680-0722	1/25/2019	tony.gardner@navy.mil john.b.moore2@navy.mil
NSAHQ-CA499-SAA-01	Building CA499	55 gallon steel drum w/ can puncture unit (waste aerosol cans)	MWR Sewell's Point Golf Course Maintenance	F002, F003, F005, D001, D005, D007, D008, D029, D035, D039, D040	386E	Flammable Liquid (3)	Tony Gardner	757-444-1945	OJT 11/14/2019	John Moore	757-680-0722	1/25/2019	tony.gardner@navy.mil john.b.moore2@navy.mil
NSAHQ-MCA604-SAA-03	Building MCA604	5 gallon bucket (for waste aerosol cans) and 14 gallon bucket (for lead and solvent contaminated rags)	Marine Corps Shooting Range (<90 day site)	D001, D005, D007, D008, D035	64HM 394C	Flammable Gas (2.1) and Miscellaneous (9)	Jeremy Pescrillo	757-489-2585/2586	1/23/2019	Theodore Billups	757-489-2585/2586	6/17/2019	theodore.billups.usmc-mccs.org pescrillojm@usmc-mccs.org
NSAHQ-MCA614-SAA-01	Building MCA614	55 gallon steel drum w/ can puncture unit (for waste aerosol cans)	US Marine Corps Forces Command	F002, F003, F005, D001, D005, D007, D008, D029, D035, D039, D040	386E	Flammable Liquid (3)	Vanda Glover	757-445-4282	OJT 11/14/2019				vanda.glover@usmc.mil
NSAHQ-MCE224-SAA-01	Building MCE224	5 gallon plastic bucket (for gasoline fuel filters)	MCX Gas Station	D001, D018	FUELFIL-WET	Flammable Solid (4.1)	Jeff Mongelli	757-423-1539	2/6/2019	Joe Glover	757-423-1539	2/20/2019	jeffrey.mongelli@usmc-mccs.org
NSAHQ-MCE224-SAA-02		55 gallon steel drum w/ can puncture unit (for waste aerosol cans)		F002, F003, F005, D001, D005, D007, D008, D029, D035, D039, D040	386E	Flammable Liquid (3)							
NSAHQ-NH31A-SAA-01	Building NH31A	5 gallon plastic bucket (for waste aerosol cans)	NATO SACT Facilities Maintenance	D001, D005, D007, D008, D035	64HM	Flammable Gas (2.1)	BU1 Sean Wills	757-747-3508	OJT 11/14/2019	CE2 Jerome Barnett	757-747-3371		sean.wills@act.nato.int jerome.barnett@act.nato.int
NSAHQ-NH31B-SAA-01	Building NH31B	5 gallon plastic bucket (for waste aerosol cans) 5 gallon plastic bucket (for spent gasoline filters and 5 gallon bucket (for solvent contaminated rags)	NATO SACT Transportation	D001, D005, D007, D008, D035, D018	64HM/ FUELFIL-WET	Flammmable Solid (4.1) and Flammable Gas (2.1)	CM2 Justin Keith	757-747-3354	OJT 11/14/2019				justin.keith@act.nato.int
NSAHQ-NH94-SAA-01	Building NH94	15 gallon plastic drum (for waste aerosol cans)	NAVFAC Midlant Power Supply Plant	D001, D005, D007, D008, D035	64HM	Flammable Gas (2.1)	Ramone Mason	757-836-5602	10/4/2019	Lee Dillon	757-836-5602	OJT 11/14/2019	roland.dillon@navy.mil
NSAHQ-NH95-SAA-02	Building NH95 Door 36	various wastes (typically waste aerosols and cleaners)	NAVFAC Midlant Public Works Shop	D001, D005, D007, D008, D035	64HM	Flammable Gas (2.1)	Eugene "Gene" E. Bliss, Jr.	757-836-5646, 757-838-4480 757-838-4428 (shop cell)	OJT 11/14/2019				eugene.bliss@navy.mil
NSAHQ-SC401-SAA-01	material turn in bay at Building SC401	30 gallon plastic drum w/ can puncture unit (for waste aerosol cans) and 15 gallon plastic drum (for coil cleaner)	National Defense University Joint Forces Staff College Support Services Division; Performs maintenance on college and adjacent student housing	D001, D005, D007, D008, D035	64HM	Flammable Liquid (3) and Corrosive (8)	Watt Cross	757-443-6507	10/1/2019	Jermaine Mason	757-443-6082	10/24/2019	crossw@ndu.edu jermaine.mason.civ@ndu.edu
NSAHQ-SDA218-SAA-01	Formerly known as SDA 218	5 gallon plastic bucket (for gasoline fuel filters) and 5 gallon plastic bucket (for waste aerosol cans)	Didlake Grounds Maintenance Contractor	D001, D005, D007, D008, D035/ D001, D018	64HM/ FUELFIL-WET	Flammmable Solid (4.1) and Flammable Gas (2.1)	Tim Thornley	757-439-3668	8/6/2019				tthornley@didlake.org

APPENDIX O
INVENTORY OF HAZARDOUS WASTE ACCUMULATION STORAGE AREAS

NSA HR Headquarters Hazardous Waste Site List
(EPA ID #: VAR000533216 - LQG)

Universal Waste Accumulation Area Name/ID	Location	Waste Being Collected	Operation/Activity	Disposal Code	Waste Profile #	Haz Class Label	Primary POC	Primary Phone #	Training Date	Secondary POC	Secondary Phone #	Training Date	Notes/Comments
NSAHQ-MCA614-UWAA-01	Building MCA614	Fluorescent Bulbs	US Marine Corps Forces Command	UNIV	571HM		Vanda Glover	757-445-4282	OJT 11/14/2019				vanda.glover@usmc.mil Bulbs are generated from bldgs: NH-41 E, NH-45 E&W, NH-33, MCE Exchange, Camp Allen 495.
NSAHQ-NH95-UWAA-01	Building NH-95 Door 36	Batteries (Nicad, Lithium), Fluorescent Bulbs	NAVFAC Midlant Public Works Shop	UNIV	170DHM-RECYCLE/ 58HM/ 571HM		Eugene "Gene" E. Bliss, Jr.	757-836-5646, 757-838-4428 (shop cell)	OJT 11/14/2019				eugene.bliss@navy.mil Bulbs are generated from bldgs: NH-95 and NH-139.
NSAHQ-SC401-UWAA-01	material turn in bay at Building SC401	Batteries (Lithium), Fluorescent Bulbs	National Defense University Joint Forces Staff College Support Services Division; Performs maintenance on college and adjacent student housing	UNIV	58HM/ 571HM		Watt Cross	757-443-6507	10/1/2019	Jermaine Mason	757-443-6082	10/24/2019	crossw@ndu.edu jermaine.mason.civ@ndu.edu
NSAHQ-SDA204-UWAA-01	Building SDA204	Batteries (Lithium), Fluorescent Bulbs	DLA/DRMO	UNIV	58HM/ 571HM		Neal Black	757-444-6077	2/1/2019	Joseph Hunnewell	757-444-6077 757-278-8457 757-278-8466	5/13/2019	neal.black@dla.mil joseph.Hunnewell@dla.mil
NSAHQ-SDA216-UWAA-01 (Temporary UWAA)	Building SDA216	Fluorescent Bulbs	Contractor pressure washing inside of warehouse as part of a Bldg renovation project	UNIV	58HM/ 571HM		Jesse Conefal	757-805-2529	OJT 11/13/2019	Kevin Eppley	757-604-2611	OJT 11/13/2019	Contractor - TST Construction FEAD POC - Albert Bulkwalter (Engineering Tech) 757-334-9417
Central Accumulation Area Name/ID	**Location**	**Waste Being Collected**	**Operation/Activity**	**Disposal Code**	**Waste Profile #**	**Haz Class Label**	**Primary POC**	**Primary Phone #**	**Training Date**	**Secondary POC**	**Secondary Phone #**	**Training Date**	**Notes/Comments**
NSAHQ-MCA604-CAA-01	Building MCA604	Lead Waste (HEPA air filters and lead contaminated debris from vacuuming the ranges)	Marine Corps Shooting Range (<90 day site)	D008	394A/ 394	Miscellaneous (9)	Jeremy Pescrillo	757-489-2585/2586	1/23/2019	Theodore Billups	757-489-2585-2586	6/17/2019	theodore.billups@usmc-mccs.org pescrillojm@usmc-mccs.org
NSAHQ-SDA204-CAA-01	Building SDA204	Various Waste	DLA/DRMO (<90 day CAA) EV services helps move materials in the 90-day site around, and signs hazardous waste manifests.	F002, F003, F005, D001, D002, D005, D007, D008, D029, D035, D039, D040	Various	Various	Neal Black	757-444-6077	2/1/2019	Joseph Hunnewell	757-444-6077 757-278-8457 757-278-8466	5/13/2019	neal.black@dla.mil joseph.Hunnewell@dla.mil They don't accept oxidizers or nuclear waste; only haz waste items get labeled; other haz items (w/ no label) are material for re-sale.
NSAHQ-SDA216-CAA-01 (Temporary CAA)	Building SDA216	lead based paint chips and wastewater	Contractor pressure washing inside of warehouse as part of a Bldg renovation project	D008		Miscellaneous (9)	Jesse Conefal	757-805-2529	OJT 11/13/2019	Kevin Eppley	757-604-2611	OJT 11/13/2019	Contractor - TST Construction FEAD POC - Albert Bulkwalter (Engineering Tech) 757-334-9417

Installation Environmental Program Director: Linda Hicks Office No. (757) 836-1862 Cell No. (757) 478-8590 Email: linda.hicks1@navy.mil
EPS: James Bonavita Office No. (757) 421-8114 Cell No. (757) 650-7286 Email: james.bonavita@navy.mil

APPENDIX O

INVENTORY OF HAZARDOUS WASTE ACCUMULATION STORAGE AREAS

Used Oil Sites	Capacity	POC
NSAHQ-CA501-AST-03	250 gallon used oil AST	Tony Gardner 757-444-1945 tony.gardner@navy.mil John Moore 757-680-0722 john.b.moore2@navy.mil
NSAHQ-MCA614-AST-01	30 gallon used oil drum	Vanda Glover 757-757-445-4282 vanda.glover@usmc.mil
NSAHQ-MCA612-AST-04	500 gallon used oil AST	GySgt Philip Bender 757-444-6776 philip.j.bender@usmc.mil
NSAHQ-MCE224-AST-05	275 gallon used oil AST	Jeff Mongelli 757-423-1539 jeffrey.mongelli@usmc-mccs.org
NSAHQ-NH34	30 gallon used compressor oil	Robert Greer 757-836-5646 robert.c.greer1@navy.mil
NSAHQ-NH94-AST-10	1,000 gallon used oil AST	Lee Dillon 757-836-1831 roland.dillon@navy.mil
NSAHQ-NH94-AST-10	1,000 gallon used oil AST	Lee Dillon 757-836-1831 roland.dillon@navy.mil
NSAHQ-NH95	30 gallon used compressor oil	Gene Bliss 757-836-5646 eugene.bliss@navy.mil
Used cooking oil	**Capacity**	**POC**
NSAHQ-CA501-DSA-01	2-30 gallon drums	Catherine Coleson (MWR Food, Beverage Director) 757-443-6111 catherine.coleson@navy.mil or Nhare Payson (Admin Assistant) 757-443-6064 nhare.j.payson@navy.mil
NSAHQ-MCA602-DSA-01	2-30 gallon drums	Vanda Glover 757-757-445-4282 vanda.glover@usmc.mil
NSAHQ-NH31C-DSA-01	150 gallon container	Demetrius D. Burton 757-747-4266 demetruis.burton@act.nato.int
NSAHQ-SC404-DSA-01	4-30 gallon drums	Catherine Coleson (MWR Food, Beverage Director) 757-443-6111 catherine.coleson@navy.mil or Nhare Payson (Admin Assistant) 757-443-6064 nhare.j.payson@navy.mil

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Appendix P
Inventory of Scrap & Waste Recycling Facilities

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APPENDIX P

INVENTORY OF SCRAP & WASTE RECYCLING FACILITIES

Outfall	Location	Map	Type of Material	Pollution Potential
207, 208	SDA-210	T-4, U-4	Demilitarization warehouse	Low

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Appendix Q
Inventory of Public Warehousing Areas

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APPENDIX Q

INVENTORY OF PUBLIC WAREHOUSING AREAS

Outfall	Location	Activity	Outdoor Storage	Pollution Potential
207	SDA-216	SeaBee Storage Warehouse	Yes	Low
207, 208	SDA-205	Reutilization Warehouse	Yes	Low
207, 208	SDA-210	Demilitarization Warehouse	Yes	Low
208	SDA-204	Disposition and Reutilization Services “Hazardous Storage Area” (90 day storage)	No	Low

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Appendix R
Chemical Application Areas

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APPENDIX R

CHEMICAL APPLICATION AREAS

Chemical	Area of Application	Purpose	Application Rates	Comments
Lesco 2-4-D	Parking Lots	Herbicide	1 lb. per 1,000 S.F.	As needed for weed control.
Turflon	Fence Lines	Herbicide	2 pints per 1,000 S.F.	As needed for weed control.
Roundup (Gyphosate)	Parking Lots	Herbicide	2½ oz. per 1 gallon of water per 1,000 S.F.	As needed for weed control.
Simizine	Lawns Throughout NSA Hampton Roads	Herbicide	Under investigation	As needed for weed control.
Bromacil	Various	Herbicide	Under investigation	As needed for weed control.
Pramitol 25E	Storage Areas	Herbicide	2 pints per 1,000 S.F.	As needed for weed control.
Lime Pelletized	Lawns Throughout NSA Hampton Roads	Fertilizer	8 lbs. per 1,000 S.F.	As needed for lawn repair.
Trimec Classic	Lawns Throughout NSA Hampton Roads	Herbicide	2½ pints per 1,000 S.F.	As needed for weed control.
Trimec Plus	Golf Course	Herbicide	3 oz. per 1 gallon of water per 1,000 S.F.	As needed for broadleaf and grass control.
Country Club	Lawns Throughout NSA Hampton Roads	Fertilizer & Herbicide	1 lb. per 12,000 S.F.	Applied 2 times a year.
Elanco Surflan	Ornamental Beds	Herbicide	3 oz. per 1,000 S.F.	As needed for weed control.
Insecticide VII	Golf Course	Pesticide	Under investigation	As needed for grub control.
Fly Tec Bait	Outside Galley and Dumpsters	Pesticide	3 ounces per area	As needed for fly control.
Gopha-Rid	Ammunition Bunkers	Rodenticide	0.5 ounces per burrow	As needed for gopher control.
Karmel (Karmex)	Fence Lines	Herbicide	8 lbs. per acre	Applied twice a year.
Malathion 57%	Ornamental Plants	Insecticide	1/10% mixture	Applied 6 to 8 times a year.
Ornamec	Ornamental Plants	Herbicide	1% mixture	As needed for weed control.
Orthene Ornamental	Ornamental Plants	Insecticide	1/2% mixture	As needed for insect control.
Permanone	Throughout NSA Hampton Roads	Insecticide	3/4 ounces per minute	As needed for mosquito control.
Purge Jet Freeze	Throughout NSA Hampton Roads	Insecticide	4 ounces per nest	As needed for wasp and hornet control.
Monsanto Round-Up	Parking Lots	Herbicide	1/2% mixture	As needed for weed control.
Snail and Slug Bait	Throughout NSA Hampton Roads	Pesticide	1/2 lb per year	As needed for snail and slug control.
Spike Treflan	Electrical Substations	Herbicide	100 lbs per acre	Applied twice a year.
Surflan	Ornamental Beds	Herbicide	1% mixture	As needed for weed control.
Vectobac G	Marsh Areas and Golf Course	Insecticide	2,000 lbs per year	As needed for mosquito larva control.
Weedar 64	Fence Lines and Parking Lots	Herbicide	1/2% mixture	As needed for weed control.
Scotts Fertilizer 32	Lawns Throughout NSA Hampton Roads	Fertilizer	51.88 lbs per 12,000 S.F.	As needed for fertilization during March, May, August, and November.
Scotts Fertilizer 18	Lawns Throughout NSA Hampton Roads	Fertilizer	50 lbs per 12,000 S.F.	As needed for fertilization during March, May, August, and November.

APPENDIX R

CHEMICAL APPLICATION AREAS

Chemical	Area of Application	Purpose	Application Rates	Comments
Devrinol 50-WP	Lawns Throughout NSA Hampton Roads	Herbicide	2-4 lbs per acre	As needed for weed control.
Gallery 75	Lawns Throughout NSA Hampton Roads	Herbicide	1/2 oz per 1,000 S.F.	As needed for weed control.
LESCO 2 4 D	Parking Lots	Herbicide	1 lb per 1,000 S.F.	As needed for weed control.
Turflon	Fence Lines	Herbicide	2 pints per 1,000 S.F.	As needed for weed control.

Appendix S
Quarterly Visual Monitoring

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APPENDIX S

QUARTERLY VISUAL MONITORING

Quarterly Visual Monitoring reports are located at NSA Hampton Roads Environmental Office (NH-34)

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Appendix T
Sampling Data 2008-2019

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APPENDIX T

SAMPLING DATA 2019

Naval Station Norfolk VPDES
MONITORING REQUIREMENTS (Beginning May 4, 2011 - May 3, 2016)
VPDES PERMIT VA0004421

VISUAL EXAMINATION REQUIREMENTS - 2019

OUTFALL MONITORING REQUIREMENTS - 2019

Outfall	Analytical Monitoring of Discharges	January 1 - March 31	April 1 - June 30	July 1 - September 30	October 1 - December 30
205	Visual				
206	Visual				
207	Visual				
208	Visual	1/24/2019	4/2/2019	7/23/2019	11/12/2019
605	Visual				
611	Visual				

Outfall Group	Analytical Monitoring of Discharges	Outfall	Date
005, 017, 031, 033, 076, 089, 091, 103, 104, 113, 139, 205, 206, 208, 400	Flow (MG)	017	4/2/2019
	pH (NL/NL)	091	4/8/2019
	TSS (NL)	208	1/24/2019
	TPH (NL)		
029, 207	Flow (MG)	029	5/31/2019
	pH (NL/NL)		
	TSS (NL)		
	TPH (NL)		
	Total Recoverable Aluminum (NL)		
	Total Recoverable Cadmium (NL)		
	Total Recoverable Chromium (NL)		
	Total Recoverable Copper (NL)		
	Total Recoverable Iron (NL)		
	Total Recoverable Lead(NL)		
	Total Recoverable Zinc (NL)		

APPENDIX T

SAMPLING DATA 2018

	Quantity or Loading - Average	Quantity or Loading - Maximum	Quantity or Loading - Units	Quality or Concentration - Minimum	Quality or Concentration - Average	Quality or Concentration - Maximum	Quality or Concentration - Unit	Frequency of Analysis	Sample Type
Outfall Name:"205"	ANNUAL SUMMARY								
TSS:"004"	*****	*****		*****	*****	4.4	MG/L	1/YR	GRAB
FLOW, PRECIPITATION EVENT:"199"	*****	0.2197	MG	*****	*****	*****		1/YR	EST
pH, PRECIPITATION EVENT:"200"	*****	*****		7.11	*****	7.11	SU	1/YR	GRAB
PETROLEUM HYDROCARBONS, TOTAL RECOVERABLE:"257"	*****	*****		*****	*****	<QL	MG/L	1/YR	GRAB
Outfall Name:"206"									
TSS:"004"	*****	*****		*****	*****	4.4	MG/L	1/YR	GRAB
FLOW, PRECIPITATION EVENT:"199"	*****	0.2197	MG	*****	*****	*****		1/YR	EST
pH, PRECIPITATION EVENT:"200"	*****	*****		7.11	*****	7.11	SU	1/YR	GRAB
PETROLEUM HYDROCARBONS, TOTAL RECOVERABLE:"257"	*****	*****		*****	*****	<QL	MG/L	1/YR	GRAB
Outfall Name:"207"									
TSS:"004"	*****	*****		*****	*****	36	MG/L	1/YR	GRAB
ZINC, TOTAL RECOVERABLE:"196"	*****	*****		*****	*****	67	UG/L	1/YR	GRAB
FLOW, PRECIPITATION EVENT:"199"	*****	0.9423	MG	*****	*****	*****		1/YR	EST
pH, PRECIPITATION EVENT:"200"	*****	*****		7.98	*****	7.98	SU	1/YR	GRAB
CADMIUM, TOTAL RECOVERABLE:"202"	*****	*****		*****	*****	<QL	UG/L	1/YR	GRAB
COPPER, TOTAL RECOVERABLE:"203"	*****	*****		*****	*****	17	UG/L	1/YR	GRAB
CHROMIUM, TOTAL RECOVERABLE:"211"	*****	*****		*****	*****	<QL	UG/L	1/YR	GRAB
LEAD, TOTAL RECOVERABLE:"233"	*****	*****		*****	*****	9.5	UG/L	1/YR	GRAB
PETROLEUM HYDROCARBONS, TOTAL RECOVERABLE:"257"	*****	*****		*****	*****	0.37	MG/L	1/YR	GRAB
IRON, TOTAL RECOVERABLE:"361"	*****	*****		*****	*****	910	UG/L	1/YR	GRAB
ALUMINUM, TOTAL RECOVERABLE:"410"	*****	*****		*****	*****	690	UG/L	1/YR	GRAB
Outfall Name:"208"									
TSS:"004"	*****	*****		*****	*****	4.4	MG/L	1/YR	GRAB
FLOW, PRECIPITATION EVENT:"199"	*****	0.2197	MG	*****	*****	*****		1/YR	EST
pH, PRECIPITATION EVENT:"200"	*****	*****		7.11	*****	7.11	SU	1/YR	GRAB
PETROLEUM HYDROCARBONS, TOTAL RECOVERABLE:"257"	*****	*****		*****	*****	<QL	MG/L	1/YR	GRAB
Outfall Name:"332"									
TSS:"004"	*****	*****		*****	*****	22	MG/L	1/YR	GRAB
FLOW, PRECIPITATION EVENT:"199"	*****	0.1669	MG	*****	*****	*****		1/YR	EST
pH, PRECIPITATION EVENT:"200"	*****	*****		7.7	*****	7.7	SU	1/YR	GRAB
PETROLEUM HYDROCARBONS, TOTAL RECOVERABLE:"257"	*****	*****		*****	*****	0.37	MG/L	1/YR	GRAB

APPENDIX T

SAMPLING DATA 2017

O/F	PARAMETER	FREQ	DECISION CRITERIA/ LIMITS	January	February	March	April	May	June	July	August	September	October	November	December
208	DATE														
	Flow (MGD)	Annually	NL		0.1214										
	pH	Annually	6.0 - 9.0		6.98										
	TSS (mg/L)	Annually	NL		16										
	TPH (mg/L)	Annually	NL		<QL										
	Visual Examination**	Quarterly			Y			Y			Y			Y	

APPENDIX T

SAMPLING DATA 2016

O/F	PARAMETER	FREQ	DECISION CRITERIA/ LIMITS	January	February	March	April	May	June	July	August	September	October	November	December
208	DATE														
	Flow (MGD)	Annually	NL	0.1											
	pH	Annually	6.0 - 9.0	7.3											
	TSS (mg/L)	Annually	NL	16											
	TPH (mg/L)	Annually	NL	<QL											
	Visual Examination**	Quarterly		Y			Y			Y			Y		

APPENDIX T

SAMPLING DATA 2015

O/F	PARAMETER	FREQ	DECISION CRITERIA/ LIMITS	January	February	March	April	May	June	July	August	September	October	November	December
208	DATE														
	Flow (MGD)	Annually	NL	0.2											
	pH	Annually	6.0 - 9.0	8.1											
	TSS (mg/L)	Annually	NL	12											
	TPH (mg/L)	Annually	NL	<QL											
	Visual Examination**	Quarterly		Y			Y			Y			Y		

APPENDIX T

SAMPLING DATA 2014

O/F	PARAMETER	FREQ	DECISION CRITERIA/ LIMITS	January	February	March	April	May	June	July	August	September	October	November	December
208	DATE														
	Flow (MGD)	Annually	NL	0.24											
	pH	Annually	6.0 - 9.0	6.9											
	TSS (mg/L)	Annually	NL	28											
	TPH (mg/L)	Annually	NL	<QL											
	Visual Examination**	Quarterly		Y			Y			Y					
613	DATE														
Cooling Tower	Flow (MGD)	Annually		**DISCHARGES**			**TO THE**			**SANITARY SEWER**			**SYSTEM**		
	pH	Annually													
	Temperature	Annually													
NH-95	Ammonia-Nitrogen (mg/L)	Annually													
C-61	Total Residual Chlorine (mg/L)	Annually													
	Hardness (mg/L) (as CaCO3)	Annually													
	Total Phosphorus (mg/L)	Annually													
	Total Recoverable Silver (ug/L)	Annually													
	Total Recoverable Copper (ug/L)	Annually													
	Total Recoverable Zinc (ug/L)	Annually													
	Whole Effluent Toxicity Testing (WET)	Annually													

APPENDIX T

SAMPLING DATA 2013

OUTFALL	PARAMETER	FREQUENCY	DECISION CRITERIA/ LIMITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
208															
	Flow (MGD)	Annually	NL	0.60											
	pH	Annually	6.0 - 9.0	8.9											
	TSS (mg/L)	Annually	NL	32											
	TPH (mg/L)	Annually	NL	<QL											
	Visual Examination	Quarterly		Y			Y			Y			Y		

APPENDIX T
SAMPLING DATA 2012

OUTFALL	PARAMETER	FREQUENCY	DECISION CRITERIA/ LIMITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
205 & 206															
	Flow (MG)	Annually	NL					0.0369							
Group #2	pH	Annually	NL					6.6							
	TSS (mg/L)	Annually	NL					1.0							
	TPH (mg/L)	Annually	NL					1.0							
	Visual Examination	Quarterly			Y			Y			Y			Y	
207															
	Flow (MG)	Annually	NL		0.2032										
Group #6	pH	Annually	NL		8.7										
	TSS (mg/L)	Annually	NL		22										
	TPH (mg/L)	Annually	NL		<QL										
	Total Recoverable Al (ug/l)	Annually	NL		<QL										
	Total Recoverable Fe (ug/L)	Annually	NL		<QL										
	Total Recoverable Cd (ug/L)	Annually	NL		<QL										
	Total Recoverable Cr (mg/L)	Annually	NL		<QL										
	Total Recoverable Cu (ug/L)	Annually	NL		<QL										
	Total Recoverable Pb (ug/L)	Annually	NL		<QL										
	Total Recoverable Zn (ug/L)	Annually	NL		<QL										
	Visual Examination	Quarterly			Y			Y			Y			Y	
208															
	Flow (MGD)	Annually	NL		0.3352										
	pH	Annually	NL		7.6										
	TSS (mg/L)	Annually	NL		48										
	TPH (mg/L)	Annually	NL		<QL										
	Visual Examination	Quarterly			Y			Y			Y			Y	
605 & 611															
	Visual Examination	Quarterly			Y			Y			Y			Tidal	
613															
	Flow (MGD)	Annually			0.007										
Cooling	pH	Annually			7										
Tower	Temperature(°C)	Annually			24.4										
SC-1	Ammonia-Nitrogen (mg/L)	Annually			0.18										
	Total Residual Chlorine (mg/L)	Annually			0.2										
	Hardness (mg/L) (as CaCO3)	Annually			165										
	Total Phospohrus (mg/L)	Annually			1.23										
	Total Recoverable Silver (ug/L)	Annually			<1										
	Total Recoverable Copper (ug/L)	Annually			140										
	Total Recoverable Zinc (ug/L)	Annually			102										
	Whole Effluent Toxicity Testing (WET)	Annually			<1										

APPENDIX T

SAMPLING DATA 2011 - NEW PERMIT

OUTFALL	PARAMETER	FREQUENCY	DECISION CRITERIA/ LIMITS	JUL	AUG	SEP	OCT	NOV	DEC
208	DATE						10/29/2011		
	Flow (MGD)	Annually	NL						
	pH	Annually	6.0 - 9.0						
	TSS (mg/L)	Annually	NL						
	TPH (mg/L)	Annually	NL						
	Visual Examination**	Quarterly					Y		

APPENDIX T

SAMPLING DATA 2011 - OLD PERMIT

OUTFALL	PARAMETER	FREQUENCY	DECISION CRITERIA/ LIMITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
207	DATE				1/2/2011										
	Flow (MG)	Annually	NL		0.0072										
	pH	Annually	6.0-9.0		7.7										
	TSS (mg/L)	Annually	NL		2.6										
	TPH (mg/L)	Annually	NL		<1.0										
	Total Recoverable Al (ug/l)	Annually	NL		192										
	Total Recoverable Fe (ug/L)	Annually	NI		521										
	Dissolved Cd (ug/L)	Annually	NL		<QL										
	Dissolved Hexavalent Cr (mg/L)	Annually	NL		<QL										
	Dissolved Cu (ug/L)	Annually	NL		21										
	Dissolved Pb (ug/L)	Annually	NL		<QL										
	Dissolved Zn (ug/L)	Annually	NL		164										
	Visual Examination**	Quarterly			Y										

APPENDIX T

SAMPLING DATA 2010 - OLD PERMIT

OUTFALL	PARAMETER	FREQUENCY	DECISION CRITERIA/ LIMITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
207	DATE			3/29/2010*			6/20/2010								
	Flow (MG)	Annually	NL	0.1174			0.0178			Not Sampled			Not Sampled		
	pH	Annually	6.0-9.0	8.2			6.8								
	TSS (mg/L)	Annually	NL	21			4.4								
	TPH (mg/L)	Annually	NL	< 1.0			< 1.0								
	Total Recoverable Al (ug/l)	Annually	NL	1090			280								
	Total Recoverable Fe (ug/L)	Annually	Nl	572			339								
	Dissolved Cd (ug/L)	Annually	NL	< QL			< QL								
	Dissolved Hexavalent Cr (mg/L)	Annually	NL	< QL			< QL								
	Dissolved Cu (ug/L)	Annually	NL	30			< QL								
	Dissolved Pb (ug/L)	Annually	NL	< QL			< QL								
	Dissolved Zn (ug/L)	Annually	NL	< QL			100								
	Visual Examination**	Quarterly		Y			Y								

APPENDIX T

SAMPLING DATA 2009 - OLD PERMIT

OUTFALL	PARAMETER	FREQUENCY	DECISION CRITERIA/ LIMITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
207	DATE			3/26/2009						9/7/2009			12/9/2009		
	Flow (MG)	Annually	NL	0.0119			Not Needed			0.0386			0.1330		
	pH	Annually	6.0-9.0	8						7.9			7.69		
	TSS (mg/L)	Annually	NL	22						Not Needed			Not Needed		
	TPH (mg/L)	Annually	NL	<0.50											
	Total Recoverable Al (ug/l)	Annually	NL	625											
	Total Recoverable Fe (ug/L)	Annually	NI	1170											
	Dissolved Cd (ug/L)	Annually	NL	<QL											
	Dissolved Hexavalent Cr (mg/L)	Annually	NL	<QL											
	Dissolved Cu (ug/L)	Annually	NL	<QL											
	Dissolved Pb (ug/L)	Annually	NL	<QL											
	Dissolved Zn (ug/L)	Annually	NL	343											
	Visual Examination**	Quarterly		Y			N			N			Y		

APPENDIX T

SAMPLING DATA 2008 - OLD PERMIT

OUTFALL	PARAMETER	FREQUENCY	DECISION CRITERIA/ LIMITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
207	DATE			Not Sampled			3/31/2008			Not Needed			Not Needed		
	Flow (MG)	Annually	NL				0.0646								
	pH	Annually	6.0-9.0				7.9								
	TSS (mg/L)	Annually	NL				20								
	TPH (mg/L)	Annually	NL				< 0.5								
	Total Recoverable Al (ug/l)	Annually	NL				230								
	Total Recoverable Fe (ug/L)	Annually	Nl				707								
	Dissolved Cd (ug/L)	Annually	NL				< QL								
	Dissolved Hexavalent Cr (mg/L)	Annually	NL				< QL								
	Dissolved Cu (ug/L)	Annually	NL				< QL								
	Dissolved Pb (ug/L)	Annually	NL				< QL								
	Dissolved Zn (ug/L)	Annually	NL				300								
	Visual Examination**	Quarterly		Y			Y			Y			Y		

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Appendix U
Monitoring Requirements

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APPENDIX U

MONITORING REQUIREMENTS

OUTFALL(S)	PARAMETER	FREQUENCY	DECISION CRITERIA/ LIMITS	ACTIVITY
205, 206, 208				**Rain Event Sampling**
	Flow (MG)	Annually	NL	General Warehousing/Storage, Active HVAC Discharges
	pH	Annually	6.0 - 9.0	
	TSS (mg/L)	Annually	NL	
	TPH (mg/L)	Annually	NL	
	Toxicity	Annually		Americamsys Bahia
207				**Rain Event Sampling**
	Flow (MG)	Annually	NL	General Warehousing and Storage, Scrap and Waste Materials, Repair Shops and Related Services, Active HVAC Discharges
	pH	Annually	6.0 - 9.0	
	TSS (mg/L)	Annually	NL	
	TPH (mg/L)	Annually	NL	
	Total Recoverable Al (µg/L)	Annually	NL	
	Total Recoverable Cd (µg/L)	Annually	NL	
	Total Recoverable Cr (µg/L)	Annually	NL	
	Total Recoverable Cu (µg/L)	Annually	NL	
	Total Recoverable Fe (µg/L)	Annually	NL	
	Total Recoverable Pb (µg/L)	Annually	NL	
	Total Recoverable Zn (µg/L)	Annually	NL	

APPENDIX U

ANALYTICAL MONITORING REQUIREMENTS - COOLING TOWERS

OUTFALL	PARAMETER	FREQUENCY	ACTIVITY
613 (C-61, Bldg NH-95)			**Batch**
	Flow (MGD)	CY 2014	Cooling Tower Discharge
	pH (SU)	CY 2014	
	Temperature (°C)	CY 2014	
	Ammonia-Nitrogen (mg/L)	CY 2014	
	Total Residual Chlorine (mg/L)	CY 2014	
	Hardness (as CaCO3) (mg/L)	CY 2014	
	Total Phosphorus (mg/L)	CY 2014	
	Total Recoverable Cu (µg/L)	CY 2014	
	Total Recoverable Ag (µg/L)	CY 2014	
	Total Recoverable Zn (µg/L)	CY 2014	
	Whole Effluent Toxicity Testing (TUa)	CY 2014	
613 (C-62, Bldg SC-1)			**Batch**
	Flow (MGD)	CY 2012	Cooling Tower Discharge
	pH (SU)	CY 2012	
	Temperature (°C)	CY 2012	
	Ammonia-Nitrogen (mg/L)	CY 2012	
	Total Residual Chlorine (mg/L)	CY 2012	
	Hardness (as CaCO3) (mg/L)	CY 2012	
	Total Phosphorus (mg/L)	CY 2012	
	Total Recoverable Cu (µg/L)	CY 2012	
	Total Recoverable Ag (µg/L)	CY 2012	
	Total Recoverable Zn (µg/L)	CY 2012	
	Whole Effluent Toxicity Testing (TUa)	CY 2012	

Appendix V
Spills and Leaks

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APPENDIX V

SPILLS AND LEAKS

The spill log is updated in real time. Files can be found on the share drive located with Environmental.

APPENDIX V

SPILL LOG (2017-2019)

MONTH	YEAR	INCIDENT # BY CY	INSTALLATION	DATE	TIME	LOCATION	SPILL TYPE	SPILL CATEGORY	CONTAINER	QUANTITY (GALS)	RECEIVING WATERWAY (SANITARY/ STORM)	CLEAN UP ACTION	CAUSE DESCRIPTION
2	2017	1	NSANWA	2/6/2017	11:27	Main gate Relay Road	SEWAGE	SEWAGE	SEWER BACKUP	20.00	NA	NA	Toilet running inside B275, manhole filled w/ grey water
4	2017	2	NSA-HR	4/14/2017	11:59	CA509	PCB waste oil	HS	Drum	8.00	NA	Removed drum and contaminated soil	Contractor working at Camp Allen Elementary School unearthed and punctured a 15-gallon drum causing a spill, results of lab anaysis <50ppm for PCBs.
6	2017	3	NSA NWA	6/6/2017	1:20	SITE 14 CPGRD	Sewage	SEWAGE	Sewer main clogged	5.00	NA	pump truck/hth	Sewer main blockage by PAPER TOWELS
6	2017	4	NSA-HR	6/27/2017	12:05	SDA215	SEWAGE	SEWAGE	SEWER MAIN CLOGGED	100.00	STORMDRAIN	PUMP TRUCK/LIME	Sewer main blockage by grease buildup
7	2017	5	NSA NWA	7/14/2017	1:21	CAMPGRD	SEWAGE	SEWAGE	SEWER MAIN CLOGGED	10.00	NA	PUMP TRUCK/LIME	SEPTIC TANK OVERFLOWED
8	2017	6	NSA NWA	7/21/2017	10:10	B41	Sewage	SEWAGE	SEWER MAIN CLOGGED	25.00	NA	PUMP TRUCK/LIME	Sewage spilled out of the clean out cap when removed.
1	2018	1	NSA-HR	1/22/2018	9:50	SDA330	Sewage	SEWAGE	SEWER MAIN CLOGGED	75.00	STORMDRAIN	PUMP TRUCK/LIME	Sewer main blockage by PAPER TOWELS
7	2018	2	NSA-HR	7/12/2018	16:00	Parking lot behind NH-140	Sewage	SEWAGE	SEWER MAIN CLOGGED	3600.00	STORMDRAIN	PUMP TRUCK/LIME	Sewer main blockage
7	2018	3	NSA-HR	7/19/2018	19:04	Parking lot behind NH-140	Sewage	SEWAGE	SEWER MAIN CLOGGED	400.00	STORMDRAIN	PUMP TRUCK/LIME	Sewer main blockage
5	2019	1	NSA-HR	5/24/2019	15:45	Building SDA-332 off Hampton Blvd	Sewage	SEWAGE	SEWER MAIN CLOGGED	20.00	STORMDRAIN	PUMP TRUCK/LIME	Sewer main blockage

Appendix W
Oil/Water Separators

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APPENDIX W

OIL/WATER SEPARATORS

Outfall	Location	Device Number	Map	Process	Discharge To
605	MCA-612	NSN-MCA612-OWS-01	P-9, P-10	Vehicle Wash Rack	Both*
610	MCE-1	NSN-MCE1-OWS-01	T-9	Marine Corps Exchange	Both*
610	MCE-3	NSN-MCE3-OWS-01	S-9, T-9	POV car wash	Both*
610	MCE-3	NSN-MCE3-OWS-02	S-9, T-9	POV car wash	Both*
610	MCE-3	NSN-MCE3-OWS-03	S-9, T-9	POV car wash	Both*
610	MCE-3	NSN-MCE3-OWS-04	S-9, T-9	POV car wash	Both*
610	MCE-224	NSN-MCE224-OWS-01	T-8	Maintenance Floor Drains	Both*
613	NH-31A	NSN-NH31A-OWS-01	S-8, T-8	GOV Wash Rack	Both*

* Diversion valve/automatic valve washing operations have the valve position set to discharge flow to the sanitary sewer.
** Overflow valve for AFFF Holding Tank is set to discharge flow to the storm sewer.
GOV - Government Owned Vehicle

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Appendix X
Structural BMPs Recommended for Implementation

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APPENDIX X

STRUCTURAL BMPs RECOMMENDED FOR IMPLEMENTATION

Michael Baker International performed a comprehensive Site Compliance Evaluation (SCE) at NSA Hampton Roads from November 7, 2019 through December 9, 2019 and found no concerns that required recommendations for structural BMPs to be implemented for industrial stormwater pollution prevention.

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Appendix Y
Non-Structural BMPs Recommended for Implementation

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APPENDIX Y

NON-STRUCTURAL BMPs RECOMMENDED FOR IMPLEMENTATION

Location	Outfall(s)	Map	Industrial Activity	2019 Compliant (Y/N)	Recommendations *(High and Medium Priority)*
MCA-612	605	P-9, P-10	Vehicle Maintenance or Land Transportation	Yes	Medium- Train employees on the operation of the wash rack and use of the OWS diverter valve
NH-31A	611, 612	S-8, T-8	Operational Level Vehicle Maintenance and Repair	Yes	Medium- Train employees on the operation of the wash rack and use of the OWS diverter valve

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Appendix Z
Recommended Buildings for Inspections

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APPENDIX Z

RECOMMENDED BUILDINGS FOR INSPECTIONS

Location	Outfall(s)	Map	Industrial Activity	Recommended Inspection Frequency
MCA-612 Wash Rack at MCA-612	605	P-9, P-10	Operational level maintenance on ground transportation vehicles	Quarterly
NH-31A/B Wash Rack at NH-31B	613	S-8, T-8	Operational level vehicle maintenance and repair	Quarterly
SDA-204	208	U-4, U-5	General warehousing and storage, Disposition and reutilization services “Hazardous Storage Area” (90 day storage)	Quarterly
SDA-205	207, 208	T-4, U-4, U-5	General Warehousing and Storage, Reutilization warehouse	Quarterly
SDA-210	207, 208	T-4, U-4	General Warehousing and Storage, Scrap and Waste Materials, Demilitarization warehouse	Monthly

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Appendix AA

Virginia Pollutant Discharge Elimination System (VPDES)
Permit No. VA0004421, effective 4 May 2011 through 3 May 2016

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COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
TIDEWATER REGIONAL OFFICE
5636 Southern Boulevard, Virginia Beach, Virginia 23462
(757) 518-2000 Fax (757) 518-2009
www.deq.virginia.gov

Doug Domenech
Secretary of Natural Resources

David K. Paylor
Director

Permit No: VA0004421
Effective Date: May 04, 2011
Expiration Date: May 03, 2016

AUTHORIZATION TO DISCHARGE UNDER THE

VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM

AND

THE VIRGINIA STATE WATER CONTROL LAW

In compliance with the provisions of the Clean Water Act as amended and pursuant to the State Water Control Law and regulations adopted pursuant thereto, the following owner is authorized to discharge in accordance with the information submitted with the permit application, and with this cover page, and Parts I and II of this permit, as set forth herein.

Owner: Department of the U.S. Navy
Commander, Naval Region Mid-Atlantic

Facility Name: US - Naval Station Norfolk
City: Norfolk
County: N/A
Facility Location: 9900 Hampton Blvd at Gate 2
Norfolk, Virginia 23511-2737

The owner is authorized to discharge to the following receiving stream:

Stream: SEE ATTACHMENT I

River Basin:
River Subbasin:
Section:
Class:
Special Standards:

Maria R. Nold
Acting Regional Director

May 4, 2011
Date

ATTACHMENT I

Outfall No(s).	Receiving Stream
001, 01A-010, 200-208, 401	Elizabeth River Basin: James River (Lower) Subbasin: N/A Section: 1 Class: II Special Standards: a, z
011-053, 402, 404	James River Basin: James River (Lower) Subbasin: N/A Section: 1 Class: II Special Standards: a, z
054-083, 087, 089, 091, 094, 100-105, 110, 112-147, 149, 151-158, 415, 422-424, 426, 427	Willoughby Bay Basin: James River (Lower) Subbasin: N/A Section: 1 Class: II Special Standards: a, z
400, 407-421, 425, 600-617	Bousch Creek Basin: James River (Lower) Subbasin: N/A Section: 1 Class: II Special Standards: a, z
300-355, 416	Masons Creek Basin: James River (Lower) Subbasin: N/A Section: 1 Class: II Special Standards: a, z

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall: 001 and 01A (once-through non-contact cooling water discharge, U.S. Navy's Lambert's Point Deperming Station; SIC Code 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS [a]	
	Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NA	NA	NL	1/Year	Estimate
pH (S.U.)	NA	NA	6.0	9.0	1/Year	Grab
Temperature (°C)	NA	NA	NA	NL	1/Year	I.S.
Total Recoverable Copper (ug/l) [a]	NA	NA	NA	NL	1/Year	Grab
Total Recoverable Zinc (ug/l) [a]	NA	NA	NA	NL	1/Year	Grab

NA = Not Applicable.

NL = No limitation, however, reporting is required.

I.S. = Immersion Stabilization

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	001
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
001 FLOW	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MGD	*********	*********	*********			1/YR	EST
002 PH	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		6.0	*********	9.0	SU		1/YR	GRAB
080 TEMPERATURE, WATER (DEG. C)	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	C		1/YR	IS
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	01A
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
001 FLOW	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MGD	*********	*********	*********			1/YR	EST
002 PH	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		6.0	*********	9.0	SU		1/YR	GRAB
080 TEMPERATURE, WATER (DEG. C)	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	C		1/YR	IS
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfalls: 002, 004, 006-010, 012, 013, 015, 018-021, 025-028, 030, 032, 035-038, 040-053, 056, 057, 060, 062-065, 070-072, 077, 079, 080, 081, 087, 101, 102, 118, 119, 121, 122, 124-131, 134, 136-138, 140-143, 145-147, 151-158, 200-204, 300-328, 330, 337, 340-342, 346-355, 409, 414-416, 600-604, 606-610, and 612-617 (storm water runoff not associated with regulated industrial activities; storm water runoff from a small municipal separate storm sewer system [MS4] as defined by the U.S. Environmental Protection Agency [40CFR122.32]; outfalls 134, 610 and 613 with active HVAC discharges; outfalls 326, and 614 with vehicle washrack discharges; SIC code 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

THESE OUTFALLS SHALL CONTAIN STORM WATER RUNOFF NOT ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITY AND WHERE NO CHEMICAL OR VISUAL MONITORING OF STORM WATER RUNOFF ARE REQUIRED.

THIS DESIGNATION DOES NOT RELEIVE THE PERMITTEE FROM THE RESPONSIBILITY OF FILING FOR, OBTAINING, AND COMPLYING WITH THE TERMS AND CONDITIONS OF ANY PERMIT OR ALLOWANCES AFFORDED UNDER THE SMALL MS4 PERMIT REQUIRED BY 40 CFR 122.32 THAT HAS BEEN, OR MAY BE, ISSUED TO THIS FACILITY.

OTHER THAN DE-MINIMUS QUANTITIES OF STEAM CONDENSATE AND KNOWN DISCHARGES OF WASTEWATERS FROM PROPERLY OPERATED AND MAINTAINED HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) SYSTEMS, THERE SHALL BE NO DISCHARGE(S) OF PROCESS WASTEWATER(S), INCLUDING WASTEWATERS FROM VESSEL, VEHICLE, EQUIPMENT, AND AIRCRAFT MAINTENANCE ACTIVITIES, FROM THESE OUTFALLS.

FOR CERTAIN OUTFALLS NOTED ABOVE THAT CONVEY EQUIPMENT COOLING WASTEWATER DISCHARGES ASSOCIATED WITH ACTIVE AND OPERATING HVAC SYSTEMS, SEPARATE WASTEWATER MONITORING AND REPORTING REQUIREMENTS AND CONDITIONS MAY BE REQUIRED ELSEWHERE IN THIS PERMIT.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 003 (storm water runoff from multiple regulated industrial activities; active HVAC discharge; SIC codes 4225, 4449, 5171, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab
Total Recoverable Aluminum (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Iron (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Zinc (ug/l) [c]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: US Navy - Naval Station Norfolk
ADDRESS: Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION: 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	003
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
361 IRON, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
410 ALUMINUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 005, 017, 031, 033, 076, 089, 091, 103, 104, 113, 139, 205, 206, 208, and 400 (storm water runoff from regulated industrial activities; general warehousing and storage; outfalls 031 and 113 with active HVAC discharges; outfall 400 with vehicle washrack; outfall 112 with aircraft washrack; SIC codes 4222, 4225, 4226, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	005
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/28/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: US Navy - Naval Station Norfolk
ADDRESS: Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION: 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

VA0004421	017
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	031
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	033
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	076
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	089
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)

Tidewater Regional Office
5636 Southern Boulevard

Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	091
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	103
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: US Navy - Naval Station Norfolk
ADDRESS: Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION: 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	104
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	113
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	139
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	205
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

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OPERATOR IN RESPONSIBLE CHARGE			DATE		
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PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	206
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

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TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

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ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	208
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

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TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	400
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

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OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 011, 014, 022, 105, and 110 (storm water runoff from regulated industrial activities; boat building and repairing; SIC codes 3732, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Copper (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Zinc (ug/l) [c]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: US Navy - Naval Station Norfolk
ADDRESS: Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION: 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

VA0004421	011
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD									.	
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

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Norfolk VA 23511
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COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	014
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
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		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
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BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

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TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

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COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	022
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
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Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

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		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
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BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

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TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

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FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	105
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: US Navy - Naval Station Norfolk
ADDRESS: Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION: 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

VA0004421	110
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 016, 023, 039, 083 and 112 (storm water runoff from multiple regulated industrial activities; outfall 016 with active HVAC discharge; SIC codes 3731, 3732, 4225, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	016
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: US Navy - Naval Station Norfolk
ADDRESS: Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION: 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

VA0004421	023
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

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PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	039
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk

ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511

FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	083
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)

Tidewater Regional Office
5636 Southern Boulevard

Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
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PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	112
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 024 (storm water runoff from multiple regulated industrial activities; bermed petroleum storage [402]; SIC codes 4961, 5171, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	024
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 029 and 207 (storm water runoff from multiple regulated industrial activities; outfall 029 with active HVAC discharges; SIC codes 4225, 5093, 7699, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l) [c] [d]	NA	NL	1/Year	Grab
Total Recoverable Aluminum (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Cadmium (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Chromium (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Copper (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Iron (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Lead (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Zinc (ug/l) [c]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 029 and 207 (storm water runoff from multiple regulated industrial activities; outfall 029 with active HVAC discharges; SIC codes 4225, 5093, 7699, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	029
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
202 CADMIUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
211 CHROMIUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
233 LEAD, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	029
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
361 IRON, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
410 ALUMINUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY (REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

VA0004421	207
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
202 CADMIUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
211 CHROMIUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
233 LEAD, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

VA0004421	207
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
361 IRON, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
410 ALUMINUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 034 (storm water runoff from multiple regulated industrial activities; vehicle washrack discharges; SIC codes 4225, 5171, 7699, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	034
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 054 (storm water runoff from regulated industrial activity; Q-72 Wharf Builder's Barge Repair Center; SIC codes 3732, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/3 Months	Estimate
pH - Precipitation Event (S.U.)	6.0	9.0	1/3 Months	Grab
Total Suspended Solids (mg/l) [b]	NA	60	1/3 Months	Grab
Dissolved Copper (ug/l) [b]	NA	NL	1/3 Months	Grab
Dissolved Zinc (ug/l) [b]	NA	NL	1/3 Months	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/3 Months = In accordance with the following schedule: 1st quarter (January 1 - March 31); 2nd quarter (April 1 - June 30); 3rd quarter (July 1 - September 30); 4th quarter (October 1 - December 31).

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	054
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
002 PH	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		6.0	*********	9.0	SU		1/3M	GRAB
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	60	MG/L		1/3M	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/3M	EST
442 COPPER, DISSOLVED (UG/L AS CU)	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/3M	GRAB
448 ZINC, DISSOLVED (AS ZN) (UG/L)	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/3M	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 055 (storm water runoff from multiple regulated industrial activities; SIC codes 3731, 3732, 5093 as oil recovery, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab
Total Recoverable Copper (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Zinc (ug/l) [c]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required; NA = Not Applicable
1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	055
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
203 COPPER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 058 and 094 (storm water runoff from multiple regulated industrial activities; outfall 058 with active HVAC and equipment and heavy vehicle washrack discharges; SIC codes 4225, 4499, 7699, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab
Total Recoverable Aluminum (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Iron (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Zinc (ug/l) [c]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	058
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
361 IRON, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
410 ALUMINUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	094
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
361 IRON, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
410 ALUMINUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 059, 605, and 611 (storm water runoff from regulated industrial activities; repair shops and related services, not elsewhere classified; outfalls 605 and 611 with vehicle washrack discharges; SIC codes 7699, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

THESE OUTFALLS SHALL CONTAIN ONLY STORM WATER RUNOFF ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITY WHERE NO CHEMICAL MONITORING IS REQUIRED. THERE SHALL BE NO DISCHARGE OF PROCESS WASTEWATER FROM THESE OUTFALLS.

SEE PART I.D. FOR STORM WATER MANAGEMENT REQUIREMENTS THAT MAY APPLY TO THESE DISCHARGES FROM A REGULATED INDUSTRIAL ACTIVITY. QUARTERLY VISUAL MONITORING WILL BE REQUIRED OF THIS GROUPING OF OUTFALLS CONSISTENT WITH THE REQUIREMENTS OF PART I.D.1.f.(1). SEE PART I.D.1.f.(4) FOR ADDITIONAL INFORMATION AND ALLOWANCES REGARDING SUBSTANTIALLY IDENTICAL EFFLUENTS. STORM WATER SAMPLING FOR THESE OUTFALLS SHALL NOT BE SUBJECT TO THE SPRCIFIED STORM EVENT MONITORING REQUIREMENTS (72 HOURS SEPARATION; STORM EVENT DURATION; RAINFALL MEASUREMENTS. ALL OTHER REQUIREMENTS SPECIFIED UNDER PART I.D.2. SHALL APPLY.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 061 and 074 (storm water runoff from regulated industrial activities; marina operations; SIC codes 4493, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Aluminum (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Iron (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Zinc (ug/l) [c]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	061
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
361 IRON, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
410 ALUMINUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	074
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
196 ZINC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
361 IRON, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
410 ALUMINUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 066 and 067 (storm water runoff from multiple regulated industrial activities; outfall 067 with active HVAC and heavy truck washrack discharges; SIC codes 4961, 5171, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	066
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	067
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 068, 069, 073, 082, 100, 116, 117, 120, 132, 133, 144, 329, 331, 343, 344, 345, 418, 425, 426, and 427 (storm water runoff from regulated industrial activities; airports, flying fields without anti-icing/deicing; outfall 069 and 133 with active HVAC discharges; outfalls 120, 132, 133, and 425 with aircraft washrack discharges; SIC codes 4581, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

THESE OUTFALLS SHALL CONTAIN ONLY STORM WATER RUNOFF ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITY WHERE NO CHEMICAL OR VISUAL MONITORING ARE REQUIRED. THERE SHALL BE NO DISCHARGE OF PROCESS WASTEWATER FROM THESE OUTFALLS.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 075, 078, and 332 (storm water runoff from multiple regulated industrial activities; outfall 078 with active HVAC discharge; outfalls 075 and 078 with aircraft washrack discharges; SIC codes 4225, 4226, 4581, and 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	075
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	078
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	332
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 114 (storm water runoff from multiple regulated industrial activities; heavy truck washrack discharges; SIC codes 3724, 4225, 4961, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	114
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 115 (storm water runoff from multiple regulated industrial activities; active HVAC discharge [Bldg. V-61]; Bousch Creek Culvert; SIC codes 3724, 4225, 4226, 4581, 5171, HZ, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

THIS OUTFALL SHALL CONTAIN STORM WATER RUNOFF ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITIES AND WHERE NO CHEMICAL OR VISUAL MONITORING OF STORM WATER RUNOFF ARE REQUIRED.

OTHER THAN DE-MINIMUS QUANTITIES OF STEAM CONDENSATE AND KNOWN DISCHARGES OF WASTEWATERS FROM PROPERLY OPERATED AND MAINTAINED HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) SYSTEMS, THERE SHALL BE NO DISCHARGE(S) OF PROCESS WASTEWATER(S) FROM THESE OUTFALLS.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 123 (storm water runoff from multiple regulated industrial activities; equipment washrack discharge; SIC codes 3724, 4581, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

THIS OUTFALL SHALL CONTAIN ONLY STORM WATER RUNOFF ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITY WHERE NO CHEMICAL OR VISUAL MONITORING ARE REQUIRED. THERE SHALL BE NO DISCHARGE OF PROCESS WASTEWATER FROM THIS OUTFALL.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 135, 422, 423, 424 (storm water runoff from multiple regulated industrial activities; outfall 135 with active HVAC discharge and aircraft washrack discharge; SIC codes 3724, 4225, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	135
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	422
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: US Navy - Naval Station Norfolk
ADDRESS: Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION: 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

VA0004421	423
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	424
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 149 (storm water runoff from multiple regulated industrial activities; jet engine test pad; SIC codes 3724, 4225, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/3 Months	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/3 Months	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/3 Months	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	NL	1/3 Months	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/3 Months = In accordance with the following schedule: 1st quarter (January 1 - March 31); 2nd quarter (April 1 - June 30); 3rd quarter (July 1 - September 30); 4th quarter (October 1 - December 31).

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	149
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/3M	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/3M	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/3M	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/3M	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 333 (storm water runoff from regulated industrial activity; airports, flying fields with potential for anti-icing/deicing; SIC codes 4581, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

THIS OUTFALL SHALL CONTAIN ONLY STORM WATER RUNOFF ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITY WHERE NO CHEMICAL OR VISUAL MONITORING ARE REQUIRED. THERE SHALL BE NO DISCHARGE OF PROCESS WASTEWATER FROM THIS OUTFALL.

SEE PART I.B.9.d.(4) FOR ADDITIONAL REPORTING REQUIREMENTS FOR THIS OUTFALL.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 334, 335, 336, 338, 339 (storm water runoff from regulated industrial activity; airports, flying fields with potential for anti-icing/deicing activities during winter season; outfall 338 with active HVAC discharge; SIC code 4581, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

THESE OUTFALLS SHALL CONTAIN ONLY STORM WATER RUNOFF ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITY WHERE NO CHEMICAL MONITORING IS REQUIRED. THERE SHALL BE NO DISCHARGE OF PROCESS WASTEWATER FROM THESE OUTFALLS.

SEE PART I.B.9.D. OF THIS PERMIT FOR ADITIONAL INFORMATION REGARDING INDUSTRIAL ACTIVITIES AT THESE LOCATIONS.

SEE PART I.D. FOR STORM WATER MANAGEMENT REQUIREMENTS THAT MAY APPLY TO THESE DISCHARGES FROM A REGULATED INDUSTRIAL ACTIVITY. QUARTERLY VISUAL MONITORING WILL BE REQUIRED OF THIS GROUPING OF OUTFALLS CONSISTENT WITH THE REQUIREMENTS OF PART I.D.1.f.(1). SEE PART I.D.1.f.(4) FOR ADDITIONAL INFORMATION AND ALLOWANCES REGARDING SUBSTANTIALLY IDENTICAL EFFLUENTS. STORM WATER SAMPLING FOR THESE OUTFALLS SHALL NOT BE SUBJECT TO THE SPRCIFIED STORM EVENT MONITORING REQUIREMENTS (72 HOURS SEPARATION; STORM EVENT DURATION; RAINFALL MEASUREMENTS). ALL OTHER REQUIREMENTS SPECIFIED UNDER PART I.D.2. SHALL APPLY.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 401, 404, (storm water runoff from regulated industrial activity; petroleum bulk stations and terminals where limitations apply; SIC codes 5171, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	1/Year	Estimate [b]
pH (S.U.)	6.0	9.0	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l [c] [d]	NA	30	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	401
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
001 FLOW	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MGD	*********	*********	*********			1/YR	EST
002 PH	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		6.0	*********	9.0	SU		1/YR	GRAB
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	30	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	404
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)

Tidewater Regional Office
5636 Southern Boulevard

Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
001 FLOW	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MGD	*********	*********	*********			1/YR	EST
002 PH	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		6.0	*********	9.0	SU		1/YR	GRAB
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	30	MG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 402, 407, 410, 411, 412, 413, 417, 419, 420 (storm water runoff from regulated industrial activity; petroleum bulk stations and terminals where limitations are not applied; SIC codes 5171, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Minimum	Maximum	Frequency	Sample Type

THESE OUTFALLS SHALL CONTAIN ONLY STORM WATER RUNOFF ASSOCIATED WITH A REGULATED INDUSTRIAL ACTIVITY WHERE NO CHEMICAL MONITORING IS REQUIRED. THERE SHALL BE NO DISCHARGE OF PROCESS WASTEWATER FROM THESE OUTFALLS.

SEE PART I.D. FOR STORM WATER MANAGEMENT REQUIREMENTS THAT MAY APPLY TO THESE DISCHARGES FROM A REGULATED INDUSTRIAL ACTIVITY. QUARTERLY VISUAL MONITORING WILL BE REQUIRED OF THIS GROUPING OF OUTFALLS CONSISTENT WITH THE REQUIREMENTS OF PART I.D.1.f.(1). SEE PART I.D.1.f.(4) FOR ADDITIONAL INFORMATION AND ALLOWANCES REGARDING SUBSTANTIALLY IDENTICAL EFFLUENTS. STORM WATER SAMPLING FOR THIS OUTFALL SHALL NOT BE SUBJECT TO THE SPRCIFIED STORM EVENT MONITORING REQUIREMENTS (72 HOURS SEPARATION; STORM EVENT DURATION; RAINFALL MEASUREMENTS. ALL OTHER REQUIREMENTS SPECIFIED UNDER PART I.D.2. SHALL APPLY.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 408, and 421 (storm water runoff from multiple regulated industrial activities; outfall 408 with active HVAC and vehicle washrack discharges; SIC codes 4212, 4225, 4226, 7699, HZ, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS [a]	
	Minimum	Maximum	Frequency	Sample Type
Flow - Precipitation Event (MG)	NA	NL	1/Year	Estimate [b]
pH - Precipitation Event (S.U.)	NL	NL	1/Year	Grab
Total Suspended Solids (mg/l) [c]	NA	NL	1/Year	Grab
Total Petroleum Hydrocarbons (mg/l) [c] [d]	NA	NL	1/Year	Grab
Total Organic Carbon (mg/l) [c]	NA	NL	1/Year	Grab
Total Kjeldahl Nitrogen (mg/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Arsenic (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Cadmium (ug/l) [c]	NA	NL	1/Year	Grab
Total Cyanide (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Lead (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Mercury (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Selenium (ug/l) [c]	NA	NL	1/Year	Grab
Total Recoverable Silver (ug/l) [c]	NA	NL	1/Year	Grab

NL = No limit, however, reporting is required
NA = Not Applicable

1/Year = Between January 1 and December 31.

Upon issuance of the permit, Discharge Monitoring Reports (DMRs) shall be submitted to the regional office at the frequency required by the permit regardless of whether an actual discharge occurs. In the event that there is no discharge for the monitoring period, then "no discharge" shall be reported on the DMR.

[a] See Part I.D. for additional storm water sampling and reporting requirements. See Parts I.D.1.e. and I.D.1.f.(4) for additional information and allowances regarding substantially identical effluents. Storm event sampling for this outfall shall not be subject to the specified storm event monitoring requirements (72 hours separation; storm event duration; rainfall measurements). All other requirements specified under Part I.D.2. shall apply.

[b] Estimate of the total volume of the discharge during the storm event.

[c] See Parts I.B.3. and I.B.4. for quantification levels and reporting requirements, respectively.

PART I

A. LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from outfall(s): 408, and 421 (storm water runoff from multiple regulated industrial activities; outfall 408 with active HVAC and vehicle washrack discharges; SIC codes 4212, 4225, 4226, 7699, HZ, 9711).

Such discharges shall be limited and monitored by the permittee as specified below:

[d] Total Petroleum Hydrocarbons (TPH) is the sum of individual gasoline range organics (TPH-GRO) and diesel range organics (TPH-DRO) to be measured by EPA SW 846 Method 8015C (2007) for gasoline and diesel range organics, or by EPA SW 846 Methods 8260B (1996) and 8270D (2007). If the combination of Methods 8260B and 8270D is used, the laboratory must report the total of gasoline range organics, diesel range organics, and polynuclear aromatic hydrocarbons.

2. There shall be no discharge of floating solids or visible foam in other than trace amounts.

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	408
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
018 CYANIDE, TOTAL (AS CN)	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
059 CARBON, TOTAL ORGANIC	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
068 TKN (N-KJEL)	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
186 SILVER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
202 CADMIUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	408
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
212 ARSENIC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
233 LEAD, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
235 MERCURY, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
408 SELENIUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME: US Navy - Naval Station Norfolk
ADDRESS: Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION: 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	421
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
004 TSS	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
018 CYANIDE, TOTAL (AS CN)	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
059 CARBON, TOTAL ORGANIC	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
068 TKN (N-KJEL)	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
186 SILVER, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
199 FLOW, PRECIPITATION EVENT	REPORTD	*********			*********	*********	*********				
	REQRMNT	*********	NL	MG	*********	*********	*********			1/YR	EST
200 pH, PRECIPITATION EVENT	REPORTD	*********	*********			*********					
	REQRMNT	*********	*********		NL	*********	NL	SU		1/YR	GRAB
202 CADMIUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

PERMITTEE NAME/ADDRESS(INCLUDE FACILITY NAME/LOCATION IF DIFFERENT)

NAME US Navy - Naval Station Norfolk
ADDRESS Regional Environmental Group Code N457
Norfolk VA 23511
FACILITY LOCATION 9900 Hampton Blvd, Norfolk VA 23505

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM(NPDES)
DISCHARGE MONITORING REPORT(DMR)

VA0004421	421
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD						
	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			

Industrial Minor 04/13/2011

DEPT. OF ENVIRONMENTAL QUALITY
(REGIONAL OFFICE)
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach VA 23462

NOTE: **READ PERMIT AND GENERAL INSTRUCTIONS BEFORE COMPLETING THIS FORM.**

PARAMETER		QUANTITY OR LOADING			QUALITY OR CONCENTRATION				NO. EX.	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		AVERAGE	MAXIMUM	UNITS	MINIMUM	AVERAGE	MAXIMUM	UNITS			
212 ARSENIC, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
233 LEAD, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
235 MERCURY, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
257 PETROLEUM HYDROCARBONS, TOTAL RECOVI	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	MG/L		1/YR	GRAB
408 SELENIUM, TOTAL RECOVERABLE	REPORTD	*********	*********		*********	*********					
	REQRMNT	*********	*********		*********	*********	NL	UG/L		1/YR	GRAB
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	
	REPORTD										
	REQRMNT									*******	

ADDITIONAL PERMIT REQUIREMENTS OR COMMENTS
See Part I.B.3. for quantification levels and reporting requirements

BYPASSES AND OVERFLOWS	TOTAL OCCURRENCES	TOTAL FLOW(M.G.)	TOTAL BOD5(K.G.)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS TO THE BEST OF MY KNOWLEDGE AND BELIEF TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

OPERATOR IN RESPONSIBLE CHARGE			DATE		
TYPED OR PRINTED NAME	SIGNATURE	CERTIFICATE NO.	YEAR	MO.	DAY
PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		TELEPHONE			
TYPED OR PRINTED NAME	SIGNATURE		YEAR	MO.	DAY

This report is required by your VPDES permit and by law. (See, e.g., the Code of Virginia of 1950 §62.1-44.5 and 9 VAC 25-31-50.) Failure to report or failure to report truthfully can result in civil penalties of $32,500 per violation, per day and felony prosecutions which can carry a 15 year term.

DISCHARGE MONITORING REPORT (DMR) - GENERAL INSTRUCTIONS

1. Complete this form in permanent ink or indelible pencil. The use of 'correction fluid/tape' is not allowed.
2. Be sure to enter the dates for the first and last day of the period covered by the report on the form in the space marked "Monitoring Period".
3. For those parameters where the "permit requirement" spaces have a requirement or limitation, provide data in the "reported" spaces in accordance with your permit.
4. Enter the average and maximum quantities and units in the "reported" spaces in the columns marked "Quantity or Loading".
   KG/DAY = Concentration (mg/L) x Flow (MGD) x 3.785 G/D (Grams/Day) = Concentration (mg/L) x Flow (MGD) x 3785
5. Enter maximum, minimum, and/or average concentrations and units in the "reported" spaces in the columns marked "Quality or Concentration".
6. For all parameters enter the number of samples which do not comply with the maximum and/or minimum permit requirements in the "reported" space in the column marked "No. Ex." (Number of Exceedances). If none, enter "0". Do NOT include monthly average violations in this field. Include any Maximum 7-Day Average and Maximum Weekly Average violations in this field. Permittees with continuous pH, or temperature monitoring requirements should consult the permit for what constitutes an exceedance and report accordingly.
7. You are required to sample (at a minimum) according to the Sample Frequencies and Sample Types specified in your permit.
8. Enter the actual frequency of analysis for each parameter (number of times per day, week, month, etc.) in the "reported" space in the column marked "Frequency of Analysis".
9. Enter the actual type of sample (Grab, 8HC, 24HC, etc) collected for each parameter in the "reported" space in the column marked "Sample Type".
10. Enter additional required data or comments in the space marked "additional permit requirements or comments". If additional required data or comments are appended to the DMR, reference appended correspondence in this field.
11. Record the number of bypasses during the month, the total flow in million gallons (MG) and BOD5 in kilograms (KG) in the proper columns in the section marked "Bypasses and Overflows".
12. The operator in responsible charge of the facility should review the form and sign in the space provided. If the plant is required to have a licensed operator or if the operator in responsible charge of the facility is a licensed operator, the operator's signature and certificate number must be reported in the spaces provided.
13. The principal executive officer then reviews the form and must sign in the space provided and provide a telephone number where he/she can be reached. Every page of the DMR must have an original signature.
14. Send the completed form(s) with original signatures to your Department of Environmental Quality Regional Office by the 10th of each month unless otherwise specified in the permit.
15. You are required to retain a copy of the report for your records.
16. Where violations of permit requirements are reported, attach a brief explanation in accordance with the permit requirements decribing causes and corrective actions taken. Reference each seperate violation by date.
17. If you have any questions, contact the Department of Environmental Quality Regional Office listed on the DMR.

B. OTHER REQUIREMENTS OR SPECIAL CONDITIONS

1. Permit Reopeners

a. Water Quality Standards Reopener

Should effluent monitoring indicate the need for any water quality based limitation, this permit may be modified or, alternatively, revoked and reissued to incorporate appropriate limitations.

b. Nutrient Enriched Waters Reopener

This permit may be modified or, alternatively, revoked and reissued to include new or alternative nutrient limitations and/or monitoring requirements should the State Water Control Board adopt nutrient standards for the waterbody receiving the discharge or if a future water quality regulation or statute requires new or alternative nutrient control.

c. Total Maximum Daily Load (TMDL) Reopener

This permit shall be modified or, alternatively, revoked and reissued if any approved wasteload allocation procedure, pursuant to Section 303(d) of the Clean Water Act, imposes wasteload allocations, limits or conditions on the facility that are not consistent with the permit requirements.

2. Notification Levels

The permittee shall notify the Department as soon as they know or have reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following notification levels:

(1) One hundred micrograms per liter (100 ug/l);
(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;
(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application; or
(4) The level established by the State Water Control Board.

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following notification levels:

(1) Five hundred micrograms per liter (500 ug/l);
(2) One milligram per liter (1 mg/l) for antimony;
(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application.
(4) The level established by the State Water Control Board.

3. Quantification Levels Under Part I.A.

a. The maximum quantification levels (QL) shall be as follows:

Effluent Characteristic	Quantification Level
Chlorine	0.1 mg/l
Total Phosphorus	0.1 mg/l
Ammonia-N	0.2 mg/l
Total Kjeldahl Nitrogen	0.5 mg/l
Hardness	1.0 mg/l
Total Suspended Solids	1.0 mg/l
Total Petroleum Hydrocarbons	1.0 mg/l
Aluminum	1.0 mg/l
Iron	1.0 mg/l
Total Organic Carbon	10.0 mg/l
Arsenic	27.6 ug/l
Cadmium	16.0 ug/l
Chromium	50.0 ug/l
Copper	6.5 ug/l
Cyanide	1.0 ug/l
Lead	96.0 ug/l
Mercury	0.7 ug/l
Selenium	120.0 ug/l
Silver	0.8 ug/l
Zinc	36.0 ug/l

b. The permittee may use any approved method which has a QL equal to or lower than the (QL) listed in Part I.B.3.a. above. The QL is defined as the lowest concentration used to calibrate a measurement system in accordance with the procedures published for the method.

4. Compliance Reporting Under Part I.A.

a. Compliance with the daily maximum limitations and/or reporting requirements for the parameters listed in Part I.B.3.a. shall be determined as follows: All data below the quantification level (QL) listed in Part I.B.3.a. above shall be treated as zero. All data equal to or above the QL shall be treated as reported. An arithmetic average of the values shall be calculated using all reported data, including the defined zeros, collected

collected for each day during the reporting month. The maximum value of these daily averages thus determined shall be reported on the DMR as the Daily Maximum. If all data are below the QL, then the average shall be reported as <QL.

b. Any single datum required shall be reported as "<QL" if it is less than the QL listed in Part I.B.3.a. above. Otherwise, the numerical value shall be reported.

c. Where possible, all limit values on the Part I.A. limits page(s) are expressed in two significant figures. As a result, single, trailing zeros occurring after any single digit are significant. Effluent limits of 10 or greater are rounded to two significant whole numbers, with the exception that loading limits are expressed as whole numbers.

d. The permittee shall report at least the same number of significant figures as the permit limit for a given parameter. Regardless of the rounding convention used (i.e., 5 always rounding up or to the nearest even number) by the permittee, the permittee shall use the convention consistently, and shall ensure that consulting laboratories employed by the permittee use the same convention.

5. Materials Handling and Storage

Any and all product, materials, industrial wastes, and/or other wastes resulting from the purchase, sale, mining, extraction, transport, preparation and/or storage of raw or intermediate materials, final product, by-product or wastes, shall be handled, disposed of and/or stored in such a manner so as not to permit a discharge of such product, materials, industrial wastes and/or other wastes to State waters, except as expressly authorized.

6. Non-Contact Cooling Water Systems and Boiler Additives

a. If at any time during the life of this permit, the permittee decides to treat any non-contact cooling water unit(s), boiler system(s), or heating, ventilation, and cooling (HVAC) systems with chemical additives [other than those additives currently in use and on file with the DEQ Tidewater Regional Office], the following requirements shall be satisfied.

At least thirty (30) days prior to implementing any chemical addition to the cooling water and/or boiler equipment, the permittee shall **notify the DEQ Tidewater Regional Office, in writing**, of the following:

(1) The chemical additives to be employed and their purpose. Provide to the staff for review, a Material Safety Data Sheet (MSDS) for each proposed additive;

(2) Schedule of additive usage, including the identification of wastewater treatment and/or retention to be provided during the use of additives.

(3) The permittee shall neither use tributyltin and any chemical additives containing tributyltin, nor use Hexavalent chromium-based water treatment chemicals in the cooling water systems.

b. Should the addition of treatment chemicals significantly alter the characteristics of the effluent from the cooling water and/or boiler unit(s) or their usage becomes persistent or continuous, this permit shall be modified or, alternatively, revoked and reissued to include appropriate limitations or conditions.

c. The permittee shall properly operate and maintain all cooling water systems that are active and discharging a chemically treated wastewater to surface waters. The permittee, or a designated representative, shall inspect cooling towers at least once per year to ensure that they are properly operated and maintained. The results of these annual inspections shall be incorporated into the facility's storm water pollution prevention plan along with information pertaining to the designated outfalls that direct these wastewaters to surface water(s).

d. The permittee shall characterize selected wastewater discharges from HVAC cooling water systems, identified in the table below, during the term of the permit.

(1) The permittee shall obtain a grab sample of the cooling water discharges at a representative point at each building's location in accordance with the schedule in the table below. The sampling of wastewaters shall occur prior to their commingling with storm water runoff or other wastewaters that may be present in associated conveyances leading to surface waters.

CY SCHEDULE	UNIT IDENTIFIER	HVAC DISCHARGE LOCATION	FINAL OUTFALL
CY 2011	C-34	Building SP-250	134
	C-08	Building U-132	408
CY 2012	C-16	Building CEP-200	016
	C-62	Building SC-1	613
CY 2013	C-29	Building Z-133	029
	C-31	Building W-143	031
	C-15	Building V-61	115
CY 2014	C-67	Building N-25A	067
	C-69	Building N-30	069
	C-61	Building NH-95	613
CY 2015	C-58	Building N-25	058
	C-78	Building LF-18	078
	C-13	Building V-53	113

(2) Sampling shall be in accordance with Parts I.B.6.d.(3) and I.B.6.d.(4) below. Attachment A, is the reporting form for submission of the resulting chemical test data. Attachment C shall be used for submission of results from whole effluent toxicity testing. Attachments A and C shall be submitted as discrete content to the annual report required by Part I.B.6.e. of this condition.

(3) Chemical Monitoring

(a) The constituents listed below shall be characterized for each HVAC cooling water unit discharge noted in the table above, for the stipulated monitoring period:

Constituent	Reported as
Flow	MGD
pH	Standard Units
Temperature	Degrees Celsius
Ammonia-Nitrogen	mg/l
Total Residual Chlorine	mg/l
Hardness	mg/l (as CaCO3)
Total Phosphorus	mg/l
Total Recoverable Silver	ug/l
Total Recoverable Copper	ug/l
Total Recoverable Zinc	ug/l
Whole Effluent Toxicity Testing (WET)	LC_{50} / TUa

(b) The permittee may use any approved method which has a QL equal to or lower than the (QL) listed in Part I.B.3.a. of this permit.

(4) Whole Effluent Toxicity Monitoring

Whole effluent toxicity monitoring of the discharges, identified in the table in Part I.B.6.d.(1), shall be performed once per permit term in accordance with the schedule in the table.

(a) Toxicity samples shall be taken at the same time and location as the monitoring required in Part I.B.6.d. Acute toxicity tests shall be conducted with the species Americamysis bahia and Cyprinodon variegatus using 48-hour static acute tests. All toxicity test conditions and reporting requirements under Part I.C. of this permit shall be followed. The permittee shall report the results and supply one complete copy of the toxicity test report with the DMR. A complete report must contain a copy of all laboratory benchsheets, certificates of analysis, all chains of custody, and Attachment C.

ATTACHMENT A
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
SUPPLEMENTAL CHEMICAL DATA COVER SHEET

Complete and submit this form for each report of chemical testing required to characterize discharges associated with HVAC/cooling system discharges.

VPDES PERMIT NUMBER: VA0004421

FACILITY NAME: US-Naval Station Norfolk

THE REPORT SHALL CONTAIN THE FOLLOWING ITEMS	
	COMPLETED CHAIN OF SAMPLE CUSTODY
	CERTIFICATE OF ANALYSIS(ES)

FACILITY LOCATION: 9900 Hampton Blvd, Gate 2 Norfolk, VA 23511

DISCHARGE SOURCE(S) DESIGNATION(S): (circle one or more)

C-16 C-29 C-31 C-58 C-67 C-69 C-78 C-13 C-15 C-34 C-08 C-61 C-62

REPORTING PERIOD (ex: 2011 Annual): _____

SAMPLING DATE AND WASTEWATER SOURCE(S): _____

_____

(provide a brief description of source)

DISCHARGE DESIGNATION: _____		DISCHARGE DESIGNATION: _____	
PARAMETERS	RESULTS	PARAMETERS	RESULTS
FLOW	MGD	FLOW	MGD
pH	SU	pH	SU
TEMPERATURE	°C	TEMPERATURE	°C
AMMONIA-NITROGEN	mg/l	AMMONIA-NITROGEN	mg/l
TOTAL RESIDUAL CHLORINE	mg/l	TOTAL RESIDUAL CHLORINE	mg/l
HARDNESS (as CaCO3)	mg/l	HARDNESS	mg/l
TOTAL PHOSPHORUS	mg/l	TOTAL PHOSPHORUS	mg/l
TOTAL RECOVERABLE COPPER	ug/l	TOTAL RECOVERABLE COPPER	ug/l
TOTAL RECOVERABLE SILVER	ug/l	TOTAL RECOVERABLE SILVER	ug/l
TOTAL RECOVERABLE ZINC	ug/l	TOTAL RECOVERABLE ZINC	ug/l
WET TESTING	TU_a	WET TESTING	TU_a

CERTIFICATION:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations. See 18 U.S.C. §1001 and 33 U.S.C. §1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

_____

Signature, printed name and title of Principal Officer or Authorized Agent / Date

All data from discharges sampled during the specific calendar year shall be submitted with the annual report required by Part I.B.6.e. of this permit.

(b) If any of the discharges from the cooling water systems are found to be toxic (LC_{50} = 100%, TU_a 1.0), the permittee shall evaluate conditions that may have resulted in this finding and identify the cause(s) of toxicity if able.

e. The permittee shall prepare and submit an annual report addressing all boiler and cooling tower water discharges, and cooling tower blow-down discharges associated with heating, ventilation and air conditioning (HVAC) equipment where the discharges have the reasonable potential to enter surface waters. The report shall provide the following information:

(1) the location(s) and size(s) of all boilers and HVAC equipment with a potential to discharge wastewater to surface waters;

(2) the affected outfall(s) under this permit;

(3) the volume(s) of wastewater(s) discharged during the preceding calendar year;

(4) the volume(s) and type(s) of treatment chemical(s) used and their purpose, the timing of the treatment and the status of the HVAC equipment (active, inactive, installed, removed, planned, etc.);

(5) the report shall provide, as discrete content, the results of wastewater characterization required by Parts I.B.6.d.(3) and (4); and

(6) the report shall also discuss any investigations or actions taken, planned, or scheduled to reclaim HVAC wastewaters in lieu of discharge to surface waters for beneficial reuse including but not limited to landscape irrigation, boiler feed water, equipment/ vehicle/aircraft washwaters, or other similar uses.

First Annual Report Due: **No later than February 10, 2012, and annually thereafter for the term of the permit**

7. Vessels of the Armed Forces - Discharges Allowed by the Uniform National Discharge Standards (UNDS), and Other Requirements

a. Authorized Non-Storm Water Discharges from Vessels

In addition to those point source vessel discharges authorized by the UNDS, the regulation and monitoring of underwater ship husbandry does not need to be included in

this permit. Section 325 of the National Defense Authorization Act for Fiscal Year (FY) 1996 amended Section 312 of the Clean Water Act by adding a section on UNDS for Vessels of the Armed Forces. Phase I of the UNDS rulemaking was completed in FY 1999, with Environmental Protection Agency (USEPA) and the Department of Defense (DoD) jointly identifying 25 specific liquid discharges that require shipboard marine pollution control devices (MPCDS). Phase II of UNDS continues with DoD and the USEPA developing new or enhanced performance standards for all identified UNDS discharges, including underwater ship husbandry, during the term of this permit.

b. Tributyltin (TBT) Exclusion

The removal and/or application (hereafter referred to as use) of hull coatings or other hull features or materials on vessels which contain any amount of the biocide tributyltin or related compounds are prohibited at this permitted facility unless specifically allowed by the UNDS referenced in Part I.B.7.a., above. Should the permittee consider using materials that contain TBT during the term of this permit, the permit must be modified or, alternatively, revoked and reissued to incorporate a numeric limitation which addresses the State's water quality standards for tributyltin, prior to its use.

c. Non-Storm Water Discharges Associated with Vessel Maintenance and Repair Activities

(1) This permit does not authorize any non-storm water discharges from shore-side activities that may be generated at those locations associated with Standard Industrial Classification (SIC) codes 3731, 3732, and SIC Major Group code 44, which result directly from the repair or maintenance of support vessels (e.g., barges, floats, camels, etc.) or other mission essential water craft located at this facility, on a permanent or temporary basis. See Parts I.D.1.i., I.D.5.d, and I.D.5.e.(2)(a)i., for additional information and requirements in this regard.

(2) For the purposes of this permit, non-storm water discharges include process wastewaters associated with vessel repair or maintenance. Process wastewaters related to vessel maintenance or hull work shall be any water used on a vessel's hull for any purpose regardless of application pressure, including but not limited to the activities of removing marine salts, sediments, marine growth and paint, or other hull cleaning activities using water such as preparing hull areas for inspection or work (e.g., cutting, welding, grinding, etc.).

d. When and where it is necessary to rinse Naval Station Norfolk service craft or other mission essential water-borne vehicles/platforms following operational deployment in marine waters, all suitable and appropriate best management practices (BMP) should be employed to reduce, or minimize to the extent practicable, the release of solids, biocides, or other potentially deleterious materials to storm water conveyance systems or surface waters. Management practices to consider include:

(1) limit hull rinsing activities to those hulls and vessel features that are not coated with anti-foulant systems formulated with toxic biocides (tributyltin, cuprous oxide, etc.) and the washing does not disturb or remove biological growth or blistered, poorly adhered hull coatings;

(2) whenever possible, limit hull rinsing activities to locations where a designated wash-rack exists and the discharge of wastewaters at that location are collected for disposal or diverted to the sanitary sewer system, in lieu of direct discharge to surface waters;

(3) in the absence of designated washracks, limit hull rinsing activities to areas with impervious surfaces where runoff of process wastewaters can be confined for collection and approved disposal in lieu of a discharge to surface waters via on-site drainage structures, and;

(4) identify all locations where service craft and other mission essential water-borne vehicles/platforms, not in a repair status, are rinsed in the Storm Water Pollution Prevention Plan (SWPPP), in addition to describing management practices to be imposed and maintained during these activities.

e. Should the permittee consider it necessary to generate a defined process wastewater (Part I.B.7.c.(2)) that will result in a point source discharge to surface waters, this permit must be modified or, alternatively, revoked and reissued to incorporate appropriate effluent limitations, monitoring requirements and necessary permit conditions.

8. Vehicle and Equipment Maintenance

a. This permit does not authorize any discharges of non-storm water discharges that may be generated at those locations associated with Standard Industrial Classification (SIC) codes 40, 41, 42, 43, and 5171 that have vehicle and equipment maintenance shops (vehicle and equipment rehabilitation, mechanical repairs, painting, fueling and lubrication) and/or equipment cleaning operations. See Parts I.D.4. and I.D.4.d. for additional information and requirements in this regard.

b. For the purposes of this permit, non-storm water discharges include process wastewaters associated with vehicle or equipment repair or maintenance. Process wastewaters related to vehicle and equipment maintenance shall be any water used on a vehicle or piece of equipment for any purpose, including but not limited to the removal of dirt and debris, greases, oils, marine salts and paints, or other cleaning activities using water including the wash down of impervious surfaces at the location where vehicle and equipment maintenance are performed.

c. Identify all locations where mobile canteens, heavy trucks and other industrially related heavy equipment are maintained, serviced, and repaired in the Storm Water Pollution Prevention Plan (SWPPP), in addition to describing management practices to be imposed and maintained during these activities. See Part I.D.4. for additional information.

9. Aircraft Maintenance and Cold Weather Activities

a. Non-Storm Water Discharges

For the purpose of this permit, the following discharges are not "authorized" non-storm water discharges under this permit, and if present, may require additional controls, limitations, or prohibitions:

(1) aircraft, ground vehicle, runway and equipment washwaters; and

(2) dry weather discharges of deicing/anti-icing chemicals.

b. Identify all locations where private, contracted, and government owned and operated rotary and fixed wing aircraft, and other airfield support equipment are maintained, serviced, and repaired in the Storm Water Pollution Prevention Plan (SWPPP). In addition, describe management practices, to be imposed and maintained during these activities. See Part I.D.6. for additional information.

c. For all washracks associated with aircraft maintenance, that have a potential to release contaminated runoff to surface waters, the permittee shall develop and maintain current a system of sufficiently detailed log books and records that document the following actions by tenant aircraft-type Commands:

(1) identifies the date and time of aircraft washing;

(2) identifies the date and time of diversion valve positioning/realignment to ensure process wastewaters are routed to the sanitary sewer, the date and time

the valves were restored, and the identity of the tenant activity representative(s) performing these actions;

(3) identifies per location the type of cleaners, soaps, or chemical solutions that may be used during aircraft washing/maintenance;

(4) identifies the date when automatic and manual diversion valves were inspected, calibrated, maintained, and if necessary, repaired and returned to service;

(5) identifies the date when oil/water separators or other treatment equipment associated with aircraft maintenance activities are inspected, maintained, and if necessary, repaired and returned to service; and

(6) identifies the date(s) and time(s) when water program representatives of Norfolk Naval Station have inspected the contents of all washracks logs and records to confirm compliance with this permit condition and the requirements of Parts I.D. and I.D.6. of this permit.

(7) Once developed, these logbooks and records shall be maintained at a central location at each tenant aircraft maintenance activity and must be readily accessible to Naval Station Norfolk environmental staff for inspection, review, and confirmation of compliance with Naval Station Norfolk Instructions, Directives, guidance, and this permit. These logbooks and records shall also be made readily available to Department staff upon request, to confirm compliance with the terms and conditions of this permit.

d. Aircraft Cold Weather Activities - Outfalls 333, 334, 335, 336, 338, and 339

(1) The expected season for anti-icing and deicing activities is during the months of December, January, February and March. For the purpose of this section, the term "deicing" is defined as the process to remove frost, snow, or ice from aircraft surfaces and "anti-icing" is the process that prevents the accumulation of frost, snow, or ice, primarily on surfaces of fixed-wing aircraft.

(2) The permittee shall develop a log-book system that provides the date and beginning and ending times for each anti-icing and deicing event, an estimate of propylene glycol or other chemical solutions applied, the mix-ratio used, and an estimate of spent chemical solutions recovered from impervious surfaces surrounding the application site, or sites. Should recovery of chemical solutions not occur, this must

be noted in the log along with any reasons for not recovering the spent solutions. If spent propylene glycol or other chemical solutions are lost to storm water structures or conveyances for any reason, an estimate of volume lost and actions taken to recover the spent solutions shall also be documented in the log. Once developed and deployed, this log book shall be maintained at a central location and made available to Department staff upon request.

(3) Although the permittee will not be required to collect samples of runoff from these activities during the term of the permit for chemical analyses or whole effluent toxicity testing, a best management practices (BMP) compliance form shall be prepared and submitted for each anti-icing/deicing event performed during the months identified in Part I.B.9.d.(1), above. Attachment B constitutes the BMP compliance reporting form.

(4) The permittee shall prepare and submit an annual report that summarizes the information collected and maintained in paragraph (2) above. This report shall be signed and certified as per Part II.K. of this permit. The annual reports shall contain a completed Attachment B for each anti-icing/deicing event performed during the reporting period. **The first report for the first seasonal period December 2011 and January through March 2012, shall be submitted by not later than April 10, 2012, and annually thereafter for the term of the permit for subsequent reporting periods.**

(3) Should the Department's review of the annual reports determine that treatment chemical recovery rates are insufficient, or if loss of treatment chemicals to the storm water conveyance system(s) is directly associated with documented environmental impacts (discoloration of surface waters, stressed or dead animals or plants, other noticeable effects, etc.), then this permit may be modified or, alternatively, revoked and reissued to incorporate appropriate effluent monitoring requirements at outfalls 333, 334, 335, 336, 338 and 339.

ATTACHMENT B
ANTI-ICING, DEICING SAMPLING EVENT BMP COMPLIANCE REPORT

This form shall be completed for each anti-icing or deicing event during the calendar year (CY) reporting period identified below. A separate sheet shall be prepared for each such event performed during the stipulated reporting period.

CALENDAR YEAR: 2011 2012 2013 2014 2015 2016
(circle one)

CY REPORTING PERIOD: DECEMBER JANUARY FEBRUARY MARCH
(circle one)

ANNOTATE ON DIAGRAM APPROXIMATE LOCATION OF CHEMICAL APPLICATION

ANTI-ICING/DEICING EVENT INFORMATION:

Date and Time Chemical Application Began: _____

Date and Time Chemical Application Ended: _____

Type of Treatment Chemical Applied: _____

Volume Applied: _____

Best Management Practices Applied: YES NO

If NO, provide reason: _____

Estimated Volume Treatment Chemical(s) Recovered: _____

Estimated Volume Treatment Chemical Lost to Storm System: _____

_____

CERTIFICATION:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations. See 18 U.S.C. §1001 and 33 U.S.C. §1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

_____

Signature, printed name and title of Principal Officer or Authorized Agent / Date

C. TOXICS MANAGEMENT PROGRAM (TMP)

1. Biological Monitoring - Outfalls 024, 054, and 091

a. In accordance with the schedule in Part I.C.2. below, the permittee shall conduct annual acute toxicity tests for outfalls 024, 054,and 091 for the duration of the permit. The permittee shall collect a grab sample of final effluent in accordance with the sampling methodology in Parts I.A., I.D.1.a. and I.D.1.b. of this permit. The grab samples for toxicity testing shall be taken at the same time as the monitoring for the outfalls in Part I.A. of this permit. The acute test to use is:

48-Hour Static Acute test using Americamysis bahia

These acute tests shall be performed with a minimum of 5 dilutions, derived geometrically, for the calculation of a valid LC_{50}. Express the results as TU_a (Acute Toxic Units) by dividing 100/ LC_{50} for reporting.

Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3.

b. The permittee may provide additional samples to address data variability during the period of initial data generation. These data shall be reported and may be included in the evaluation of the effluent toxicity. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3.

c. The permittee may show a demonstrated absence of toxicity and request a waiver from sampling requirements for outfall 091 listed above. The following conditions are required to receive a waiver:

(1) A LC_{50} of 100% effluent equivalent to 1.0 TU_a must be met for two consecutive monitoring periods.

(2) Samples must be taken at the same time as the other Part I.A. monitoring for each outfall.

(3) A waiver request is to be submitted to and approved by the appropriate DEQ regional office. The waiver request must include a summary of the data and a certification that, based on current potential pollutant sources and BMPs used, future discharges from the outfall requesting the waiver are reasonable expected to be the same or cleaner for the remaining monitoring periods. The waiver must be signed and certified in accordance with Part II.K. of the permit.

2. Reporting Schedule

The permittee shall report the results and supply one complete copy of the toxicity test reports to the Tidewater Regional Office in accordance with the schedule below. A complete report must contain a copy of all laboratory benchsheets, certificates of analysis, all chains of custody, and Attachment C. All data shall be submitted by the 10th of the month following sampling.

(a)	Conduct first annual TMP test for outfalls 024, 054 and 091 using Americamysis bahia (A.b.)	By December 31, 2012
(b)	Submit results of all biological tests	By the 10th of the month following sampling but no later than January 10, 2013
(c)	Conduct second annual TMP tests for outfalls 024, 054 and 091 using A.b.	By December 31, 2013
(d)	Submit results of the biological test	By the 10th of the month following sampling but no later than January 10, 2014
(e)	Conduct third annual TMP tests for the required outfalls listed above using A.b.	By December 31, 2014
(f)	Submit results of all biological tests	By the 10th of the month following sampling but no later than January 10, 2015
(g)	Conduct fourth annual TMP tests for the required outfalls listed above using A.b.	By December 31, 2015
(h)	Submit results of the biological test	By the 10th of the month following sampling but no later than January 2016

ATTACHMENT C
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
TMP SUBMITTAL COVER SHEET

Complete and submit this form for each report of biological toxicity testing.

VPDES PERMIT NUMBER: VA0004421
FACILITY NAME: US-Naval Station Norfolk

THIS REPORT SHALL CONTAIN THE FOLLOWING ITEMS	
	COMPLETED CHAIN OF SAMPLE CUSTODY
	CERTIFICATE OF ANALYSIS(ES)
	COMPLETE REPORT OF TOXICITY TESTING

FACILITY LOCATION: 9900 Hampton Blvd, Gate 2 Norfolk, VA 23511

STORM WATER OUTFALL NUMBER (circle one): 024 054 091

HVAC NUMBER (circle one): C-16 C-29 C-31 C-58 C-67 C-69 C-78 C-13 C-15 C-34 C-08 C-61 C-62

REPORTING PERIOD (ex: 2011 Annual): _____

SAMPLE TYPE (circle one): Stormwater or HVAC/Cooling System Wastewater(s)

WASTEWATER SOURCE(S): _____

(if process wastewater, provide a brief source description)

SAMPLE EVENT INFORMATION (if applicable):

Sample Date and Time of Collection: _____

Time discharge began: _____

Storm event measurement (inches): _____

Time between sampling and last measurable storm event (hours): _____

ADDITIONAL INFORMATION:

If this sample is a **make-up** sample or **retest**, indicate which category of test and the reporting period this submittal applies to:

Report Type: _____
(e.g., makeup, retest, etc.)

Reporting Period: _____

If the required TMP sample(s) were not collected provide a reason/rationale:

CERTIFICATION:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations. See 18 U.S.C. §1001 and 33 U.S.C. §1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

_____

Signature, printed name and title of Principal Officer or Authorized Agent / Date

D. STORM WATER MANAGEMENT CONDITIONS

1. General Storm Water Special Conditions

a. Sample Type

For all storm water monitoring required in Part I.A. or other applicable sections of this permit, a minimum of one grab sample shall be taken. Unless otherwise specified, all such samples shall be collected from the discharge resulting from a storm event that occurs at least 72 hours from the previously measurable storm event (a "measurable storm event" is defined as a storm event that results in an actual discharge from the site). The required 72-hour storm event interval is waived where the permittee documents that less than a 72-hour interval is representative for local storm events during the season when sampling is being conducted. The grab sample shall be taken during the first hour of the discharge. If the collection of a grab sample during the first hour is impracticable, a grab sample can be taken during the first three hours of the discharge, and the permittee shall document with the SWP3 a description of why a grab sample during the first hour was impracticable. If storm water discharges associated with industrial activity commingle with process or non-process water, then where practicable, the permittee must attempt to sample the storm water discharge before it mixes with the non-storm water discharge.

b. Sampling Methodology for Specific Outfalls

Due to the nature of the effluent discharged at these outfalls (potentially contaminated storm water associated with a regulated industrial activity), the following shall be required when obtaining samples required by Part I.A. of this permit:

(1) At the time of sampling, the permittee shall ensure that the effects of tidal influences are kept to an absolute minimum. This can be achieved by:

(a) Sampling at low tide; and/or

(b) Sampling at a representative point which has been demonstrated to be free of tidal influences

(2) In the event that sampling of an outfall is not possible due to the absence of effluent flow during a particular testing period, the permittee shall provide written notification to the DEQ's Tidewater Regional Office with the DMR for the month following the period in which samples were to be collected.

c. Recording of Results

For each measurement or sample taken pursuant to the storm event monitoring requirements of this permit, the permittee shall record and report with the Discharge Monitoring Reports (DMRs) the following information:

(1) The date and duration (in hours) of the storm event(s) sampled;

(2) The rainfall total (in inches) of the storm event which generated the sampled discharge; and

(3) The duration between the storm event sampled and the end of the previous measurable storm event.

In addition, the permittee shall maintain a monthly log documenting the amount of rainfall received at this facility on a daily basis. A summarization of this information shall also be submitted with the DMRs.

d. Sampling Waiver

When a permittee is unable to collect storm water samples required in Part I.A. or other applicable sections of this permit within a specified sampling period due to adverse climatic conditions, the permittee shall collect a substitute sample from a separate qualifying event in the next period and submit these data along with the data for the routine sample in that period. Adverse weather conditions that may prohibit the collection of samples include weather conditions that create dangerous conditions for personnel (such as local flooding, high winds, hurricane, tornadoes, electrical storms, etc.) or otherwise make the collection of a sample impracticable (drought, extended frozen conditions, etc.).

e. Representative Discharges

When a facility has two or more outfalls that discharge substantially identical effluents, based on similarities of the industrial activities, significant materials, size of drainage areas, and storm water management practices occurring within the drainage areas of the outfalls, the permittee may test the effluent of one of such outfalls and report that the quantitative data also apply to the substantially identical outfall(s) provided that:

(1) the representative outfall determination has been approved by DEQ prior to data submittal; and,

(2) the permittee includes in the storm water pollution prevention plan a description of the location of the outfalls and explains in detail why the outfalls are expected to discharge substantially identical effluents.

f. Quarterly Visual Examination of Storm Water Quality

(1) Commensurate with initiation of annual Part I.A. monitoring for storm water discharges associated with industrial activity, beginning not later than January 1, 2012, and continuing for the term of the permit, the permittee must perform and document a quarterly visual examination of a storm water discharge from each outfall, except discharges exempted below and those exempted in Part I.A. of this permit. The examination(s) must be made at least once in each of the following three-month periods: January through March, April through June, July through September, and October through December. Whenever practicable, the visual examination should be made during daylight hours (e.g., normal working hours). If no storm event resulted in runoff from the facility during a monitoring quarter, the permittee is excused from visual monitoring for that quarter provided that documentation is included with the monitoring records indicating that no runoff occurred. The documentation must be signed and certified in accordance with Part II.K. of this permit.

(2) Visual examinations must be made of grab samples taken during the first hour of when the runoff or snowmelt begins discharging from the facility. If the collection of a grab sample during the first hour is impracticable, a grab sample can be taken during the first three hours of the discharge, and the permittee shall document with the SWP3 a description of why a grab sample during the first hour was impracticable. The examination must document observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution. The examination must be conducted in a well-lit area. No analytical tests are required to be performed on the samples. All samples (except snowmelt samples) must be collected from the discharge resulting from a storm event that results in an actual discharge from the site (defined as a "measurable storm event"), and that occurs at least 72 hours from the previously measurable storm event. The 72-hour storm interval is waived if the permittee is able to document that less than a 72-hour interval is representative for local storm events during the sampling period. Where practicable, the same individual should carry out the collection and examination of discharges for the entire permit term. If no qualifying storm event resulted in runoff during daylight hours from the facility during a monitoring quarter, the permittee is excused from visual monitoring for that quarter provided that

documentation is included with the monitoring records indicating that no qualifying storm event occurred during daylight hours that resulted in storm water runoff during that quarter. The documentation must be signed and certified in accordance with Part II.K. of this permit.

(3) The visual examination reports must be maintained on-site with the Storm Water Pollution Prevention Plan (SWPPP). The report must include the outfall location, the examination date and time, examination personnel, the nature of the discharge (i.e., runoff or snow melt), visual quality of the storm water discharge (including observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of storm water pollution), and probable sources of any observed storm water contamination.

(4) If the facility has two or more outfalls that discharge substantially identical effluents, based on similarities of the industrial activities, significant materials, size of drainage areas, and storm water management practices occurring within the drainage areas of the outfalls, the permittee may conduct visual monitoring on the effluent of just one of the outfalls and report that the observations also apply to the substantially identical outfall(s) provided that the permittee includes in the storm water pollution prevention plan a description of the location of the outfalls and explains in detail why the outfalls are expected to discharge substantially identical effluents. In addition, for each outfall that the permittee believes is representative, an estimate of the size of the drainage area (in square feet) and an estimate of the runoff coefficient of the drainage area (i.e., low (under 40 percent), medium (40 to 65 percent), or high (above 65 percent)) shall be provided in the plan.

(5) When the permittee is unable to conduct the visual examination due to adverse climatic conditions, the permittee must document the reason for not performing the visual examination and retain this documentation onsite with the records of the visual examinations. Adverse weather conditions that may prohibit the collection of samples include weather conditions that create dangerous conditions for personnel (such as local flooding, high winds, hurricane, tornadoes, electrical storms, etc.) or otherwise make the collection of a sample impracticable (drought, extended frozen conditions, etc.).

g. Allowable Non-Storm Water Discharges

(1) The following non-storm water discharges are authorized by this permit provided the non-storm water component of the discharge is in compliance with g.(2) below:

(a) Discharges from fire fighting activities;

(b) Fire hydrant flushings;

(c) Potable water including water line flushings;

(d) Uncontaminated air conditioning or compressor condensate;

(e) Irrigation drainage;

(f) Landscape watering provided all pesticides, herbicides, and fertilizer have been applied in accordance with manufacturer's instructions;

(g) Pavement wash waters where no detergents are used and no spills or leaks of toxic or hazardous materials have occurred (unless all spilled material has been removed);

(h) Routine external building wash down which does not use detergents;

(i) Uncontaminated ground water or spring water;

(j) Foundation or footing drains where flows are not contaminated with process materials;

(k) Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of the facility, but NOT intentional discharges from the cooling tower (e.g., "piped" cooling tower blowdown or drains); and

(l) Discharges from swimming pools subject to the following conditions:

i. Total residual chlorine (TRC) concentration shall be non-detect at maximum quantification level (QL) of 0.1 mg/l TRC, the pH of the discharge is between the range of 6.5 to 8.5 standard units (SU), total suspended solids is below 60 mg/l, and the water is not murky upon release;

ii. The wastewater complies with the applicable water quality standards and is known to be free of algaecides such as copper or silver;

iii. Discharges should be released to vegetated areas without flow to storm water systems or streams;

iv. Discharge the water in a manner that will prevent nuisance conditions. Nuisance conditions occur when water is ponded for a prolonged period; and

v. Discharges to storm water conveyances shall only be used when all other options are unavailable (sanitary sewer system, landscape irrigation, release to vegetated areas without flows to streams, collection for beneficial reuse, etc.).

(2) Except for flows from fire fighting activities, the Storm Water Pollution Prevention Plan must include:

(a) Identification of each allowable non-storm water source;

(b) The location where the non-storm water is likely to be discharged; and

(c) Descriptions of appropriate BMPs for each source.

(3) If mist blown from cooling towers is included as one of the allowable non-storm water discharges from the facility, the permittee must specifically evaluate the discharge for the presence of chemicals used in the cooling tower. The evaluation shall be included in the SWPPP.

h. Releases of Hazardous Substances or Oil in Excess of Reportable Quantities

The discharge of hazardous substances or oil in the storm water discharge(s) from the facility shall be prevented or minimized in accordance with the storm water pollution prevention plan for the facility. This permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill. This permit does not relieve the permittee of the reporting requirements of 40 CFR 110, 40 CFR 117 and 40 CFR 302 or §62.1-44.34:19 of the Code of Virginia. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110, 40 CFR 117 or 40 CFR 302 occurs during a 24-hour period:

(1) The permittee is required to notify the Department in accordance with the requirements of Part II.G. of this permit as soon as he or she has knowledge of the discharge;

(2) Where a release enters an adjacent Municipal Separate Storm Sewer System (MS4; e.g., City of Norfolk), the permittee shall also notify the owner of the MS4; and

(3) The SWPPP required by this permit must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases, and the plan must be modified where appropriate.

i. Co-Located Industrial Activities

(1) If the facility has industrial activities occurring on-site which are described by any of the activities identified in the application submitted for reissuance of this permit, those industrial activities are considered to be co-located industrial activities. Storm water discharges from co-located industrial activities are authorized by this permit, provided that the permittee complies with any and all additional pollution prevention plan and monitoring requirements set forth in Parts I.A. and I.D. of this permit, applicable to that particular co-located industrial activity. The permittee shall determine which additional pollution prevention plan and monitoring requirements are applicable to the co-located industrial activity by examining the narrative descriptions of each coverage section.

(2) Sector-specific monitoring requirements and limitations are applied discharge by discharge at facilities with co-located activities. Where storm water from the co-located activities are commingled, the monitoring requirements and limitations are additive. Where more than one numeric limitation for a specific parameter applies to a discharge, compliance with the more restrictive limitation is required. Where monitoring requirements for a monitoring period overlap, the permittee may use a single sample to satisfy both monitoring requirements.

j. Additional Requirements for Salt Storage

Storage piles of salt or piles containing salt used for deicing or other commercial or industrial purposes shall be enclosed or covered to prevent exposure to precipitation. The permittee shall implement appropriate measures (e.g., good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile. All salt storage piles shall be located on an impervious surface. All runoff from the pile, and/or runoff that comes in contact with salt, including under drain systems, shall be collected and contained within a bermed basin lined with concrete or other impermeable materials., or within an underground storage tank(s), or within an above ground storage tank(s), or disposed of through a sanitary sewer (with the permission of the treatment facility).

A combination of any or all of these methods may be used. In no case shall salt contaminated storm water be allowed to discharge directly to the ground or to state waters.

2. Storm Water Pollution Prevention Plan (SWPPP)

The storm water pollution prevention plan requirements of this permit may be fulfilled, in part, by incorporating by reference other plans or documents such as a spill prevention control and countermeasure (SPCC) plan developed for the facility under Section 311 of the Clean Water Act, or best management practices (BMP) programs otherwise required for the facility, provided that the incorporated plan meets or exceeds the plan requirements of Part I.D.2.b. (Contents of the Plan). All plans incorporated by reference into the storm water pollution prevention plan become enforceable under this permit. If a plan incorporated by reference does not contain all of the required elements of the SWPPP of Part I.D.2.b. the permittee shall develop the missing SWPPP elements and include them in the required plan.

a. Deadlines for Plan Preparation and Compliance

(1) A SWPPP for the facility was required to be developed and implemented under the previous permit. The existing storm water pollution prevention plan shall be reviewed and modified, as appropriate, to conform to the requirements of this section. Permittees shall implement the provisions of the storm water pollution prevention plan as a condition of this permit.

(2) Measures That Require Construction

In cases where construction is necessary to implement measures required by the plan, the plan shall contain a schedule that provides compliance with the plan as expeditiously as practicable, but no later than 3 years after the effective date of this permit. Where a construction compliance schedule is included in the plan, the schedule shall include appropriate nonstructural and/or temporary controls to be implemented in the affected portion(s) of the facility prior to completion of the permanent control measure.

b. Contents of the Plan

The contents of the SWPPP shall comply with the requirements listed below and those in Parts I.D.3., I.D.4., I.D.5., I.D.6. and I.D.7. The plan shall include, at a minimum, the following items:

(1) Pollution Prevention Team

The plan shall identify the staff individuals by name or title that comprise the facility's storm water pollution prevention team. The pollution prevention

team is responsible for assisting the facility or compliance manager in developing, implementing, maintaining, revising, and ensuring compliance with the facility's SWPPP. Specific responsibilities of each staff individual on the team shall be identified and listed.

(2) Site Description

The plan shall include the following:

(a) Activities at the Facility

A description of the nature of the industrial activities at the facility.

(b) General Location Map

A general location map (e.g., USGS quadrangle or other map) with enough detail to identify the location of the facility and the receiving waters within one mile of the facility.

(c) Site Map

A site map identifying the following:

i. The size of the property (in acres);

ii. The location and extent of significant structures and impervious surfaces (roofs, paved areas and other impervious areas);

iii. Locations of all storm water conveyances including ditches, pipes, swales, and inlets, and the directions of storm water flow (use arrows to show which ways storm water will flow);

iv. Locations of all existing structural and source control BMPs;

v. Locations of all surface water bodies, including wetlands;

vi. Locations of potential pollutant sources identified under Part I.D.2.b.(3);

vii. Locations where significant spills or leaks identified under Part I.D.2.b.(4) have occurred;

viii. Locations of the following activities where such activities are exposed to precipitation: fueling stations; vehicle and equipment maintenance and/or cleaning areas; loading/unloading areas; locations used for the treatment, storage or disposal of wastes; liquid storage tanks; processing and storage areas; access

roads, rail cars and tracks; transfer areas for substances in bulk; and machinery;

ix. Locations of storm water outfalls and an approximate outline of the area draining to each outfall, and location of municipal storm sewer systems, if the storm water from the facility discharges to them;

x. Location and description of all non-storm water discharges;

xi. Location of any storage piles containing salt used for deicing or other commercial or industrial purposes; and

xii. Locations and sources of runon to the site from adjacent property where the runon contains significant quantities of pollutants. The permittee shall include an evaluation with the SWPPP of how the quality of the storm water running onto the facility impacts the facility's storm water discharges.

(d) Receiving Waters and Wetlands

The name of all surface waters receiving discharges from the site, including intermittent streams, dry sloughs, and arroyos. Provide a description of wetland sites that may receive discharges from the facility. If the facility discharges into or through a municipal separate storm sewer system (MS4), identify the MS4 operator, and the receiving water to which the MS4 discharges.

(3) Summary of Potential Pollutant Sources

The plan shall identify each separate area at the facility where industrial materials or activities are exposed to storm water. Industrial materials or activities include, but are not limited to: material handling equipment or activities, industrial machinery, raw materials, industrial production and processes, intermediate products, byproducts, final products, and waste products. Material handling activities include, but are not limited to: the storage, loading and unloading, transportation, disposal, or conveyance of any raw material, intermediate product, final product or waste product. For each separate area identified, the description shall include:

(a) Activities in Area

A list of the activities (e.g., material storage, equipment fueling and cleaning, cutting steel beams); and

(b) Pollutants

A list of the associated pollutant(s) or pollutant constituents (e.g., crankcase oil zinc, sulfuric acid, cleaning solvents, etc.) for each activity. The pollutant list shall include all significant materials handled, treated, stored or disposed that have been exposed to storm water in the three years prior to the date this SWPPP was prepared or amended. The list shall include any hazardous substances or oil at the facility.

(4) Spills and Leaks

The SWPPP shall clearly identify areas where potential spills and leaks that can contribute pollutants to storm water discharges can occur and their corresponding outfalls. The plan shall include a list of significant spills and leaks of toxic or hazardous pollutants that actually occurred at exposed areas, or that drained to a storm water conveyance during the three-year period prior to the date this SWPPP was prepared or amended. The list shall be updated if significant spills or leaks occur in exposed areas of the facility during the term of the permit. Significant spills and leaks include releases of oil or hazardous substances in excess of reportable quantities, and may also include releases of oil or hazardous substances that are not in excess of reporting requirements.

(5) Sampling Data

The plan shall include a summary of existing storm water discharge sampling data taken at the facility. The summary shall include, at a minimum, any data collected during the previous permit term.

(6) Storm Water Controls

(a) BMPs shall be implemented for all the areas identified in Part I.D.2.b.(3) to prevent or control pollutants in storm water discharges from the facility. All reasonable steps shall be taken to control or address the quality of discharges from the site that may not originate at the facility. The SWPPP shall describe the type, location and implementation of all BMPs for each area where industrial materials or

activities are exposed to storm water. Selection of BMPs shall take into consideration:

i. That preventing storm water from coming into contact with polluting materials is generally more effective, and less costly, than trying to remove pollutants from storm water;

ii. BMPs generally shall be used in combination with each other for most effective water quality protection;

iii. Assessing the type and quantity of pollutants, including their potential to impact receiving water quality, is critical to designing effective control measures;

iv. That minimizing impervious areas at the facility can reduce runoff and improve groundwater recharge and stream base flows in local streams (however, care must be taken to avoid groundwater contamination);

v. Flow attenuation by use of open vegetated swales and natural depressions can reduce in-stream impacts of erosive flows;

vi. Conservation or restoration of riparian buffers will help protect streams from storm water runoff and improve water quality; and

vii. Treatment interceptors (e.g., swirl separators and sand filters) may be appropriate in some instances to minimize the discharge of pollutants.

(b) Control Measures

The permittee shall implement the following types of BMPs to prevent and control pollutants in the storm water discharges from the facility unless it can be demonstrated and documented that such controls are not relevant to the discharges (e.g., there are no storage piles containing salt).

i. Good Housekeeping

The permittee shall keep clean all exposed areas of the facility that are potential sources of pollutants to storm water discharges. Typical problem areas include areas around trash containers, storage areas, loading docks, and vehicle fueling

and maintenance areas. The plan shall include a schedule for regular pickup and disposal of waste materials, along with routine inspections for leaks and conditions of drums, tanks and containers. The introduction of raw, final or waste materials to exposed areas of the facility shall be minimized to the maximum extent practicable. The generation of dust, along with off-site vehicle tracking of raw, final or waste materials, or sediments, shall be minimized to the maximum extent practicable.

ii. Eliminating and Minimizing Exposure

To the extent practicable, industrial materials and activities shall be located inside, or protected by a storm-resistant covering to prevent exposure to rain, snow, snowmelt, and runoff. Note: Eliminating exposure at all industrial areas may make the facility eligible for the "Conditional Exclusion" for No Exposure" provision of 9 VAC 25-31-120 E, thereby eliminating the need to have a permit.

iii. Preventive Maintenance

The permittee shall have a preventive maintenance program that includes regular inspection, testing, maintenance and repairing of all industrial equipment and systems to avoid breakdowns or failures that could result in leaks, spill and other releases. This program is in addition to the specific BMP maintenance required under Part I.D.2.c. (Maintenance of BMPs).

iv. Spill Prevention and Response Procedures
The plan shall describe the procedures that will be followed for preventing and responding to spills and leaks.

- Preventive measures include barriers between material storage and traffic areas, secondary containment provisions, and procedures for material storage and handling.
- Response procedures shall include notification of appropriate facility personnel, emergency agencies, and regulatory agencies, and procedures

for stopping, containing and cleaning up spills. Measures for cleaning up hazardous material spills or leaks shall be consistent with applicable RCRA regulations at 40 CFR Part 264 and 40 CFR Part 265. Employees who may cause, detect or respond to a spill or leak shall be trained in these procedures and have necessary spill response equipment available. If possible, one of these individuals shall be a member of the Pollution Prevention Team.

- Contact information for individuals and agencies that must be notified in the event of a spill shall be included in the SWPPP, and in other locations where it will be readily available.

v. Routine Facility Inspections

- Facility personnel who possess the knowledge and skills to assess conditions and activities that could impact storm water quality at the facility, and who can also evaluate the effectiveness of BMPs shall regularly inspect all areas of the facility where industrial materials or activities are exposed to storm water. These inspections are in addition to, or as part of, the comprehensive site evaluation required under Part I.D.2.d. At least one member of the Pollution Prevention Team shall participate in the routine facility inspections.

- The inspection frequency shall be specified in the plan based upon a consideration of the level of industrial activity at the facility, but shall be a minimum of quarterly unless more frequent intervals are specified elsewhere in the permit or written approval is received from the Department for less frequent intervals. At least once each calendar year, the routine facility inspection must be conducted during a period when a storm water discharge is occurring.

- Any deficiencies with implementation of the SWPPP that are found shall be corrected as soon as practicable, but not later than within 30 days of the inspection, unless permission for a later date is granted in writing by the Director. The results of the inspections shall be documented in the SWPPP, along with the date(s) and description(s) of any corrective actions that were taken in response to any deficiencies or opportunities for improvement that were identified.

vi. Employee Training

The permittee shall implement a storm water employee training program for the facility. The SWPPP shall include a schedule for all types of necessary training, and shall document all training sessions and the employees who received the training. Training shall be provided for all employees who work in areas where industrial materials or activities are exposed to storm water, and for employees who are responsible for implementing activities identified in the SWPPP (e.g., inspectors, maintenance personnel, etc.). The training shall cover the components and goals of the SWPPP, and include such topics as spill response, good housekeeping, material management practices, BMP operation and maintenance, etc. The SWPPP shall include a summary of any training performed.

vii. Sediment and Erosion Control

The plan shall identify areas at the facility that, due to topography, land disturbance (e.g., construction, landscaping, site grading), or other factors, have a potential for soil erosion. The permittee shall identify and implement structural, vegetative, and/or stabilization BMPs to prevent or control on-site and off-site erosion and sedimentation. Flow velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel if the flows would otherwise create erosive conditions.

viii. Management of Runoff

The plan shall describe the storm water runoff management practices (i.e., permanent structural BMPs) for the facility. These types of BMPs are typically used to divert, infiltrate, reuse, or otherwise reduce pollutants in storm water discharges from the site.

Structural BMPs may require a separate permit under § 404 of the CWA and the Virginia Water Protection Permit Program Regulation (9 VAC 25-210) before installation begins.

c. Maintenance

All BMPs identified in the SWPPP shall be maintained in effective operating condition. Storm water BMPs identified in the SWPPP shall be observed during active operation (i.e., during a storm water runoff event) to ensure that they are functioning correctly. Where discharge locations are inaccessible, nearby downstream locations shall be observed. The observations shall be documented in the SWPPP.

The SWPPP shall include a description of procedures and a regular schedule for preventive maintenance of all BMPs, and shall include a description of the back-up practices that are in place should a runoff event occur while a BMP is off-line. The effectiveness of nonstructural BMPs shall also be maintained by appropriate means (e.g., spill response supplies available and personnel trained, etc.). If site inspections required by Part I.D.2.b.(6)(b)(v) or Part I.D.2.d. identify BMPs that are not operating effectively, repairs or maintenance shall be performed before the next anticipated storm event. If maintenance prior to the next anticipated storm event is not possible, maintenance shall be scheduled and accomplished as soon as practicable. In the interim, back-up measures shall be employed and documented in the SWPPP until repairs or maintenance is complete. Documentation shall be kept with the SWPPP of maintenance and repairs of BMPs, including the date(s) of regular maintenance, date(s) of discovery of areas in need of repair or replacement, and for repairs, date(s) that the BMP(s) returned to full function, and the justification for any extended maintenance or repair schedules.

d. Comprehensive Site Compliance Evaluation

The permittee shall conduct comprehensive site compliance evaluations at least once a year. The evaluations shall be done by qualified personnel who possess the knowledge and skills to assess conditions and activities that could

impact storm water quality at the facility, and who can also evaluate the effectiveness of BMPs. The personnel conducting the evaluations may be either facility employees or outside constituents hired by the facility.

(1) Scope of the Compliance Evaluation

Evaluations shall include all areas where industrial materials or activities are exposed to storm water, as identified in Part I.D.2.b.(3). The personnel shall evaluate:

(a) Industrial materials, residue or trash that may have or could come into contact with storm water;

(b) Leaks or spills from industrial equipment, drums, barrels, tanks or other containers that have occurred within the past three years;

(c) Off-site tracking of industrial or waste materials or sediment where vehicles enter or exit the site;

(d) Tracking or blowing of raw, final, or waste materials from areas of no exposure to exposed areas;

(e) Evidence of, or the potential for, pollutants entering the drainage system;

(f) Evidence of pollutants discharging to surface waters at all facility outfalls, and the condition of and around the outfall, including flow dissipation measures to prevent scouring;

(g) Review of training performed, inspections completed, maintenance performed, quarterly visual examinations, and effective operation of BMPs;

(h) Results of both visual and any analytical monitoring done during the past year shall be taken into consideration during the evaluation.

(2) Based on the results of the evaluation, the SWPPP shall be modified as necessary (e.g., show additional controls on the map required by Part I.D.2.b.(2)(c); revise the description of controls required by Part I.D.2.b.(6) to include additional or modified BMPs designed to correct problems identified). Revisions to the SWPPP shall be completed within 30 days following the evaluation, unless permission for a later date is granted in writing by the Director. If existing BMPs need to be modified or if additional BMPs are necessary, implementation shall be completed before the next anticipated storm event, if practicable, but not more than 60 days after

completion of the comprehensive site evaluation, unless permission for a later date is granted in writing by the Department;

(3) Compliance Evaluation Report

A report shall be written summarizing the scope of the evaluation, name(s) of personnel making the evaluation, the date of the evaluation, and all observations relating to the implementation of the SWPPP, including elements stipulated in Part I.D.2. d.(1) (a) through (f) above. Observations shall include such things as: the location(s) of discharges of pollutants from the site; location(s) of previously unidentified sources of pollutants; location(s) of BMPs that need to be maintained or repaired; location(s) of failed BMPs that need replacement; and location(s) where additional BMPs are needed. The report shall identify any incidents of noncompliance that were observed. Where a report does not identify any incidents of noncompliance, the report shall contain a certification that the facility is in compliance with the SWPPP and this permit. The report shall be signed in accordance with Part II.K. and maintained with the SWPPP.

(4) Where compliance evaluation schedules overlap with routine inspections required under Part I.D.2. b.(6)(b)v., the annual compliance evaluation may be used as one of the routine inspections.

e. Signature and Plan Review

(1) Signature/Location

The SWPPP shall be signed in accordance with Part II.K., dated, and retained on-site at the facility covered by this permit in accordance with Part II.B.2. All other changes to the SWPPP, and other permit compliance documentation, must be signed and dated by the person preparing the change or documentation.

(2) Availability

The permittee shall make the SWPPP, annual site compliance evaluation report, and other information available to the Department upon request.

(3) Required Modifications

The Director may notify the permittee at any time that the SWPPP, BMPs, or other components of the facility's storm water program do not meet one or more of the requirements of this permit. The notification shall identify specific provisions of the permit that are not being met, and may include required modifications to the storm water program,

additional monitoring requirements, and special reporting requirements. The permittee shall make any required changes to the SWPPP within 60 days of receipt of such notification, unless permission for a later date is granted in writing by the Director, and shall submit a written certification to the Director that the requested changes have been made.

f. Maintaining an Updated SWPPP.

(1) The permittee shall review and amend the SWPPP as appropriate whenever:

(a) There is construction or a change in design, operation, or maintenance at the facility that has a significant effect on the discharge, or the potential for the discharge, of pollutants from the facility;

(b) Routine inspections or compliance evaluations determine that there are deficiencies in the BMPs;

(c) Inspections by local, state, or federal officials determine that modifications to the SWPPP are necessary;

(d) There is a spill, leak or other release at the facility; or

(e) There is an unauthorized discharge from the facility.

(2) SWPPP modifications shall be made within 30 calendar days after discovery, observation or event requiring a SWPPP modification. Implementation of new or modified BMPs (distinct from regular preventive maintenance of existing BMPs described in Part I.D.2. b.(6)(b)(iii)) shall be initiated before the next storm event if possible, but no later than 60 days after discovery, or as otherwise provided or approved by the Director. The amount of time taken to modify a BMP or implement additional BMPs shall be documented in the SWPPP.

(3) If the SWPPP modification is based on a release or unauthorized discharge, include a description and date of the release, the circumstances leading to the release, actions taken in response to the release, and measures to prevent the recurrence of such releases. Unauthorized releases and discharges are subject to the reporting requirements of Part II.G. of this permit.

3. Scrap Recycling and Waste Recycling Facilities

a. Discharges Covered Under This Section

The requirements listed under this section apply to storm water discharges associated with industrial activity from facilities that are engaged in the processing, reclaiming and wholesale distribution of scrap and waste materials such as ferrous and nonferrous metals, paper, plastic, cardboard, glass, animal hides (these types of activities are typically identified as SIC Code 5093), and facilities that are engaged in reclaiming and recycling liquid wastes such as used oil, antifreeze, mineral spirits, and industrial solvents (also identified as SIC Code 5093). Separate permit requirements have been established for recycling facilities that only receive source-separated recyclable materials primarily from non-industrial and residential sources (also identified as SIC Code 5093) (e.g., common consumer products including paper, newspaper, glass, cardboard, plastic containers, aluminum and tin cans). This includes recycling facilities commonly referred to as material recovery facilities (MRF).

b. Effluent Limitations

None applicable.

c. Analytical Monitoring

Non-source-separated facilities only: TSS, Al, Cu, Cd, Cr, Fe, Pb, Zn (SIC 5093);

d. Non-Storm Water Discharges

Discharges from turnings containment areas are not "authorized" non-storm water discharges under this section, and if present, may require additional controls and/or limitations.

e. Pollution Prevention Plan Requirements

In addition to the requirements of Part I.D.2., all facilities are required to comply with the general SWPPP requirement in this section. This part identifies the SWPPP requirements for specific types of recycling facilities. The permittee shall implement and describe in the SWPPP a program to address those items that apply. Included are lists of BMP options that, along with any functional equivalents, shall be considered for implementation. Selection or de-selection of a particular BMP or approach is up to the best professional judgment of the permittee, as long as the objective of the requirement is met.

(1) Site Description

(a) Site Map

The site map shall identify the locations where any of the following activities or sources may be exposed to precipitation/surface runoff: scrap and waste material storage, outdoor scrap and waste processing equipment, and containment areas for turnings exposed to cutting fluids.

(b) Scrap Recycling and Waste Recycling Facilities (Non-Source-Separated, Non-Liquid Recyclable Materials)

The following SWPPP special conditions have been established for facilities that receive, process and do wholesale distribution of non-liquid recyclable wastes (e.g., ferrous and nonferrous metals, plastics, glass, cardboard and paper). These facilities may receive both non-recyclable and recyclable materials. This section is not intended for those facilities that only accept recyclable materials primarily from non-industrial and residential sources.

i. Inbound Recyclable and Waste Material Control Program

The plan shall include a recyclable and waste material inspection program to minimize the likelihood of receiving materials that may be significant pollutant sources to storm water discharges. BMP options:

- Provide information/education flyers, brochures and pamphlets to suppliers of scrap and recyclable waste materials on draining and properly disposing of residual fluids prior to delivery to the facility (e.g., from vehicles and equipment engines, radiators, and transmissions, oil-filled transformers, and individual containers or drums), and on removal of mercury switches prior to delivery to the facility;
- Establish procedures to minimize the potential of any residual fluids from coming in contact with precipitation/ runoff.
- Establish procedures for accepting scrap lead-acid batteries. Additional requirements for the

handling, storage and disposal or recycling of batteries are contained in the scrap lead-acid battery program provisions in subpart (b)iv. below;

- Provide training targeted for those personnel engaged in the inspection and acceptance of inbound recyclable materials;
- Establish procedures to ensure that liquid wastes, including used oil, are stored in materially compatible and non-leaking containers and disposed or recycled in accordance with all requirements under the Resource Recovery and Conservation Act (RCRA), and other state or local requirements.

ii. Scrap and Waste Material Stockpiles/ Storage (Outdoor)

The plan shall describe measures and controls to minimize contact of storm water runoff with stockpiled materials, processed materials and non-recyclable wastes. BMP options:

- Permanent or semi-permanent covers;
- The use of sediment traps, vegetated swales and strips, catch basin filters and sand filters to facilitate settling or filtering of pollutants;
- Diversion of runoff away from storage areas via dikes, berms, containment trenches, culverts and surface grading;
- Silt fencing;
- Oil/water separators, sumps and dry adsorbents for areas where potential sources of residual fluids are stockpiled (e.g., automotive engine storage areas).

iii. Stockpiling of Turnings Exposed to Cutting Fluids (Outdoor Storage)

The plan shall implement measures necessary to minimize contact of surface runoff with residual cutting fluids. BMP options (use singularly/in combination):

- Storage of all turnings exposed to cutting fluids under some form of permanent or semi-permanent cover. Storm water discharges from these areas are permitted provided the runoff is first treated by an oil/water separator or its equivalent. Procedures to collect, handle, and dispose or recycle residual fluids that may be present shall be identified in the plan;

- Establish dedicated containment areas for all turnings that have been exposed to cutting fluids. Storm water runoff from these areas can be discharged provided: 1) the containment areas are constructed of either concrete, asphalt or other equivalent type of impermeable material; 2) there is a barrier around the perimeter of the containment areas to prevent contact with storm water run-on (e.g., berms, curbing, elevated pads, etc.); 3) there is a drainage collection system for runoff generated from containment areas; 4) there is a schedule to maintain the oil/water separator (or its equivalent); and 5) procedures are identified for the proper disposal or recycling of collected residual fluids.

iv. Scrap and Waste Material Stockpiles/ Storage (Covered or Indoor Storage)

The plan shall address measures and controls to minimize contact of residual liquids and particulate matter from materials stored indoors or under cover from coming in contact with surface runoff. BMP options:

- Good housekeeping measures, including the use of dry absorbent or wet vacuum clean up methods, to contain or dispose/recycle residual liquids originating from recyclable containers, or mercury spill kits from storage of mercury switches;

- Prohibiting the practice of allowing wash water from tipping floors or other processing areas from

discharging to the storm sewer system;

- Disconnecting or sealing off all floor drains connected to the storm sewer system.

v. Scrap and Recyclable Waste Processing Areas.

The plan shall include measures and controls to minimize surface runoff from coming in contact with scrap processing equipment. In the case of processing equipment that generate visible amounts of particulate residue (e.g., shredding facilities), the plan shall describe measures to minimize the contact of residual fluids and accumulated particulate matter with runoff (i.e., through good housekeeping, preventive maintenance, etc.). BMP options:

- A schedule of regular inspections of equipment for leaks, spills, malfunctioning, worn or corroded parts or equipment;
- A preventive maintenance program for processing equipment;
- Removal of mercury switches from the hood and trunk lighting units, and removal of anti-lock brake system units containing mercury switches;
- Use of dry-absorbents or other cleanup practices to collect and to dispose/recycle spilled/leaking fluids, or use of mercury spill kits for spills from storage of mercury switches;
- Installation of low-level alarms or other equivalent protection devices on unattended hydraulic reservoirs over 150 gallons in capacity. Alternatively, provide secondary containment with sufficient volume to contain the entire volume of the reservoir;
- Containment or diversion structures such as dikes, berms, culverts, trenches, elevated concrete pads, and grading to minimize contact of storm water runoff with outdoor processing equipment or stored materials;

- Oil/water separators or sumps;
- Permanent or semi-permanent covers in processing areas where there are residual fluids and grease;
- Retention and detention basins or ponds, sediment traps, vegetated swales or strips, to facilitate pollutant settling/ filtration;
- Catch basin filters or sand filters.

vi. Scrap Lead-Acid Battery Program

The plan shall address measures and controls for the proper handling, storage and disposal of scrap lead-acid batteries. BMP options:

- Segregate scrap lead-acid batteries from other scrap materials;
- A description of procedures and/or measures for the proper handling, storage and disposal of cracked or broken batteries;
- A description of measures to collect and dispose of leaking lead-acid battery fluid;
- A description of measures to minimize and, whenever possible, eliminate exposure of scrap lead-acid batteries to precipitation or runoff;
- A description of employee training for the management of scrap batteries.

vii. Spill Prevention and Response Procedures

The SWPPP shall include measures to minimize storm water contamination at loading/unloading areas, and from equipment or container failures. BMP options:

- Description of spill prevention and response measures to address areas that are potential sources of fluid leaks or spills;
- Immediate containment and clean up of spills/leaks. If malfunctioning equipment is responsible for the spill/leak, repairs shall also be conducted as soon as possible;

- Cleanup procedures shall be identified in the plan, including the use of dry absorbents. Where dry absorbent cleanup methods are used, an adequate supply of dry absorbent material shall be maintained on-site. Used absorbent material shall be disposed of properly;
- Drums containing liquids, especially oil and lubricants, shall be stored: indoors; in a bermed area; in over-pack containers or spill pallets; or in similar containment devices;
- Overfill prevention devices shall be installed on all fuel pumps or tanks;
- Drip pans or equivalent measures shall be placed under any leaking piece of stationary equipment until the leak is repaired. The drip pans shall be inspected for leaks and potential overflow and all liquids properly disposed of in accordance with RCRA requirements;
- An alarm and/or pump shut off system shall be installed on outdoor equipment with hydraulic reservoirs exceeding 150 gallons in order to prevent draining the tank contents in the event of a line break. Alternatively, the equipment may have a secondary containment system capable of containing the contents of the hydraulic reservoir plus adequate freeboard for precipitation. A mercury spill kit shall be used for any release of mercury from switches, anti-lock brake systems, and switch storage areas.

viii. Inspection Program

All designated areas of the facility and equipment identified in the plan shall be inspected at least monthly.

ix. Supplier Notification Program

The plan shall include a program to notify major suppliers which scrap materials will not be accepted at the facility or are only accepted under certain conditions.

(c) Waste Recycling Facilities (Liquid Recyclable Materials)

i. Waste Material Storage (Indoor)

The plan shall include measures and controls to minimize/eliminate contact between residual liquids from waste materials stored indoors and surface runoff. The plan may refer to applicable portions of other existing plans such as SPCC plans required under 40 CFR Part 112. BMP options:

- Procedures for material handling (including labeling and marking);
- A sufficient supply of dry-absorbent materials or a wet vacuum system to collect spilled or leaked materials (note: spilled or leaking mercury should never be vacuumed);
- An appropriate containment structure, such as trenches, curbing, gutters or other equivalent measures; and
- A drainage system, including appurtenances (e.g., pumps or ejectors, or manually operated valves), to handle discharges from diked or bermed areas. Drainage shall be discharged to an appropriate treatment facility, sanitary sewer system, or otherwise disposed of properly. Discharges from these areas may require coverage under a separate VPDES permit or industrial user permit under the pretreatment program.

ii. Waste Material Storage (Outdoor)

The plan shall describe measures and controls to minimize contact between stored residual liquids and precipitation or runoff. The plan may refer to applicable portions of other existing plans such as SPCC plans required under 40 CFR Part 112. Discharges of precipitation from containment areas containing used oil shall also be in accordance with applicable sections of 40 CFR Part 112. BMP options:

- Appropriate containment structures (e.g., dikes, berms, curbing, pits)

to store the volume of the largest single tank, with sufficient extra capacity for precipitation;

- Drainage control and other diversionary structures;
- For storage tanks, provide corrosion protection and/or leak detection systems; and
- Dry-absorbent materials or a wet vacuum system to collect spills.

iii Truck and Rail Car Waste Transfer Areas.

The plan shall describe measures and controls to minimize pollutants in discharges from truck and rail car loading/unloading areas. The plan shall also address measures to clean up minor spills/leaks resulting from the transfer of liquid wastes. BMP options:

- Containment and diversionary structures to minimize contact with precipitation or runoff; and
- Use of dry cleanup methods, wet vacuuming, roof coverings, or runoff controls.

iv. Inspections

Inspections shall be made monthly and shall also include all areas where waste is generated, received, stored, treated or disposed that are exposed to either precipitation or storm water runoff.

(d) Recycling Facilities (Source-Separated Materials)

The following SWPPP special conditions have been established for facilities that receive only source-separated recyclable materials primarily from non-industrial and residential sources.

i. Inbound Recyclable Material Control

The plan shall include an inbound materials inspection program to minimize the likelihood of receiving non-recyclable materials (e.g., hazardous materials) that may be a significant source of pollutants in surface runoff. BMP options:

- Provide information and education measures to inform suppliers of

recyclable materials on the types of materials that are acceptable and those that are not acceptable;

- A description of training measures for drivers responsible for pickup of recyclable materials;
- Clearly mark public drop-off containers regarding which materials can be accepted;
- Rejecting non-recyclable wastes or household hazardous wastes at the source; and
- Establish procedures for the handling and disposal of non-recyclable materials.

ii. Outdoor Storage

The plan shall include procedures to minimize the exposure of recyclable materials to surface runoff and precipitation. The plan shall include good housekeeping measures to prevent the accumulation of particulate matter and fluids, particularly in high traffic areas. BMP options:

- Provide totally-enclosed drop-off containers for the public;
- Install a sump/pump with each containment pit, and discharge collected fluids to a sanitary sewer system;
- Provide dikes and curbs for secondary containment (e.g., around bales of recyclable waste paper);
- Divert surface runoff away from outside material storage areas;
- Provide covers over containment bins, dumpsters, roll-off boxes; and
- Store the equivalent one day's volume of recyclable materials indoors.

iii. Indoor Storage and Material Processing.

The plan shall include measures to minimize the release of pollutants from indoor storage and processing areas. BMP options:

- Schedule routine good housekeeping measures for all storage and processing areas;
- Prohibit a practice of allowing tipping floor washwaters from draining to any portion of the storm sewer system; and
- Provide employee training on pollution prevention practices.

iv. Vehicle and Equipment Maintenance

The plan shall also provide for BMPs in those areas where vehicle and equipment maintenance is occurring outdoors. BMP options:

- Prohibit vehicle and equipment wash water from discharging to the storm sewer system;
- Minimize or eliminate outdoor maintenance areas, wherever possible;
- Establish spill prevention and clean-up procedures in fueling areas;
- Avoid topping off fuel tanks;
- Divert runoff from fueling areas;
- Store lubricants and hydraulic fluids indoors; and
- Provide employee training on proper, handling, storage of hydraulic fluids and lubricants.

4. Land Transportation and Warehousing

a. Discharges Covered Under This Section

The requirements listed under this section apply to storm water discharges associated with industrial activity from ground transportation facilities and rail transportation facilities (generally identified by SIC Codes 40, 41, 42, 43, and 5171), that have vehicle and equipment maintenance shops (vehicle and equipment rehabilitation, mechanical repairs, painting, fueling and lubrication) and/or equipment cleaning operations. Also covered under this section are facilities found under SIC Codes 4221 through 4225 (public warehousing and storage) that do not have vehicle and equipment maintenance shops and/or equipment cleaning operations.

b. Effluent Limitations

Not Applicable.

c. Analytical Monitoring

SIC Codes 4011, 4013, 4111-4173, 4212-4231, 4311, and 5171 - TPH, TSS

d. Non-Storm Water Discharges

Discharges of vehicle/equipment/surface wash water, including tank-cleaning operations are not "authorized" non-storm water discharges under this section, and if present, may require additional controls or limitations.

e. Pollution Prevention Plan Requirements

In addition to the requirements of Part I.D.2., the SWPPP shall include, at a minimum, the following items:

(1) Site Description

(a) Site Map

The site map shall identify the locations of any of the following activities and indicate whether the activities may be exposed to precipitation/surface runoff:

i. Fueling stations;

ii. Vehicle/equipment maintenance or cleaning areas;

iii. Storage areas for vehicle/equipment with actual or potential fluid leaks;

iv. Loading/unloading areas;

v. Areas where treatment, storage or disposal of wastes occur;

vi. Liquid storage tanks; and

vii. Processing areas; and storage areas.

(b) Summary of Potential Pollutant Source

The plan shall describe and assess the potential for the following to contribute pollutants to storm water discharges: on-site waste storage or disposal; dirt/gravel parking areas for vehicles awaiting maintenance; and fueling areas.

(2) Storm Water Controls

(a) Good Housekeeping

i. Vehicle and Equipment Storage Areas

The storage of vehicles and equipment awaiting maintenance with actual or potential fluid leaks shall be confined to designated areas (delineated on the site map). The permittee shall consider the following measures (or their equivalents):

- The use of drip pans under vehicles and equipment;
- Indoor storage of vehicles and equipment;
- Installation of berms or dikes;
- Use of absorbents;
- Roofing or covering storage areas; and
- Cleaning pavement surface to remove oil and grease.

ii. Fueling Areas

The permittee shall describe and implement measures that prevent or minimize contamination of the storm water runoff from fueling areas. The permittee shall consider the following measures (or their equivalents):

- Covering the fueling area;
- Using spill/overflow protection and cleanup equipment;
- Minimizing storm water run-on/runoff to the fueling area;
- Using dry cleanup methods; and
- Treating and/or recycling collected storm water runoff.

iii. Material Storage Areas

Storage vessels of all materials (e.g., for used oil/oil filters, spent solvents, paint wastes, hydraulic fluids) shall be maintained in good condition, so as to prevent contamination of storm water, and plainly labeled (e.g., "used oil," "spent solvents," etc.). The permittee shall consider the following measures (or their equivalents):

- Indoor storage of the materials;
- Installation of berms/dikes around the areas, minimizing runoff of storm water to the areas;
- Using dry cleanup methods; and
- Treating and/or recycling the collected storm water runoff.

iv. Vehicle and Equipment Cleaning Areas

The permittee shall describe and implement measures that prevent or minimize contamination of storm water runoff from all areas used for vehicle/equipment cleaning. The permittee shall consider the following measures (or their equivalents):

- Performing all cleaning operations indoors; covering the cleaning operation;
- Ensuring that all washwaters drain to a proper collection system (i.e., not the storm water drainage system unless VPDES permitted); and
- Treating and/or recycling the collected storm water runoff.

v. Vehicle and Equipment Maintenance Areas

The permittee shall describe and implement measures that prevent or minimize contamination of the storm water runoff from all areas used for vehicle/equipment maintenance. The permittee shall consider the following measures or equivalents:

- Performing maintenance activities indoors; using drip pans;
- Keeping an organized inventory of materials used in the shop;
- Draining all parts of fluids prior to disposal;
- Prohibiting wet clean up practices where the practices would result in the discharge of pollutants to storm water drainage systems;
- Using dry cleanup methods;
- Treating and/or recycling collected storm water runoff; and
- Minimizing run-on/runoff of storm water to maintenance areas.

vi. Locomotive Sanding (Loading Sand for Traction) Areas

The plan shall describe measures that prevent or minimize contamination of the storm water runoff from areas used for locomotive sanding.

The permittee shall consider the following measures (or their equivalents):

- Covering sanding areas;
- Minimizing storm water run-on/runoff; or
- Appropriate sediment removal practices to minimize the off-site transport of sanding material by storm water.

(b) Routine Facility Inspections

The following areas/activities shall be included in all inspections:

i. Storage area for vehicles/equipment awaiting maintenance;

ii. Fueling areas;

iii. Indoor and outdoor vehicle/equipment maintenance areas;

iv. Material storage areas;

v. Vehicle/equipment cleaning areas; and

vi. Loading/unloading areas.

(c) Employee Training

Employee training shall take place, at a minimum, annually (once per calendar year). Employee training shall address the following, as applicable:

i. Used oil/spent solvent management;

ii. Fueling procedures;

iii. General good housekeeping practices;

iv. Proper painting procedures; and

v. Used battery management.

5. Water Transportation, Ship and Boat Building or Repair Yards, and Tenants and Contractors Performing Similar Activities

a. Discharges covered under this section

The requirements listed under this section apply to storm water discharges associated with industrial activity from water transportation facilities (generally identified by SIC Major Group 44), that have vehicle (vessel) maintenance shops and/or equipment cleaning operations. The water transportation industry includes facilities engaged in foreign or domestic transport of freight or passengers in deep sea or inland waters; marine cargo

handling operations; ferry operations; towing and tugboat services; and marinas.

In addition, the requirements listed under this section also apply to storm water discharges associated with industrial activity from facilities engaged in ship building and repairing and boat building and repairing (SIC Code 373). According to the U.S. Coast Guard, a vessel 65 feet or greater in length is referred to as a ship and a vessel smaller than 65 feet is a boat.

The term "yard", as used in this section, refers to any shore-side location(s) at Naval Station Norfolk where vessels, boats, barges, or other similar water-borne craft are stored, maintained, repaired, and/or fabricated.

b. Effluent Limitations

Not applicable.

c. Analytical Monitoring

(1) SIC Codes 4412-4499 - Al, Fe, Zn

(2) SIC codes 3731, 3732 - TSS

d. Non-Storm Water Discharges

Consistent with the requirements of Part I.B.7.c., The following discharges are not "authorized" non-storm water discharges under this section, and if present, may require additional controls and/or limitations:

(1) Bilge and ballast water;

(2) Sanitary wastes;

(3) Pressure wash water; and

(4) Cooling water originating from vessels.

e. Pollution Prevention Plan Requirements

In addition to the requirements of Part I.D.2., the SWPPP shall include, at a minimum, the following items:

(1) Site Description.

(a) Site Map

The site map shall identify the locations where any of the following activities may be exposed to precipitation/surface runoff:

i. Fueling;

ii. Engine maintenance/repair;

iii. Vessel maintenance/repair;

iv. Pressure washing;

v. Painting;

vi. Sanding;

vii. Blasting;

viii. Welding;

ix. Metal fabrication;

x. Loading/unloading areas;

xi. Locations used for the treatment, storage or disposal of wastes;

xii. Liquid storage tanks;

xiii. Liquid storage areas (e.g., paint, solvents, resins); and

xiv. Material storage areas (e.g., blasting media, aluminum, steel, scrap iron).

(b) Summary of Potential Pollutant Sources

The plan shall describe the following additional sources and activities that have potential pollutants associated with them:

i. Outdoor manufacturing or processing activities (i.e., welding, metal fabricating); and

ii. Significant dust or particulate generating processes (e.g., abrasive blasting, sanding, painting).

(2) Storm Water Controls

(a) Good Housekeeping Measures

i. Pressure Washing Area

If pressure washing is used to remove marine growth from vessels, the discharge water must be permitted as a process wastewater by a separate VPDES permit. The SWPPP shall describe: the measures to collect or contain the discharge from the pressure washing area(s); the method for the removal of the visible solids; the methods of disposal of the collected solids; and where the discharge will be released.

ii. Blasting and Painting Areas

The permittee shall describe and implement measures to prevent spent abrasives, paint chips and overspray from discharging into the receiving waterbody or the storm sewer system. To prevent the discharge of contaminants, the permittee shall consider containing all blasting/painting

activities, or using other methods, such as hanging plastic barriers or tarpaulins during blasting or painting operations to contain debris. The plan shall include a schedule for regularly cleaning storm systems to remove deposits of abrasive blasting debris and paint chips. The plan shall include any standard operating practices with regard to blasting and painting activities, such as the prohibition of uncontained blasting/painting over open water or the prohibition of blasting/painting during windy conditions that can render containment ineffective.

iii. Material Storage Areas

All containerized materials (e.g., fuels, paints, solvents, waste oil, antifreeze, batteries) shall be plainly labeled and stored in a protected, secure location away from drains. The permittee shall describe and implement measures to prevent or minimize the contamination of precipitation/surface runoff from the storage areas. The plan shall specify which materials are stored indoors and consider containment or enclosure for materials that are stored outdoors. The permittee shall consider implementing an inventory control plan to limit the presence of potentially hazardous materials on-site. Where abrasive blasting is performed, the plan shall specifically include a discussion on the storage and disposal of spent abrasive materials generated at the facility.

iv. Engine Maintenance and Repair Areas

The permittee shall describe and implement measures to prevent or minimize contamination of precipitation/surface runoff from all areas used for engine maintenance and repair. The permittee shall consider the following measures (or their equivalent):

- Performing all maintenance activities indoors; maintaining an organized inventory of materials used in the shop; draining all parts of fluids prior to disposal;

- Prohibiting the practice of hosing down the shop floor;
- Using dry cleanup methods; and
- Treating and/or recycling storm water runoff collected from the maintenance area.

v. Material Handling Areas

The permittee shall describe and implement measures to prevent or minimize contamination of precipitation/surface runoff from material handling operations and areas (e.g., fueling, paint and solvent mixing, disposal of process wastewater streams from vessels). The permittee shall consider the following measures (or their equivalents):

- Covering fueling areas; using spill/overflow protection; mixing paints and solvents in a designated area (preferably indoors or under a shed); and
- Minimizing run-on of storm water to material handling areas.

vi. Dry-dock Activities

The industrial operations of, and process wastewater discharges from, floating drydocks, graving drydocks, conventional and Crandall marine railways are not authorized activities under this permit. Should the permittee desire to site and operate any of those vessel hauling, repair, and maintenance systems at Naval Station Norfolk, this permit shall be modified or, alternatively, revoked and reissued to incorporate appropriate limitations and effluent monitoring requirements.

vii. General Yard Area

The plan shall include a schedule for routine yard maintenance and cleanup. Scrap metal, wood, plastic, miscellaneous trash, paper, glass, industrial scrap, insulation, welding rods, packaging, etc., shall be routinely removed from the general yard area.

(b) Preventative Maintenance

As part of the facility's preventive maintenance program, storm water management devices shall be inspected and maintained in a timely manner (e.g., oil/water separators and sediment traps cleaned to ensure that spent abrasives, paint chips and solids are intercepted and retained prior to entering the storm drainage system). Facility equipment and systems shall also be inspected and tested to uncover conditions that could cause breakdowns or failures resulting in discharges of pollutants to surface waters.

(c) Routine Facility Inspections

The following areas shall be included in all monthly inspections:

i. Pressure washing area;

ii. Blasting, sanding, and painting areas;

iii. Material storage areas;

iv. Engine maintenance and repair areas;

v. Material handling areas; and

vi. General yard area.

(d) Employee Training

Training shall address, at a minimum, the following activities (as applicable):

i. Used oil management;

ii. Spent solvent management;

iii. Disposal of spent abrasives;

iv. Disposal of vessel wastewaters;

v. Spill prevention and control;

vi. Fueling procedures;

vii. General good housekeeping practices;

viii. Painting and blasting procedures; and

ix. Used battery management.

(e) Comprehensive Site Compliance Evaluation

The permittee shall conduct regularly scheduled evaluations at least once a year and address those areas contributing to a storm water discharge associated with industrial activity (e.g., pressure washing area, blasting/sanding areas, painting areas, material storage areas, engine maintenance/repair areas, and material handling areas. These sources shall be

inspected for evidence of, or the potential for, pollutants entering the drainage system.

6. Air Transportation.

a. Discharges Covered Under This Section

The requirements listed under this section apply to storm water discharges associated with industrial activity from air transportation facilities including airports, airport terminal services, air transportation (scheduled and nonscheduled), flying fields, air courier services, and establishments engaged in operating and maintaining airports, and servicing, repairing or maintaining aircraft (generally classified under SIC Code 45), which have vehicle maintenance shops, material handling facilities, equipment cleaning operations or airport and/or aircraft deicing/anti-icing operations. For the purpose of this section, the term "deicing" is defined as the process to remove frost, snow, or ice and "anti-icing" is the process which prevents the accumulation of frost, snow, or ice. Only those portions of the facility that are either involved in vehicle maintenance (including vehicle rehabilitation, mechanical repairs, painting, fueling, and lubrication), equipment cleaning operations, or deicing/ anti-icing operations are addressed under this section.

b. Effluent Limitations

Not applicable.

c. Analytical Monitoring.

Facilities at airports that use 100,000 gallons of glycol-based deicing/anti-icing chemicals and/or 100 tons of urea on an average annual basis, monitor only those outfalls from the airport facility that collect runoff from areas where deicing/anti-icing activities occur (SIC 45): pH, TSS, BOD_5, COD, and TKN.

d. Non-Storm Water Discharges

The following discharges are not "authorized" non-storm water discharges under this section, and if present, may require additional controls and/or limitations:

(1) Aircraft, ground vehicle, runway and equipment washwaters; and

(2) Dry weather discharges of deicing/anti-icing chemicals.

e. Releases of Reportable Quantities of Hazardous Substances and Oil

If an airport authority is the sole permittee, then the sum total of all spills at the airport shall be assessed against the reportable quantity. If the airport authority is a co-permittee with other deicing/anti-icing operators

at the airport, such as numerous different airlines, the assessed amount shall be the summation of spills by each co-permittee. If separate, distinct individual permittees exist at the airport, then the amount spilled by each separate permittee shall be the assessed amount for the reportable quantity determination.

f. Pollution Prevention Plan Requirements

SWPPPs developed for areas of the facility occupied by tenants of the airport shall be integrated with the plan for the entire airport. For the purposes of this permit, tenants of the airport facility include airline passenger or cargo companies, fixed based operators and other parties who have contracts with the airport authority to conduct business operations on airport property and whose operations result in storm water discharges associated with industrial activity. In addition to the requirements of Part I.D.2., the SWPPP shall include, at a minimum, the following items:

(1) Site Description

(a) Site Map

The site map shall identify the location of the following activities and indicate any of the activities that may be exposed to precipitation/surface runoff:

i. Aircraft and runway deicing/anti-icing operations;

ii. Fueling stations;

iii. Aircraft, ground vehicle and equipment maintenance/cleaning areas; and

iv. Storage areas for aircraft, ground vehicles and equipment awaiting maintenance.

(b) Summary of Potential Pollutant Sources

The plan shall include a narrative description of the potential pollutant sources from the following activities:

i. Aircraft, runway, ground vehicle and equipment maintenance and cleaning; and

ii. Aircraft and runway deicing/anti-icing operations (including apron and centralized aircraft deicing/anti-icing stations, runways, taxiways and ramps). Facilities which conduct deicing/anti-icing operations shall maintain a record of the types (including the Material Safety Data Sheets (MSDS)) and monthly quantities of deicing/anti-icing chemicals

used, either as measured amounts, or in the absence of metering, as estimated amounts. This includes all deicing/anti-icing chemicals, not just glycols and urea (e.g., potassium acetate). Tenants and fixed-base operators who conduct deicing/anti-icing operations shall provide the above information to the airport authority for inclusion in the storm water pollution prevention plan for the entire facility.

The SWPPP shall define the average seasonal timeframe (e.g., December-February, October-March, etc.) during which deicing activities typically occur at the facility. Implementation of BMPs, facility inspections and monitoring shall be conducted with particular emphasis throughout the defined deicing season.

(2) Storm Water Controls

(a) Good Housekeeping

i. Aircraft, Ground Vehicle and Equipment Maintenance Areas

The permittee shall describe and implement measures that prevent or minimize the contamination of storm water runoff from all areas used for aircraft, ground vehicle and equipment maintenance (including the maintenance conducted on the terminal apron and in dedicated hangars). The following practices (or their equivalents) shall be considered:

- Performing maintenance activities indoors;
- Maintaining an organized inventory of materials used in the maintenance areas; draining all parts of fluids prior to disposal;
- Preventing the practice of hosing down the apron or hangar floor;
- Using dry cleanup methods; and
- Collecting the storm water runoff from the maintenance area and providing treatment or recycling.

ii. Aircraft, Ground Vehicle and Equipment Cleaning Areas

Permittees shall ensure that cleaning of equipment is conducted in designated areas only and clearly identify these areas on the ground and delineate them on the site map. The permittee shall describe and implement measures that prevent or minimize the contamination of the storm water runoff from cleaning areas.

iii. Aircraft, Ground Vehicle and Equipment Storage Areas

The storage of aircraft, ground vehicles and equipment awaiting maintenance shall be confined to designated areas (delineated on the site map). The following BMPs (or their equivalents) shall be considered:

- Indoor storage of aircraft and ground vehicles;
- The use of drip pans for the collection of fluid leaks; and
- Perimeter drains, dikes or berms surrounding storage areas.

iv. Material Storage Areas

Storage vessels of all materials (e.g., used oils, hydraulic fluids, spent solvents, and waste aircraft fuel) shall be maintained in good condition, so as to prevent or minimize contamination of storm water, and plainly labeled (e.g., "used oil," "Contaminated Jet A," etc.). The permittee shall describe and implement measures that prevent or minimize contamination of precipitation/runoff from storage areas. The following BMPs or their equivalents shall be considered:

- Indoor storage of materials;
- Centralized storage areas for waste materials; and
- Installation of berms/dikes around storage areas.

v. Airport Fuel System and Fueling Areas

The permittee shall describe and implement measures that prevent or minimize the discharge of fuels to the storm sewer/surface waters resulting from fuel

servicing activities or other operations conducted in support of the airport fuel system. The following BMPs (or their equivalents) shall be considered:

- Implementing spill and overflow practices (e.g., placing absorptive materials beneath aircraft during fueling operations);
- Using dry cleanup methods; and
- Collecting the storm water runoff.

(3) Source Reduction

Owners who conduct deicing/anti-icing operations shall consider alternatives to the use of urea and glycol-based deicing/anti-icing chemicals to reduce the aggregate amount of deicing/anti-icing chemicals used and/or lessen the environmental impact. Chemical options to replace ethylene glycol, propylene glycol and urea include: potassium acetate; magnesium acetate; calcium acetate; anhydrous sodium acetate.

(a) Runway Deicing Operations

Owners shall evaluate present application rates to ensure against excessive over application by analyzing application rates and adjusting as necessary, consistent with considerations of flight safety. Also the following BMP options shall be considered (or their equivalents):

i. Metered application of chemicals;

ii. Pre-wetting dry chemical constituents prior to application;

iii. Installation of runway ice detection systems; and

iv. Implementing anti-icing operations as a preventive measure against ice buildup.

(b) Aircraft Deicing/Anti-Icing Operations

Owners shall determine whether excessive application of deicing/anti-icing chemicals occurs, and adjust as necessary, consistent with considerations of flight safety. This evaluation shall be carried out by the personnel most familiar with the particular aircraft and flight operations in question (versus an outside entity such as the airport authority). The use of alternative deicing/anti-icing agents as well as containment measures for all applied chemicals

shall be considered. Also, the following BMP options (or their equivalents) shall be considered for reducing deicing fluid use:

i. Forced-air deicing systems;

ii. Computer-controlled fixed-gantry systems;

iii. Infrared technology;

iv. Hot water;

v. Varying glycol content to air temperature;

vi. Enclosed-basket deicing trucks;

vii. Mechanical methods;

viii. Solar radiation;

ix. Hangar storage;

x. Aircraft covers; and

xi. Thermal blankets for MD-80s/DC-9s.

The use of ice-detection systems and airport traffic flow strategies and departure slot allocation systems shall also be considered.

(c) Management of Runoff

Where deicing/anti-icing operations occur, owners shall describe and implement a program to control or manage contaminated runoff to reduce the amount of pollutants being discharged from the site. The plan shall describe the controls used for collecting or containing contaminated melt water from collection areas used for disposal of contaminated snow. The following BMPs (or their equivalents) shall be considered:

i. Establishing a dedicated deicing facility with a runoff collection/recovery system;

ii. Using vacuum/collection trucks;

iii. Storing contaminated storm water/deicing fluids in tanks and releasing controlled amounts to a publicly owned treatment works;

iv. Collecting contaminated runoff in a wet pond for natural decomposition (be aware of attracting wildlife that may be hazardous to flight operations); and

v. Directing runoff into vegetative swales or other infiltration measures.

The plan shall consider the recovery of deicing/anti-icing materials when these materials are applied during non-precipitation events (e.g., covering storm sewer inlets, using booms, installing absorptive interceptors in the drains, etc.) to prevent these materials from later becoming a source of storm water contamination. Used deicing fluid shall be recycled whenever possible.

(d) Routine Facility Inspections

The inspection frequency shall be specified in the plan. At a minimum, inspections shall be conducted once per month during deicing/anti-icing season (e.g., October through April for most airports). If deicing occurs before or after this period, the inspections shall be expanded to include all months during which deicing chemicals may be used. Also, if significantly or deleteriously large quantities of deicing chemicals are being spilled or discharged, or if water quality impacts have been reported, the inspection frequency shall be increased to weekly until such time as the chemical spills/discharges or impacts are reduced to acceptable levels. The Director may specifically require increased inspections and the SWPPP to be reevaluated as necessary.

(e) Comprehensive Site Compliance Evaluation.

The annual site compliance evaluations shall be conducted by qualified facility personnel during periods of actual deicing operations, if possible. If not practicable during active deicing or if the weather is too inclement, the evaluations shall be conducted when deicing operations are likely to occur and the materials and equipment for deicing are in place.

7. Transportation Equipment, Industrial or Commercial Machinery

a. Discharges Covered Under This Section

The requirements listed under this section apply to storm water discharges associated with industrial activity from transportation equipment, industrial or commercial machinery manufacturing facilities (commonly described by SIC Major Group 35 [except SIC Code 357], and SIC Major Group 37 [except SIC Code 373]).

b. Effluent Limitations

Not applicable.

c. Analytical Monitoring

Not applicable

d. Pollution Prevention Plan Requirements

In addition to the requirements of Part I.D.2., the SWPPP shall include, at a minimum, the following items:

(1) Site Description

(a) Site Map

The site map shall identify where any of the following may be exposed to precipitation/ surface runoff: vents and stacks from metal processing and similar operations.

(2) Storm Water Controls

(a) Non-Storm Water Discharges

For facilities that discharge wastewater, other than solely domestic wastewater, to the sanitary sewer system, the permittee shall notify the operator of the sanitary sewer and associated treatment works of its discharge. In such cases, a copy of a notification letter shall be attached to the plan. Any specific permit conditions shall be considered in the plan.

CONDITIONS APPLICABLE TO ALL VPDES PERMITS

A. Monitoring

1. Samples and measurements taken as required by this permit shall be representative of the monitored activity.

2. Monitoring shall be conducted according to procedures approved under Title 40 Code of Federal Regulations Part 136 or alternative methods approved by the U.S. Environmental Protection Agency, unless other procedures have been specified in this permit.

3. The permittee shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will insure accuracy of measurements.

B. Records

1. Records of monitoring information shall include:

   a. The date, exact place, and time of sampling or measurements;

   b. The individual(s) who performed the sampling or measurements;

   c. The date(s) and time(s) analyses were performed;

   d. The individual(s) who performed the analyses;

   e. The analytical techniques or methods used; and

   f. The results of such analyses.

2. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years, the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period of retention shall be extended automatically during the course of any unresolved litigation regarding the regulated activity or regarding control standards applicable to the permittee, or as requested by the Board.

C. Reporting Monitoring Results

1. The permittee shall submit the results of the monitoring required by this permit not later than the 10th day of the month after monitoring takes place, unless another reporting schedule is specified elsewhere in this permit. Monitoring results shall be submitted to:

Department of Environmental Quality
Tidewater Regional Office
5636 Southern Boulevard
Virginia Beach, VA 23462

2. Monitoring results shall be reported on a Discharge Monitoring Report (DMR) or on forms provided, approved or specified by the Department.

3. If the permittee monitors any pollutant specifically addressed by this permit more frequently than required by this permit using test procedures approved under Title 40 of the Code of Federal Regulations Part 136 or using other test procedures approved by the U.S. Environmental Protection Agency or using procedures specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or reporting form specified by the Department.

4. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.

D. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Board may require the permittee to furnish, upon request, such plans, specifications, and other pertinent information as may be necessary to determine the effect of the wastes from his discharge on the quality of state waters, or such other information as may be necessary to accomplish the purposes of the State Water Control Law. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

E. Compliance Schedule Reports

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. Unauthorized Discharges

Except in compliance with this permit, or another permit issued by the Board, it shall be unlawful for any person to:

1. Discharge into state waters sewage, industrial wastes, other wastes, or any noxious or deleterious substances; or

2. Otherwise alter the physical, chemical or biological properties of such state waters and make them detrimental to the public health, or to animal or aquatic life, or to the use of such waters for domestic or industrial consumption, or for recreation, or for other uses.

G. Reports of Unauthorized Discharges

Any permittee who discharges or causes or allows a discharge of sewage, industrial waste, other wastes or any noxious or deleterious substance into or upon state waters in violation of Part II F; or who discharges or causes or allows a discharge that may reasonably be expected to enter state waters in violation of Part II F, shall notify the Department of the discharge immediately upon discovery of the discharge, but in no case later than 24 hours after said discovery. A written report of the unauthorized discharge shall be submitted to the Department, within five days of discovery of the discharge. The written report shall contain:

1. A description of the nature and location of the discharge;
2. The cause of the discharge;
3. The date on which the discharge occurred;
4. The length of time that the discharge continued;
5. The volume of the discharge;
6. If the discharge is continuing, how long it is expected to continue;
7. If the discharge is continuing, what the expected total volume of the discharge will be; and
8. Any steps planned or taken to reduce, eliminate and prevent a recurrence of the present discharge or any future discharges not authorized by this permit.

Discharges reportable to the Department under the immediate reporting requirements of other regulations are exempted from this requirement.

H. Reports of Unusual or Extraordinary Discharges

If any unusual or extraordinary discharge including a bypass or upset should occur from a treatment works and the discharge enters or could be expected to enter state waters, the permittee shall promptly notify, in no case later than 24 hours, the Department by telephone after the discovery of the discharge. This notification shall provide all available details of the incident, including any adverse affects on aquatic life and the known number of fish killed. The permittee shall reduce the report to writing and shall submit it to the Department within five days of discovery of the discharge in accordance with Part II I 2. Unusual and extraordinary discharges include but are not limited to any discharge resulting from:

1. Unusual spillage of materials resulting directly or indirectly from processing operations;
2. Breakdown of processing or accessory equipment;
3. Failure or taking out of service some or all of the treatment works; and
4. Flooding or other acts of nature.

I. Reports of Noncompliance

The permittee shall report any noncompliance which may adversely affect state waters or may endanger public health.

1. An oral report shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which shall be reported within 24 hours under this paragraph:

   a. Any unanticipated bypass; and

   b. Any upset which causes a discharge to surface waters.

2. A written report shall be submitted within 5 days and shall contain:

   a. A description of the noncompliance and its cause;

   b. The period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and

   c. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

   The Board may waive the written report on a case-by-case basis for reports of noncompliance under Part II I if the oral report has been received within 24 hours and no adverse impact on state waters has been reported.

3. The permittee shall report all instances of noncompliance not reported under Parts II I 1 or 2, in writing, at the time the next monitoring reports are submitted. The reports shall contain the information listed in Part II I 2.

NOTE: The immediate (within 24 hours) reports required in Parts II G, H and I may be made to the Department's Regional Office at (757) 518-2000 (voice), and online via http://www.deq.virginia.gov/prep/h2rpt.html . For reports outside normal working hours, leave a message and this shall fulfill the immediate reporting requirement. For emergencies, the Virginia Department of Emergency Services maintains a 24 hour telephone service at 1-800-468-8892.

J. Notice of Planned Changes

1. The permittee shall give notice to the Department as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

   a. The permittee plans alteration or addition to any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced:

      (1) After promulgation of standards of performance under Section 306 of Clean Water Act which are applicable to such source; or

(2) After proposal of standards of performance in accordance with Section 306 of Clean Water Act which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal;

b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations nor to notification requirements specified elsewhere in this permit; or

c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

2. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

K. Signatory Requirements

1. Applications. All permit applications shall be signed as follows:

a. For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (i) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

c. For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this section, a

principal executive officer of a public agency includes: (i) The chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.

2. Reports, etc. All reports required by permits, and other information requested by the Board shall be signed by a person described in Part II K 1, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Part II K 1;

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

   c. The written authorization is submitted to the Department.

3. Changes to Authorization. If an authorization under Part II K 2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part II K 2 shall be submitted to the Department prior to or together with any reports, or information to be signed by an authorized representative.

4. Certification. Any person signing a document under Parts II K 1 or 2 shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

L. Duty to Comply

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the State Water Control Law and the Clean Water Act, except that noncompliance with certain provisions of this permit may constitute a violation of the State Water Control Law but not the Clean Water Act. Permit

noncompliance is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if this permit has not yet been modified to incorporate the requirement.

M. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee shall apply for and obtain a new permit. All permittees with a currently effective permit shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Board. The Board shall not grant permission for applications to be submitted later than the expiration date of the existing permit.

N. Effect of a Permit

This permit does not convey any property rights in either real or personal property or any exclusive privileges, nor does it authorize any injury to private property or invasion of personal rights, or any infringement of federal, state or local law or regulations.

O. State Law

Nothing in this permit shall be construed to preclude the institution of any legal action under, or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any other state law or regulation or under authority preserved by Section 510 of the Clean Water Act. Except as provided in permit conditions on "bypassing" (Part II U), and "upset" (Part II V) nothing in this permit shall be construed to relieve the permittee from civil and criminal penalties for noncompliance.

P. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Sections 62.1-44.34:14 through 62.1-44.34:23 of the State Water Control Law.

Q. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes effective plant performance, adequate funding, adequate staffing, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary

facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

R. Disposal of Solids or Sludges

Solids, sludges or other pollutants removed in the course of treatment or management of pollutants shall be disposed of in a manner so as to prevent any pollutant from such materials from entering state waters.

S. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

T. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

U. Bypass

1. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts II U 2 and U 3.

2. Notice

   a. Anticipated bypass. If the permittee knows in advance of the need for a bypass, prior notice shall be submitted, if possible at least ten days before the date of the bypass.

   b. Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Part II I.

3. Prohibition of Bypass

   a. Bypass is prohibited, and the Board may take enforcement action against a permittee for bypass, unless:

      (1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

      (2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The permittee submitted notices as required under Part II U 2.

b. The Board may approve an anticipated bypass, after considering its adverse effects, if the Board determines that it will meet the three conditions listed above in Part II U 3 a.

V. Upset

1. An upset constitutes an affirmative defense to an action brought for noncompliance with technology based permit effluent limitations if the requirements of Part II V 2 are met. A determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is not a final administrative action subject to judicial review.

2. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the permittee can identify the cause(s) of the upset;

b. The permitted facility was at the time being properly operated;

c. The permittee submitted notice of the upset as required in Part II I; and

d. The permittee complied with any remedial measures required under Part II S.

In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

W. Inspection and Entry

The permittee shall allow the Director, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act and the State Water Control Law, any substances or parameters at any location.

For purposes of this section, the time for inspection shall be deemed reasonable during regular business hours, and whenever the facility is discharging. Nothing contained herein shall make an inspection unreasonable during an emergency.

X. Permit Actions

Permits may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

Y. Transfer of Permits

1. Permits are not transferable to any person except after notice to the Department. Except as provided in Part II Y 2, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued, or a minor modification made, to identify the new permittee and incorporate such other requirements as may be necessary under the State Water Control Law and the Clean Water Act.

2. As an alternative to transfers under Part II Y 1, this permit may be automatically transferred to a new permittee if:

   a. The current permittee notifies the Department at least 30 days in advance of the proposed transfer of the title to the facility or property;

   b. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

   c. The Board does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in Part II Y 2 b.

Z. Severability

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

Appendix I

Wildlife Management

Enclosure 1 **Commander, Navy Region Mid-Atlantic Instruction (COMNAVREG MIDLANT INST) 11015.1 (Fishing)**

Enclosure 2 **Hunting Regulations and Information**

Enclosure 3 **Deer Harvest Data**

Enclosure 4 **Kill Permit**

Enclosure 5 **Commander, Navy Region Mid-Atlantic Instruction COMNAVREG MIDLANT INST) 11015.3 (Natural Resources Management for Fish and Wildlife, Feral Animals, Invasive Species, and Certain Pests)**

Enclosure 6 **Chief of Naval Operations (CNO) Policy Letter on Feral Cats and Dogs**

Enclosure 7 **Pollinator-Friendly Management**

Enclosure 8 **Nuisance Coyote & Nutria Management Plan**

Enclosure 9 **Navy Integrated Pest Management Plan**

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Enclosure 1. Commander, Navy Region Mid-Atlantic Instruction 5090.4 (Fishing)

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DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL SUPPORT ACTIVITY HAMPTON ROADS
7918 BLANDY ROAD SUITE 100
NORFOLK, VA 23551-2419

NAVSUPPACTHRINST 5090.4
N4
10 Jul 20

NAVSUPPACT HAMPTON ROADS INSTRUCTION 5090.4

From: Commanding Officer, Naval Support Activity Hampton Roads

Subj: FISHING PROGRAM

Ref: (a) 32 C.F.R. Section 190
(b) DODINST 4715.3
(c) OPNAVINST 5090.1(Series)
(d) Installation Natural Resource Management Plan
(e) P.L. 105-85 (Sikes Act Improvement Amendments of 1997)
(f) E.O. 12962
(g) Virginia Freshwater and Saltwater Fishing Regulations

Encl: (1) Installation Fishing Areas
(2) Example Permit
(3) Installation Waiver

1. Purpose. This instruction sets forth the authority, responsibilities, procedures, and policies for fishing on board Naval Support Activity (NAVSUPPACT) Hampton Roads Portsmouth Annex (PA) and Northwest Annex (NWA) at the locations in enclosure (1).

2. Policy

a. References (a) through (g) allow for recreational fisheries management on military installations, consistent with military requirements.

b. Violations of reference (g) or this instruction may result in suspension or revocation of NWA and/or PA fishing privileges. Department of Defense (DoD) law enforcement and/or Environmental Division personnel are authorized by the Commanding Officer (CO) to suspend a fishing permit until adjudication by the Legal Officer.

3. Definitions

a. Fishing. Refers to the harvest or attempted harvest of finfish species for sport or self-consumption.

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Any misuse or unauthorized disclosure may result in both civil and criminal penalties

b. Catch and Release. Practice within recreational fishing intended as a technique of conservation. After capture, the fish are unhooked and returned to the water.

c. Tidal Waters (Saltwater). Tidal waters include the shorelines of the Elizabeth River along the seawall at PA.

4. Responsibilities

a. Environmental Division. The Environmental Division, part of the Public Works Department, has a Natural Resources (NR) branch responsible for the management of fish and wildlife resources, including management and approval of fishing locations; and enforcement of federal, state, and local fish and wildlife laws and regulations.

b. Public Safety Department. Law Enforcement Division personnel will provide assistance and support to NR staff and Conservation Officers with state law enforcement issues upon request and where applicable. Installation security officers have the power to apprehend and arrest violators for violations occurring at places over which the Navy has law enforcement jurisdiction.

c. Anglers

1. All personnel who exercise their privilege to fish onboard PA and NWA are responsible for complying with this instruction and abide by all Federal and State statutes and regulations incorporated herein by reference, and directives of NR staff.

2. Rec Access. Each user must set up an account within Rec Access at nwa.recaccess.com. After registering, users will be given a Rec Access ID Number ("RAID #") which will be unique to each individual angler. Accounts previously created are still valid.

d. Base Personnel. Military and civilian personnel who observe or acquire credible information concerning violations of fish and wildlife laws and regulations, and this instruction, shall report information to the installation NR Manager.

5. Regulations and Procedures

a. Authorized Personnel. For reasons of safety and security, and pending changes in Force Protection Condition (FPCON) constraints, the following persons are authorized to

fish on PA and NWA with proper credentials (Common Access Card (CAC), military/civilian retiree, and/or dependent identification card) must be carried at all times and presented to security personnel, NR staff, or their representatives when requested. The authorized personnel include:

(1) Active duty military personnel, with current DoD CAC

(2) Retired military personnel, with DD Form 2 (Retired)

(3) Dependents of active duty/retired military personnel, with current DD Form 1173

(4) Active and retired federal civil service employees, with a current CAC/retiree CAC

If allowable under existing FPCON, authorized patrons may be accompanied by two guests. All guests must adhere to applicable fish and wildlife laws and regulations, and this instruction. Sponsors are responsible for their guests and must accompany them at all times.

b. Permit. An installation permit is required in order to fish on NWA and PA; all patrons over the age of 18 and guests are required to purchase an installation fishing permit. Permits are available through the online Rec Access website at nwa.recaccess.com. The permit provides fishing access to PA and NWA only. Possession of an installation permit does not authorize access to the installation, convey, or bestow any other rights or privileges in enclosure (2).

c. Installation Waiver. Enclosure (3) is the acceptance of responsibility in the event an injury occurs while fishing on the installation and required prior to purchasing/signature of a permit.

d. License. All patrons and guests must comply with Virginia State fishing regulations and licensing requirements. Dependents and guests under the age of 12 must be directly supervised by an adult 18 years or older who holds a valid fishing license.

e. Fishing Regulations. Reference (g) outlines state specific rules and regulations. Violators will be held accountable.

(1) Hook and line, and rod and reel are the only lawful methods of take.

(2) Cast nets and trot lines are prohibited.

(3) It is prohibited to use life fish as bait or release any species of fish into managed ponds at NWA, except fish caught from the respective pond.

(4) NWA is catch and release only.

(5) Only natural bait (e.g., crickets, shrimp, worms, cut bait) and artificial bait may be used. Minnows are prohibited at NWA.

(6) Consumption of alcoholic beverages is prohibited during any fishing activity or event to which this instruction applies.

(7) Launching boats from NAVSUPPACT Hampton Roads properties is not permitted.

(8) Littering on station is prohibited. All refuse shall be placed in a designated trash container or carried out. This includes all refuse generated from fishing activities (monofilament line, hooks, etc.).

(9) CO, Officer in Charge, or NR Managers may close specific fishing areas at any time. Such announcements will be posted online or at the NR Office. Personnel may not use water bodies in areas not listed in enclosure (1) of this instruction without specific authorization by the NR Manager.

6. Rates. Fees for fishing permits are at the discretion of the NR program and may change year to year depending on program requirements

7. Public Safety Department. Law Enforcement Division personnel will provide assistance and support to NR staff and Conservation Officers with state law enforcement issues upon request and where applicable. Installation security officers have the power to apprehend and arrest violators for violations occurring at places over which the Navy has law enforcement jurisdiction.

8. Records Management. Records created, as a result of this instruction, regardless of media and format, must be managed per Secretary of the Navy Manual 5210.1 of January 2012

9. Review and Effective Date. Per OPNAVINST 5215.17A, the Environmental Department will review this instruction annually on the anniversary of its effective date to ensure applicability, currency, and consistency with the Federal, DoD, SECNAV, and Navy policy and statutory authority using OPNAV 5215/40 Review of Instruction. This instruction will automatically expire 5 years after effective date unless reissued or canceled prior to the 5-year anniversary date, or an extension has been granted.

J. P. KLINE

Distribution:
NAVSUPPACT 5216.1 (Series)
List I through IV

Figure 1. Portsmouth Annex Fishing Area Highlighted in Green.

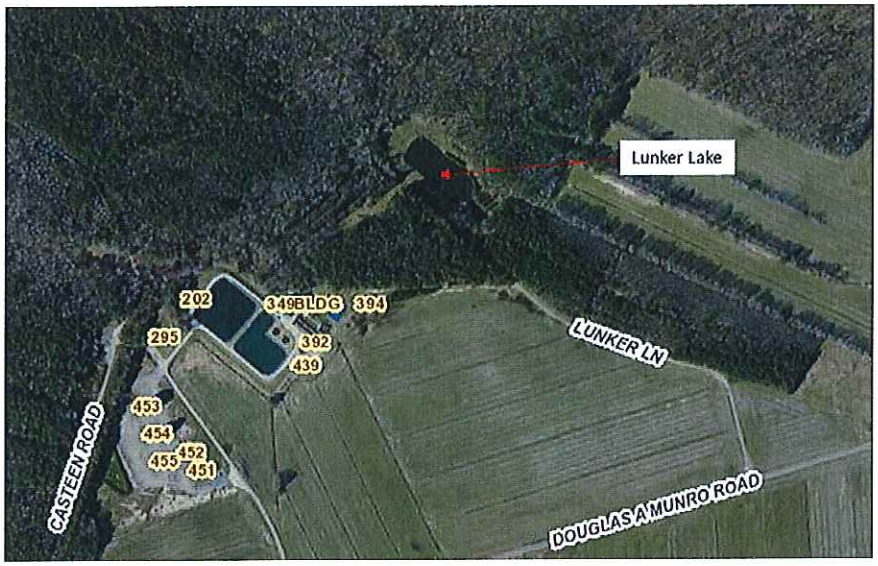

Figure 2. Northwest Annex Lunker Lake Fishing Area

Print and bring with you to all of your permit requirements for validation.

Cut out and keep with you at all times

Name:

RAID #:

Date: _____

Natural Resource Manager: _____
(Permit invalid if not signed)

757-421-8240

Place on dashboard of vehicle, readable from outside.

&
Parking Permit

By my signature below, I attest that I have read, understand and will abide by all rules, laws, and regulations, both state and installation, pertaining to the purchase of this permit.

*This must be displayed on the dash of your vehicle as your parking pass and proof of validation. *

NAME:

RAID #:

DATE: _____

Applicant Signature

Natural Resource Manager

_____ _____

Validation Stamps

INDOC _____ Waiver_____

NSA HAMPTON ROADS
NATURAL RESOURCE OUTDOOR RECREATION PROGRAM
INSTALLATION WAIVER

Date: _____ Military: ☐

Name: _____ Civilian: ☐

Address: _____ Retired Military/Civilian: ☐

_____ Vehicle Lic #: _____

Dependent: _____ Driver's Lic #: _____

Person to Contact in Case of an Emergency:

Name: _____ Phone: _____

Address: _____

I, the undersigned understand that the Natural Resouce Program outdoor recreation activity (hunting, fishing, trapping, firewood collection) I am participating in is inherently dangerous and I voluntarily assume the risks associated with these activities on NSA Hampton Roads Installations. I hereby release, indemnify and will hold harmless, acquit, and discharge, the United States of America, the United States Navy, all officers, organizations, military and civilian personnel, and activities of the United States or the United States Navy and any other individual or organization connected with the United States or the United States Navy from any and all Cause or causes of action, including personal injury, illness, death, property damage, costs charges, claims, demands, and liabilities of whatever kind, name or nature in any manner arising out of use or enjoyment of said permit or any control exercised over said use, participation, property, facilities, equipment or individual in the use of enjoyment of any permit. I have read and I understand the provisions of (base instruction). I am aware that a violation of the above notice will result in revocation of my permit and civil prosecution.

_____ _____ _____ _____

Applicant Signature Date EV NRM Signature Date

Privacy Act Statement: This statement is provided in compliance with the provisions of the Privacy Act of 1974 (Public Law 93-79) which requires that Federal Agencies must inform individuals who are requested to furnish personal information about themselves as to certain facts regarding the information requested below.

1. Authority: 5 U.S.C. § 301; 10 U.S.C. §§ 972 (5), 1201-1222, 2733, 2734-2734b, 2737, 5947, 6148, 7205, 7622-7623; 28 U.S.C. §§ 1346, 2671-2680; 31 U.S.C. §§ 71-75, 82a, 89-92, 95a, 240-243, 951-953; 37 U.S.C. § 802; 38 U.S.C. § 105; 42 U.S.C. §§ 2651-2653; 44 U.S.C. § 3101; 49 U.S.C. § 1901.
2. Principal Purpose: The primary use of this information is personal identification verification and to approve and record licensing data.
3. Disclosure: Disclosure is voluntary. Failure to provide information may result in denial of base hunting/fishing privileges.
4. Base Hunting Instruction 11015 2A COMNAVREGMIDLANTINST - HUNTING AND TRAPPING PROGRAM
5. Base Fishing Instruction
6. Base Firewood Collection Instruction

Enclosure 2. Hunting Regulations and Information

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DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL SUPPORT ACTIVITY HAMPTON ROADS
7918 BLANDY ROAD, SUITE 100
NORFOLK, VA 23551-2419

NAVSUPPACTHRINST 5090.5
N4
17 Jul 20

NAVSUPPACT HAMPTON ROADS INSTRUCTION 5090.5

From: Commanding Officer, Naval Support Activity Hampton Roads

Subj: HUNTING AND TRAPPING PROGRAM

Ref: (a) OPNAVINST 5090.1E
(b) 29.1 VA Code Ch. 3 and 4; 4 VA Admin. Code, Agency 15
(c) NC General Statutes, CH. 113, Subchapters 3 and 4
(d) NAVSUPPACT HR Weapons Registration
(e) Virginia Hunting and Trapping Regulations Digest
(f) Regulations Digest, North Carolina
(g) SECNAV Manual 5210.1
(h) Installation Natural Resource Management Plan

Encl: (1) Hunting and Trapping Regulations for Naval Support Activity Hampton Roads Northwest Annex
(2) Installation Waiver
(3) NAVSUPPACTHR Weapons Registration Form
(4) Example Hunter's and Parking Permit
(5) Health and Safety Information

1. Purpose. This instruction sets forth the authority, responsibilities, procedures, and policies for hunting and trapping onboard Naval Support Activity (NAVSUPPACT) Hampton Roads Northwest Annex (NWA).

2. Policy

a. Hunting and trapping at NAVSUPPACT Hampton Roads NWA is authorized and controlled by the installation Commanding Officer (CO) through locally published NAVSUPPACT Hampton Roads NWA instructions and references (a) through (h).

b. Violations of applicable federal and state hunting and trapping regulations and wildlife conservation statutes may result in criminal prosecution in the United States District Court and/or under the Uniform Code of Military Justice, as well as suspension or revocation of NAVSUPPACT Hampton Roads NWA hunting and trapping privileges. Department of Defense (DoD) law enforcement and/or Environmental Division personnel are

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Any misuse or unauthorized disclosure may result in both civil and criminal penalties

authorized by the CO to suspend a hunter or trappers' permit until adjudication.

3. Responsibilities

a. Environmental Division. The Environmental Division, part of the Public Works Department, has a Natural Resources (NR) branch responsible for the management of fish and wildlife resources, including control of game harvesting, management, and approval of hunting locations; and enforcement of federal, state, and local laws and regulations.

b. Public Safety Department. Law Enforcement Division personnel will provide assistance and support to NR staff and Conservation Officers with state law enforcement issues upon request and where applicable. Installation security officers have the power to apprehend and arrest violators for violations occurring at places over which the Navy has law enforcement jurisdiction.

c. Hunters/Trappers

(1) All personnel who exercise their privilege to hunt and/or trap onboard NAVSUPPACT Hampton Roads NWA are responsible for complying with this instruction, Installation specific regulations listed in Enclosure (1), and all federal and state statutes and regulations, including but not limited to References (e) and (f).

(2) Recreation Access. Used to administer the sale and check in/out component of the natural resources hunting and trapping program. Each user must set up an account within Rec Access at nwa.recaccess.com. After registering, users will be given a Recreation (Rec) Access ID Number (RAID #) which will be unique to each individual. Accounts previously created are still valid.

d. Sportsman Quality Management Board. The Sportsman Quality Management Board is a group of approved and waivered volunteers that support the installations natural resources hunting and trapping program. Volunteers are managed by the NR Manager and help support the installation program through maintaining trails, tree stands, and assisting with harvested game.

e. Base Personnel. Military and civilian personnel who observe or acquire credible information concerning violations of fish and wildlife laws and regulations, and this instruction, shall report information to the installation Natural Resource Manager.

4. Regulations/Procedures

a. Authorized Personnel. For reasons of safety and security, and pending changes in Force Protection Condition (FPCON) constraints, the following persons are authorized to hunt or trap on NAVSUPPACT Hampton Roads NWA. Proper credentials (Common Access Card (CAC), military/civilian retiree, and/or dependent identification card) must be carried at all times and presented to NAVSUPPACT Hampton Roads NWA security personnel, NR staff, or their representatives when requested. Authorized personnel include:

(1) Active duty military personnel, with current DoD CAC

(2) Retired military personnel, with DD Form 2 (Retired)

(3) Dependents of active duty/retired military personnel, with current DD Form 1173

(4) Active and retired federal civil service employees, with a current CAC/retiree CAC

If allowable under existing FPCON, authorized patrons may be accompanied by one guest. All guests must adhere to applicable federal and state statutes and regulations, and this instruction. Sponsors are responsible for their guests and must accompany them at all times, including sitting on the same stand.

b. Permits/Licenses. Installation permits are required in order to hunt/trap on NAVSUPPACT Hampton Roads NWA; all patrons and guests must purchase an installation hunting/trapping permit. Permits are available through the online Rec Access website at nwa.recaccess.com. The permits provide hunting/trapping access to NAVSUPPACT Hampton Roads NWA only, are valid continuously from 1 August to 31 July, and must be carried at all times. Possession of an installation permit does not authorize access to the installation, convey, or bestow any other rights or privileges. In order to obtain a permit, hunters/trappers must complete items 1-3 prior to purchasing a permit and items 4-6 to validate the permit for hunting:

(1) Installation Waiver. Enclosure (2) is the acceptance of responsibility in the event an injury occurs while hunting/trapping on the installation. Validation of Installation Waiver will be added to each user's account following completion. Required prior to purchasing permit

(2) Hunter Safety Card/Certificate. All hunters must have attended a hunter safety course from any state prior to hunting on NAVSUPPACT Hampton Roads NWA. Validation of Hunter Safety Card or Certificate will be added to each user's account following completion. Required prior to purchasing a permit. See Enclosure (3) for example hunter and parking permit.

(3) Indoctrination Brief. All persons wishing to hunt on NAVSUPPACT Hampton Roads NWA are required to watch and/or attend, an Indoctrination brief available on Rec Access and/or in person by the NR Manager. This brief will help hunters familiarize themselves with base regulations, hunting areas, and all procedures not covered herein. Required prior to purchasing a permit.

(4) Weapons Registration. Weapons registration is required annually per reference (d), enclosure (3) prior to transporting a firearm on the installation. Proof of completion shall be provided to the NR Manager prior to validating a permit.

(5) Weapons Qualifications. Hunters must qualify with bow, muzzleloader, and/or shotgun at least every three years. Validation of weapons qualification will be added to each user's account following completion.

(6) License. A valid Virginia/North Carolina hunting and/or trapping license is required for each person for the state in which they plan to hunt or trap game species on NAVSUPPACT Hampton Roads NWA.

c. Hunting/Trapping Regulations. See Enclosure (1) for installation specific rules and regulations.

d. Health/Safety. See Enclosure (4) for health and safety information.

5. Rates. Fees for NAVSUPPACT Hampton Roads NWA hunting and trapping permits are at the discretion of the NR program and may change year to year depending on program requirements.

6. Records Management. Records created, as a result of this instruction, regardless of media and format, must be managed per reference (g).

7. Review and Effective Date. Per OPNAVINST 5215.17A, the Environmental Department will review this instruction annually on the anniversary of its effective date to ensure applicability, currency, and consistency with the Federal, DoD, SECNAV, and Navy policy and statutory authority using OPNAV 5215/40 Review of Instruction. This instruction will automatically expire five years after effective date unless reissued or canceled prior to the five year anniversary date, or an extension has been granted.

J. P. KLINE

Distribution: (NAVSUPPACTHRINST 5216.1V)
Lists I through IV

Northwest Annex Hunting and Trapping Regulations

1. General Regulations. All local, state, and Federal laws and regulations apply to installation property, unless specifically modified by this rules and regulations product.

2. Enforcement. The Natural Resource Manager, his/her agents, Public Safety Department, and State Wildlife Law Enforcement officers are authorized to conduct inspections of hunters/trappers for the purpose of checking bag limits, type of game, means used to take game, and for any other wildlife conservation restrictions.

3. Weapons

   a. Per this instruction, all firearms, including bows and crossbows, intended for use on NWA must be registered through Security. Registered firearms are permitted for hunting during hunting activities on NWA ONLY. Firearms are not permitted on any other installation under NSA Hampton Roads. Enclosure (3) of this instruction is available and should be filled out and submitted to the Natural Resource Manager.

   b. Approved firearms on NWA include bow, crossbow, muzzleloader, and shotgun.

      i. Shotgun must be 20 gauge or larger and are authorized for buckshot (#1, 0, 00, 000) or slugs for deer; turkey hunting requires #2 to #6 shot.
      ii. Muzzleloader must be .45 caliber or larger. Smokeless powder is not authorized on NWA.

   c. Pistols and rifles, with the exception of muzzleloaders, are not permitted on board NWA.

   d. Loaded firearms are prohibited while walking to and from a tree stand and while climbing.

   e. Firearms must remain unloaded with safety on and trigger lock installed while transporting in a vehicle farthest point away from ammo.

4. Blaze Orange Requirements

a. A solid blaze colored (blaze orange or blaze pink) hat or solid blaze colored upper body clothing that is visible from 360 degrees while walking to and from a tree stand or hunting area is required at all times.

b. Display at least 100 square inches of solid blaze colored material at shoulder level within body reach and visible from 360 degrees during general firearms season. Turkey hunting and bow hunting during bow hunting season only are exempt.

c. Hunting from an enclosed ground blind (pop-up, chair, box, etc.) that conceals view shall display at least 100 square inches of solid blaze colored material, visible from 360 degrees attached to or immediately above the blind. This blaze color is in addition to any worn on the hunter's person during open firearms season.

5. Deer Hunting

a. Seasons. NWA hunting seasons follow state rules and regulations provided in references (d) and (e); however, hunting is only permitted on Monday, Tuesday, Thursday, and Saturday.

b. Bag Limits. Daily/Season bag limits for the Installation follow state rules and regulations as described in reference (d) and (e) for each season.

c. Deer Management Assistance Program (DMAP). Yearly, NWA applies for DMAP and may receive doe tags for hunters to use in place of their personal tag in Virginia only. Hunters are still required to check harvested game in through the VDGIF. Tags will be available at the Game Check Station until they are all used. DMAP tags must be used before using your own tag when harvesting does in Virginia.

d. Check-in/Out

i. Hunters are required to check in and out for hunting. Hunters may log in to Rec Access via their smartphone, tablet, or personal computer at nwa.recaccess.com to check in or out of a tree stand/area. Hunters may also check in using the tablet available at the Game Check Station, BLDG 295. Hunters are required to check for special notices and area closures, which will be posted online and on the bulletin board at the Game Check Station, BLDG 295.

ii. Check-in is permitted one and a half (1.5) hours prior to a hunter's arrival on NWA and check out no later than one and a half (1.5) hours after sunset. Under no circumstances may a hunter leave the installation while checked in to hunt. The earliest you can check in is 1.5 hours before sunrise. Failure to conform to these requirements will result in a violation.

iii. Hunters may hunt in only one hunting stand or bow hunting area at a time and may not enter other stands/bow hunting areas at any time unless tracking a wounded animal.

iv. Dependent hunters under 16 years of age must be accompanied by, and be under the positive supervision of, an adult 21 years of age or older who has completed all requirements to hunt on NWA. Positive supervision means:

1. within clear and full view of the adult sponsor;
2. within such a distance that clear, verbal communication can be maintained; and,
3. in such a position as to be influenced by the adult sponsor, if necessary.

e. Hunting Areas/Stands. Figure 1 identifies authorized hunting stands and bow hunting areas. Maps are available online at nwa.recaccess.com or at the Game

f. Check Station. The CO/OIC or Natural Resource Manager may secure tree stands/areas at any time during special events, training exercises, or for safety concerns.

i. Any stand or blind established for the purpose of hunting shall not have exclusive use rights.

ii. Hunters are permitted to climb or attach a temporary stand within 50 yards of designated, permanent tree stand locations.

iii. Numbered tree stands identify Virginia stands and letters identify North Carolina stands.

iv. Bow hunting only areas include the Supply Woods Areas (00, 01, and 02), Barracks Woods, and Coast Guard Woods. You must be hunting from an elevated stand in Coast Guard Woods. Hunters must stay within the parameters identified for each area.

v. Hunters may not place a tree stand or ground blind in a hunting area more than 45 days prior to the opening day of the deer-hunting season. Additionally, all hunters must remove all portable tree stands and ground blinds within 45 days of the last day of the deer-hunting season. The Natural Resources program may confiscate portable stands found within hunting areas outside of authorized dates.

vi. Anyone caught stealing, damaging, or defacing a tree stand, or who interferes with or disrupts the lawful taking of wildlife by another person, will be prosecuted to the maximum extent possible.

vii. Hunters are permitted to clear limbs no greater than 2" in diameter to create shooting lanes. Felling trees of any size is prohibited and will result in a violation.

viii. Use of a safety belt or harness is mandatory when hunting from any ladder or climbing tree stand. Stand-alone platform stands are exempt from this requirement.

ix. Hunters are permitted to use bicycles on trails to access tree stands or areas. No motorized vehicles are permitted.

g. Harvested Game

i. All hunters are required to notch their tag per state regulations prior to moving the animal from the spot of kill per reference (d) and (e). This includes use of a DMAP tag in Virginia. DMAP tags must be notched and in your possession at all times while deer is in your possession.

ii. All deer harvested on NWA shall be processed through the Game Check Station, BLDG 295 by a Sportsman Quality Management Board Volunteer, NR Manager, or other personnel as assigned prior to butchering or removing from base during the hunting season. If there is no one present at the Game Check Station, please contact the Hunter Hotline at 757-421-8256 only for checking in harvested game. Deer harvest data collected is submitted to the game department for analysis. If someone is not available to assist, hunters are responsible for data collection per instructions at the game check station.

iii. Deer may be field dressed at the location of kill or at the Game Check Station (Building 295) during the hunting season. All hunters must ensure cleanliness of the Game Check Station and be respectful of base personnel and residents while transporting game across the installation.

h. Special Authority Hunts. When determined to be necessary for game management, to protect human health and safety, or to provide hunt opportunities for persons with disabilities, special hunts may occur

(deer drives, wounded warrior hunts, etc.). Certain permit requirements may be authorized and approved to allow additional hunters access. Scheduling and oversight of special authority hunts will be the responsibility of the installation Natural Resources Manager.

6. Spring Turkey Hunting

a. Seasons. NWA spring turkey hunting season follows state rules and regulations provided in references (d) and (e); however, hunting is only permitted on lottery drawn hunt days and per installation Natural Resources Manager.

b. Bag Limits. One turkey per day per person.

c. Lottery. Hunters interested in Spring Turkey season must possess a validated installation hunting permit in order to enter the lottery. The lottery will be run via Rec Access.

d. Turkey Hunting Areas. Areas available subject to change per the Natural Resources Manager. Firearms restrictions are still relevant. Bow only areas must use bow and firearms are permitted in other areas.

e. Day of Hunt. The hunting day will be from 30 minutes before sunrise until 1200 or as otherwise directed.

f. Harvested Game. All harvested turkeys shall be reported to the Natural Resources Manager.

g. Authorized Hunters. Each hunter may bring one guest depending on FPCON requirements at the time. Guest must meet all the requirements as the sponsor. Authorized hunters must have purchased an installation hunting permit prior to entering the lottery.

7. Trapping. All areas open to hunting are open to trapping. Trapping seasons, legal traps, and methods are announced annually in references (d) and (e). Trappers are directed

to contact the Natural Resource Manager for specific details and regulations pertaining to trapping on NWA.

8. Wounded Game. Hunters must make every reasonable effort to retrieve wounded game. Hunter's/hunt captains are encouraged to assist others in tracking and recovering wounded game. Hunter's may not pursue wounded game into an adjacent hunting area until first checking in from his/her assigned area and checking out a new area, unless the hunter is in pursuit of a recently wounded animal and following an active and obvious blood trail. Hunters must cease tracking efforts one and a half (1.5) hours after sunset and come back the next day.

9. Scouting

   a. Scouting is defined as looking for game, game trails, or signs; preparing for hunting by searching out hunting locations or placing stands. Firearms may not be carried into the field when signed out for scouting.

   b. Unless closed for operational or security reasons, all hunting areas are open for scouting prior to the first day of hunting season on Wednesday, Friday and Sunday during the season. Hunters interested in scouting shall use the Rec Access website and check out using the Scouting Permit.

10. Parking

   a. Parking permit for the hunting season will be provided following the purchase of a hunting/trapping permit.

   b. Parking permit must be displayed on the dashboard of your vehicle while parked in designated hunter-parking areas ONLY.

   c. Vehicles are restricted to paved roads only. Off-road vehicular use and driving on dirt/grassy farm roads are prohibited. Do not block any roadways, firebreaks, or gates. Penalties/parking tickets may be warranted.

11. Spotlighting. It is unlawful for any person to cast the rays of an artificial light on any NWA field or wooded area at any time. This restriction does not apply to law enforcement personnel exercising official duties; Environmental Division representatives conducting official population studies; or hunters who are attempting to locate wounded or dead deer.

12. Baiting. Attracting wildlife by baiting is NOT permitted on the installation.

13. Wanton Waste. Animals may not be deliberately killed and left in the field. Hunters should make every effort possible to retrieve lost or crippled game. All game killed and found by the hunter will be applied to a hunter's bag limit, regardless of condition. Cases of wanton waste will be prosecuted to the maximum extent possible. Hunters are encouraged to utilize as much of all harvested animals as possible.

14. Other Wildlife. Protected wildlife such as songbirds, hawks, owls, eagles, gulls, herons, egrets, snakes, etc. shall not be hunted or trapped at any time. Killing, capturing, or harassing other non-game species is prohibited. There shall be no open season on any wildlife except for feral swine and coyotes. Report any harvest or sighting of feral swine or coyote to the NR Manager immediately.

15. Permit Suspension/Revocation Policy

a. Violations of state and/or federal game laws will be prosecuted in the U.S. District Court. Violation of NWA policies and regulations will be processed through the Legal Officer. Penalties listed are the maximum that may be awarded for the given infraction. Appeal of punishment imposed by the Legal Officer will be forwarded to the CO, via the Executive Officer.

b. Second and subsequent offenses will be considered if they have occurred within the past 5 years. These punishments are for routine incidents. Should an incident be aggravated or the perpetrator be

uncooperative or unwilling to abide by the terms of a punishment, more severe punishments may be awarded (e.g., a 1st or 2nd offense may merit indefinite suspension of hunting privileges). Penalties may carry over into the following season. A hunter will not get credit for time served after the hunting season ends.

c. Violations and corresponding punishments at the discretion of the NR Manager are as follows:

VIOLATION	**PUNISHMENT**
Check-in/out (failing to sign-in/out, leaving while signed in, checking in earlier than 1.5 hours, not where signed out to, illegal parking)	1st Offense: up to 1 month suspension 2nd Offense: up to 3 month suspension 3rd Offense: up to 1 year suspension 4th Offense: indefinite suspension
Unauthorized "mercy killing"	1st Offense: up to 3 month suspense 2nd Offense: up to 1 year suspension 3rd Offense: indefinite suspension
Violation of NWA season or bag limit, but within State's season or bag limit	1st Offense: up to 3 month suspense and game forefeiture. 2nd Offense: up to 1 year suspension and game forefeiture 3rd Offense: indefinite suspension and game forefeiture
Incorrect firearm/ammo	1st Offense: up to 6 month suspension 2nd Offense: up to 1 year suspension 3rd Offense: indefinite suspension
Littering	1st Offense: warning 2nd Offense: up to 6 month suspension 3rd Offense: 1 year suspension
Failure to wear safety clothing or to use safety belt in tree stand	1st Offense: warning 2nd Offense: up to 6 month suspension

	3rd Offense: up to 1 year suspension
Building/using unapproved blind or stand	1st Offense: up to 6 month suspension 2nd Offense: up to 1 year suspension 3rd Offense: indefinite suspension
Unapproved release of animals onboard NWA	1st Offense: up to 6 month suspension 2nd Offense: up to 1 year suspension 3rd Offense: indefinite suspension
Violation of State's season or bag limit (daily or season, wrong sex/age or species)	1st Offense: up to 1 year suspension and game forefeiture. 2nd Offense: indefinite suspension and game forefeiture
Defacing Property	1st Offense: up to 1 year suspension 2nd Offense: indefinite suspension
No License and/or Base Access Permit	1st Offense: up to 1 year suspension 2nd Offense: indefinite suspension
Unescorted junior hunter	1st Offense: up to 1 year suspension 2nd Offense: indefinite suspension
Failure to check deer at Game Check Station BLDG 295	1st Offense: up to 1 year suspension 2nd Offense: indefinite suspension
"Spotlight" hunting	1st Offense: up to 1 year suspension 2nd Offense: indefinite suspension
Wanton Waste	1st Offense: up to 1 year suspension 2nd Offense: indefinite suspension

Failure to comply with EV Division special announcements	1st Offense: up to 1 year suspension 2nd Offense: indefinite suspension

Figure 1. Map of Hunting Stands and Areas, NWA

(Currently being developed)

NSA HAMPTON ROADS
NATURAL RESOURCE OUTDOOR RECREATION PROGRAM
INSTALLATION WAIVER

Date: _____ Military: ☐

Name: _____ Civilian: ☐

Address: _____ Retired Military/Civilian: ☐

_____ Vehicle Lic #: _____

Dependent: _____ Driver's Lic #: _____

Person to Contact in Case of an Emergency:

Name: _____ Phone: _____

Address: _____

I, the undersigned understand that the Natural Resouce Program outdoor recreation activity (hunting, fishing, trapping, firewood collection) I am participating in is inherently dangerous and I voluntarily assume the risks associated with these activities on NSA Hampton Roads Installations. I hereby release, indemnify and will hold harmless, acquit, and discharge, the United States of America, the United States Navy, all officers, organizations, military and civilian personnel, and activities of the United States or the United States Navy and any other individual or organization connected with the United States or the United States Navy from any and all Cause or causes of action, including personal injury, illness, death, property damage, costs charges, claims, demands, and liabilities of whatever kind, name or nature in any manner arising out of use or enjoyment of said permit or any control exercised over said use, participation, property, facilities, equipment or individual in the use of enjoyment of any permit. I have read and I understand the provisions of (base instruction). I am aware that a violation of the above notice will result in revocation of my permit and civil prosecution.

_____ _____ _____ _____

Applicant Signature Date EV NRM Signature Date

Privacy Act Statement: This statement is provided in compliance with the provisions of the Privacy Act of 1974 (Public Law 93-79) which requires that Federal Agencies must inform individuals who are requested to furnish personal information about themselves as to certain facts regarding the information requested below.

1. Authority: 5 U.S.C. § 301; 10 U.S.C. §§ 972 (5), 1201-1222, 2733, 2734-2734b, 2737, 5947, 6148, 7205, 7622-7623; 28 U.S.C. §§ 1346, 2671-2680; 31 U.S.C. §§ 71-75, 82a, 89-92, 95a, 240-243, 951-953; 37 U.S.C. § 802; 38 U.S.C. § 105; 42 U.S.C. §§ 2651-2653; 44 U.S.C. § 3101; 49 U.S.C. § 1901.
2. Principal Purpose: The primary use of this information is personal identification verification and to approve and record licensing data.
3. Disclosure: Disclosure is voluntary. Failure to provide information may result in denial of base hunting/fishing privileges.
4. NSA Hampton Roads Hunting Instruction
5. NSA Hampton Roads Fishing Instruction
6. NSA Hampton Roads Firewood Collection Instruction

NAVSUPPACT HAMPTON ROADS
PRIVATE FIREARMS AND WEAPONS BACKGROUND INVESTIGATION CHECKLIST

YES	NO	CRITERIA
		APPLICATION STATUS
		Is the applicant under the age of 18?
		Is the applicant an Illegal Alien?
		Is the applicant a Fugitive from Justice?
		Has the applicant received a Dishonorable Discharge from Military Service?
		COURT ORDERS PROTECTIVE ORDERS
		Is the applicant subject to a Restraining Order or Protective Order from a State or Federal Court?
		Is the applicant subject to a Military Protective Order prohibiting possession of private firearms or weapons?
		Is the applicant under a "No Contact" order relative to a misdemeanor conviction for Stalking?
		Is the applicant under a court order prohibiting entry to a jointly owned or rented residence during divorce or custody proceedings?
		CONVICTIONS
		Does the applicant have any pending felony charges?
		Does the applicant have a felony conviction?
		Does the applicant have any misdemeanor convictions for "Domestic Violence"?
		Does the applicant have any DUI convictions within the date of this application?
		Does the applicant have any Assault, Assault and Battery, Sexual Battery, Shooting from a Vehicle, Public Discharge of a Firearm, or Brandishing a Firearm within 3 years of this application to include "First Offender Status"?
		Does the applicant have any Controlled Substance violations within 3 years of the date of this application to include "First Offender Status"?
		Does the applicant have a Felony level "Delinquency" conviction or finding within 16 years of a conviction, or release from incarceration? (Whatever is Later)
		Does the applicant have two or more misdemeanor convictions within 5 years of the date of this application, if one is a Class 1 misdemeanor (Traffic Infractions and Reckless Driving convictions are excluded)
		COMPETENCE
		Has the applicant been acquitted of any crime by Reason of Insanity?
		Has the applicant been adjudicated as Legally Incompetent, Mentally Incapacitated, or Incapacitated?
		Has the applicant been addicted to, or an Unlawful User, or Distributor of Controlled Substances?
		Has the applicant been in a "Residential Setting" Substance Abuse or Mental Health treatment within 5 years of the date of this application?

Date: _____

From: _____
To: Commanding Officer, Naval Support Activity Hampton Roads
Via: Installation Security Officer

Subj: PRIVATELY OWNED FIREARMS REGISTRATION FOR HUNTING

Ref: (a) NAVSUPPACTHRINST 5090.5

1. Per reference (a), which I have read and understand, it is requested that I be permitted to register and transport onboard NAVSUPPACTHR Northwest Annex the following firearm(s) for hunting only. I understand that all firearms transported onboard will be unloaded, safety on and have a trigger lock in place. This authorization may be revoked at any time.

Type of Firearm or Weapon (Please print legibly)

Manufacturer	**Model**	**Serial #**	**Caliber/Gauge**

Name: _____ SSN: _____ DOB: _____

Rank/Rate: _____ Command: _____

Address Where the Firearm/Weapon will be stored:

_____

Signature: _____ Work Number: _____

Home/Cell: _____

Are you planning to hunt at NAS Oceana as well? Yes ☐ No ☐

If yes, your information will be passed on to NAS Oceana Security.

PARENT COMMAND ENDORSEMENT - COMMANDING OFFICER
Forwarded, recommending Approval: ☐ Disapproval: ☐

Commanding Officer Signature/Date: _____

Note: If disapproved by CO, no further action is necessary.

ENDORSEMENT (Security Background Investigation)
Forwarded, recommending Approval: ☐ Disapproval: ☐

_____
Signature/Date

ENDORSEMENT (Installation Security Officer)

Forwarded, recommending Approval: ☐ Disapproval: ☐

_____
Signature/Date

ENDORSEMENT (Installation Commanding Officer)

This request is Approved: ☐ Disapproved: ☐

_____
Signature/Date

ACKNOWLEDGEMENT: Upon completion of hunting season, the applicant will surrender their CLEOC registration.

I have read and understand the requirements listed in Reference (a) NAVSUPPACTHRINST 5090.1 and I have received my CLEOC Registration Form for hunting on NWA. I understand that it is my responsibility to update my personal information on an annual basis with the Security Department. Furthermore, I understand that if I purchase a new firearm or weapon and want to use it during the hunting season, I am required to inform the Security Department immediately of my purchase and have my CLEOC Registration Form updated to reflect my most recent purchase.

_____Signature/Date

QUALIFICATION TO POSSESS FIREARMS OR AMMUNITION

PRIVACY ACT STATEMENT

AUTHORITY: 18 U.S.C. 922(g)(9); E.O. 9397.

PRINCIPLE PURPOSE(S): To obtain information to determine if you have been convicted of a crime of domestic violence which would disqualify you from shipping, transporting, possessing or receiving either Government-issued or private firearms or ammunition and to determine if reassignment, reclassification, detailor other administrative action is warranted. Your Social Security Number is solicited solely for purposes of verifying your identity.

ROUTINE USE(S): To the Department of Justice so that such information can be included in the National Instant Criminal Background Check System which may be used by firearm licensees (importers, manufacturers or dealers) to determine whether individuals are qualified to receive or possess firearms and ammunition.

DISCLOSURE: Mandatory for all personnel who are required to certify. Failure to provide the information may result in (1) (military only) the imposition of criminal or administrative penalties for failing to obey a lawful order, and (2) (civilian only) the imposition of administrative penalties, to include removal from Federal service. However, neither your answers nor information or evidence gained by reason of your answers can be used against you in any criminal prosecution for a violation of Title 18, United States Code, Section 922(g)(9), including (military only) prosecutions under the Uniform Code of Military Justice, based on a violation of Section 922(g)(9), for conduct which occurred prior to the completion of this form.
The answers you furnish and any information resulting therefrom, however, may be used against you in a criminal or administrative proceedings if you knowingly and willfully provide false statements or information.

SECTION I – INSTRUCTIONS

An amendment to the Gun Control Act of 1968 (18 U.S.C. 922) makes it a felony for anyone who has been convicted of a misdemeanor crime of domestic violence to ship, transport, possess, or receive firearms or ammunition. It is also a felony for any person to sell or otherwise dispose of a firearm to any person so convicted.

The Department of Defense has, by policy, expanded the prohibitions contained in Title 18 Section 922(g)(9) to those military or civilian personnel who have felony convictions for crimes of domestic violence. Convictions of crimes of domestic violence do not include summary court-martial convictions, the imposition of nonjudicial punishment (Article 15, UCMJ), or deferred prosecutions (or similar alternative dispositions) in civilian courts. Furthermore, a person shall not be considered as having committed a "crime of domestic violence" for purposes of the firearms restriction of the Gun Control Act unless all of the following elements are present:

(1) the person was convicted of a crime;

(2) the offense has as its factual basis the use or attempted use of physical force, or threatened use of a deadly weapon;

(3) the convicted offender was at the time of the offense:
(a) a current or former spouse, parent or guardian of the victim,
(b) a person with whom the victim shared a child in common,
(c) a person who was cohabiting with or has cohabited with the victim as a spouse, parent, or guardian, or (d) a person who was similarly situated to a spouse, parent, or guardian of the victim;

(4) the convicted offender was represented by counsel, or knowingly and intelligently waived the right to counsel;

(5) if entitled to have the case tried by jury, the case was actually tried by jury or the person knowingly and intelligently waived the right to have the case tried by jury;

(6) the conviction has not been expunged or set aside, or the convicted offender has not been pardoned for the offense or had civil rights restored, unless the pardon, expungement, or restoration of civil rights provides that the person may not ship, transport, possess or receive firearms.

SECTION II – QUALIFICATION INQUIRY (Complete and return to your commander or immediate supervisor within 10 days of receipt)

1. HAVE YOU EVER BEEN CONVICTED OF A CRIME OF DOMESTIC VIOLENCE AS DESCRIBED ABOVE: (Initial and date)

YES		NO		I DON'T KNOW (Provide explanation on reverse)

2. IF YOU ANSWERED "YES" TO THE FIRST QUESTION, PROVIDE THE FOLLOWING INFORMATION WITH RESPECT TO THE CONVICTION:

a. COURT/JURISDICTION	b. DOCKET/CASE NUMBER
c. STATUTE/CHARGE	d. DATE SENTENCED (YYYYMMDD)

3. CERTIFICATION I hereby certify that, to the best of my information and belief, all of the information provided by me is true, correct, complete, and made in good faith. I understand that false or fraudulent information provided herein may be grounds for criminal and/or administrative proceedings, to include (if civilian) adverse action, up to and including removal, and (if military) disciplinary action under the Uniform Code of Military Justice. I further understand that I have a continuing obligation to inform my Commander or Supervisor should I be convicted of a crime of domestic violence in the future.

a. NAME (Last, First, Middle Initial)	b. RANK/GRADE	c. SOCIAL SECURITY NUMBER
d. ORGANIZATION	e. SIGNATURE	f. DATE SIGNED (YYYYMMDD)

DD FORM 2760, DEC 2002 PREVIOUS EDITION IS OBSOLETE Adobe Professional X

WEAPON REGISTRATION (OWNER'S COPY)

BASE LOCATION : NSGA NORTHWEST

PREPARED BY : **DATE PREPARED :**

Current Owner Info

Owner	Identification

Weapon Registered

Serial	Weapon Type	Caliber	Make	Model	CLEOC Reg#

Other Weapons Registered to Owner

Serial	Weapon Type	Caliber	Make	Model	CLEOC Reg#

I Hereby Certify I will abide by all Federal and State laws, including security regulations, that govern the use, storage, and carrying of this weapon and any other weapon.

Signature : _____

Example of CLEOC Firearms/Weapons Registration Card Completed By Security

Must carry with you at all times while in possession of a firearm.

Print and bring with you to all of your permit requirements for validation.

Cut out and keep with you at all times

Name:

RAID #:

Date: _____

Natural Resource Manager: _____
(Permit invalid if not signed)

Hunter Hotline: 757-421-8256

Emergency: 911 or NWA Security at 757-435-5128 Exp. 2/20

Place on dashboard of vehicle, readable from outside. Passenger hunters must display theirs as well.

&

Parking Permit

By my signature below, I attest that I have read, understand and will abide by all rules, laws, and regulations, both state and installation, pertaining to the purchase of this permit.

*This must be displayed on the dash of your vehicle as your parking pass and proof of validation. *

NAME:

RAID #: Exp. Date: 2/20

Applicant Signature Natural Resource Manager Signature

_____ _____

Federal ID _____ Hunter Safety Card _____ IBEP _____

Waiver_____ INDOC/Deer_____ Weapons Card _____

Archery _____ Slug _____ Muzzeloader _____

Health and Safety

Lyme disease (LD): A tick-borne bacterial disease that is becoming a significant health problem in Virginia. The primary vector for LD in the east coast states is the deer tick, but all ticks are potential vectors. LD bacterium can be transmitted at any time during the tick's active life cycle, which involves the following stages: larva, nymph, and adult. Small mammals, particularly mice, are the common hosts of the larval and nymphal stages, whereas deer are the primary hosts for adults. Larvae and nymphs are of particular concern because of their small size. Thorough tick checks should be made after being in an area inhabited by ticks.

Symptoms commonly associated with the early stages of the disease include flu-like symptoms such as a headache, chills, fatigue, fever, and sore, aching muscles and joints. A large red rash, usually characteristic of LD, can appear within 3 to 32 days after an infected tick bites a person. The rash most often appears around the bite but can occur elsewhere on the body. However, sportsmen should be aware that not all individuals will develop a rash. If any of the above symptoms develop, consult your physician immediately.

Rabies: May be prevalent in the area. Sportsmen should consult their physician for advice on pre-exposure vaccines. If you are bit and suspect rabies, please consult your physician immediately.

West Nile Virus: Has been confirmed in the State of Virginia from year to year. Symptoms of West Nile Virus often include fever, headache, tiredness, and body aches. These symptoms usually only persist for a few days. To reduce the possible exposure to West Nile Virus, apply insect repellant contain permethrin; do not spray permethrin directly on the skin. Wear long pants and long sleeved shirts weather permitting. Remove and prevent any standing water around your house and yard, including empting and refilling bird baths and pet's water bowl once or twice per week.

Venomous Snakes: Are present on the installation. Canebrake Rattlesnake, Copperhead, and Cottonmouths have all been observed

and present high risk when encountered and bitten. Consult medical help immediately upon being bit by any of these species. **Black Bear**: Are present on the installation. If a bear is encountered make lots of noise, make yourself look big and back away slowly. Take bear spray in the woods with you as a deterrent. Report bear/human conflicts to the NR manager as soon as possible.

Due to the risks of contracting wildlife diseases, hunters are advised to wear rubber gloves while field dressing deer and other game animals.

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Enclosure 3. Deer Harvest Data

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DMAP REPORT NAME : **2018 NSA Northwest Annex**

DATE: ***26-Apr-19***

Table 1. DMAP Cooperator and Data Information

| | | |

DMAP REPORT NAME : 2018 NSA Northwest Annex

DATE: *26-Apr-19*

Table 3. Deer Kill Summary

	ANTLERED MALES (with ages)	ANTLERED MALES (without ages)	TOTAL ANTLERED MALES	MALE FAWNS	MALES (no age or antlers)	FEMALES	UNKNOWN SEX	TOTAL KILL
Total	18	1	19	0	0	13 (41%)	0	32
Kill/Square Mile			3.3			2.2		5.5

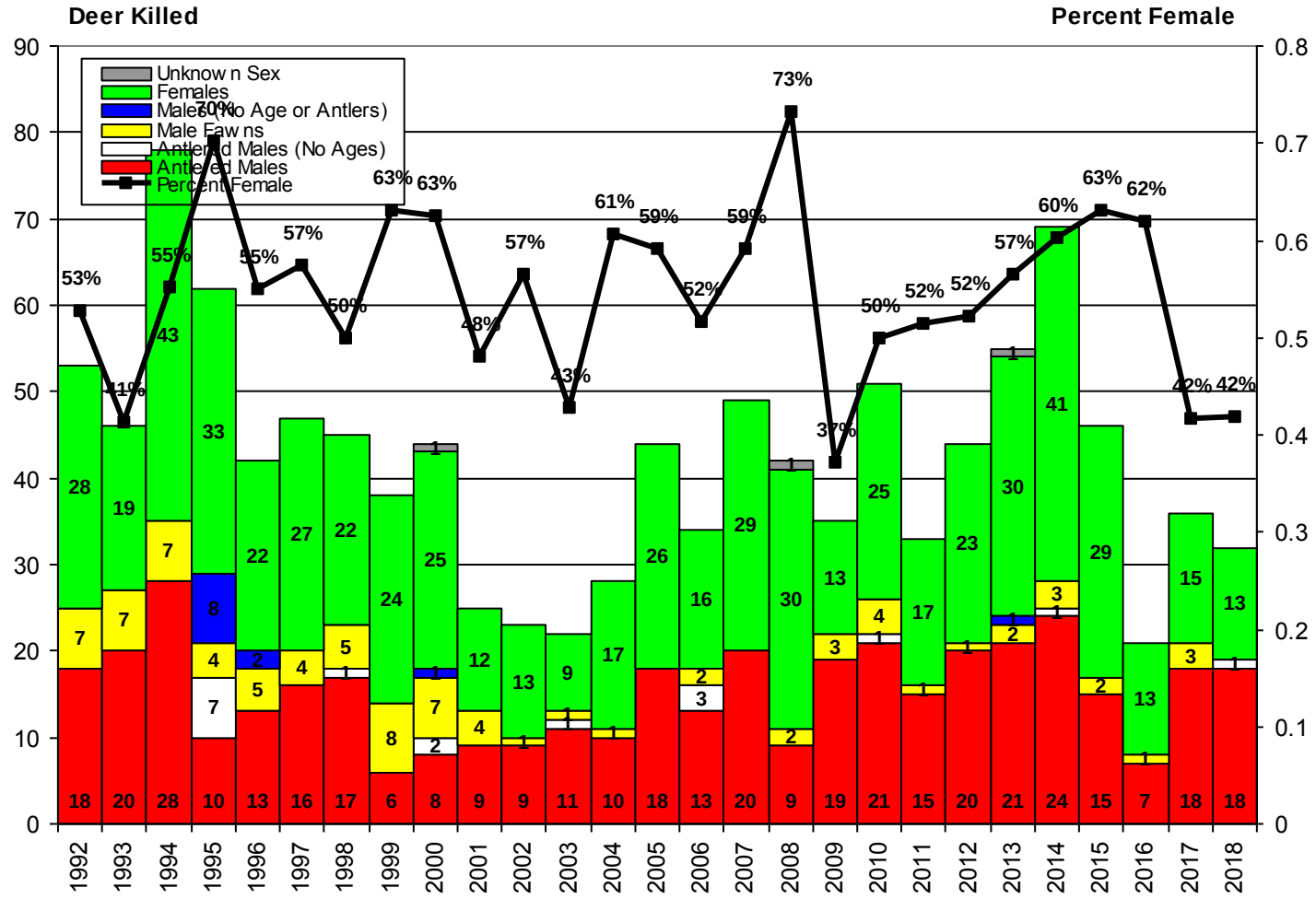
Table 4. Deer Kill History

SEASON	SQ MI	TOTAL ANTLERED MALES	MALE FAWNS	FEMALES	(%)	UNKNOWN SEX	TOTAL KILL
1992	5.7	18 (3.1)	7	28 (4.9)	53%	0	53 (9.2)
1993	5.7	20 (3.5)	7	19 (3.3)	41%	0	46 (8.0)
1994	5.7	43 (7.5)	7	43 (7.5)	55%	0	78 (13.6)
1995	5.7	18 (3.1)	4	33 (5.8)	53%	0	62 (10.8)
1996	5.7	13 (2.3)	5	22 (3.8)	52%	0	42 (7.3)
1997	5.7	16 (2.8)	4	27 (4.7)	57%	0	47 (8.2)
1998	5.7	18 (3.1)	5	22 (3.8)	49%	0	45 (7.8)
1999	5.7	6 (1.0)	8	24 (4.2)	63%	0	38 (6.6)
2000	5.8	10 (1.7)	7	25 (4.3)	57%	1	44 (7.6)
2001	5.8	9 (1.6)	4	12 (2.1)	48%	0	25 (4.3)
2002	5.8	9 (1.6)	1	13 (2.2)	57%	0	23 (4.0)
2003	5.8	12 (2.1)	1	9 (1.6)	41%	0	22 (3.8)
2004	5.8	10 (1.7)	1	17 (2.9)	61%	0	28 (4.8)
2005	5.8	18 (3.1)	0	26 (4.5)	59%	0	44 (7.6)
2006	5.8	16 (2.8)	2	16 (2.8)	47%	0	34 (5.9)
2007	5.8	20 (3.5)	0	29 (5.0)	59%	0	49 (8.5)
2008	5.8	9 (1.6)	2	30 (5.2)	71%	1	42 (7.3)
2009	5.7	19 (3.3)	3	13 (2.3)	37%	0	35 (6.1)
2010	5.7	22 (3.8)	4	25 (4.4)	49%	0	51 (8.9)
2011	5.7	15 (2.6)	1	17 (3.0)	52%	0	33 (5.8)
2012	5.7	20 (3.5)	1	23 (4.0)	52%	0	44 (7.7)
2013	5.7	21 (3.7)	2	30 (5.2)	55%	1	55 (9.6)
2014	5.7	25 (4.4)	3	41 (7.2)	59%	0	69 (12.0)
2015	5.8	15 (2.6)	2	29 (5.0)	63%	0	46 (7.9)
2016	5.8	7 (1.2)	1	13 (2.2)	62%	0	21 (3.6)
2017	5.8	18 (3.1)	3	15 (2.6)	42%	0	36 (6.2)
2018	5.8	19 (3.3)	0	13 (2.2)	41%	0	32 (5.5)

DMAP REPORT NAME : **2018 NSA Northwest Annex**

DATE: ***26-Apr-19***

Figure 1. Deer Kill History



DMAP REPORT NAME : 2018 NSA Northwest Annex

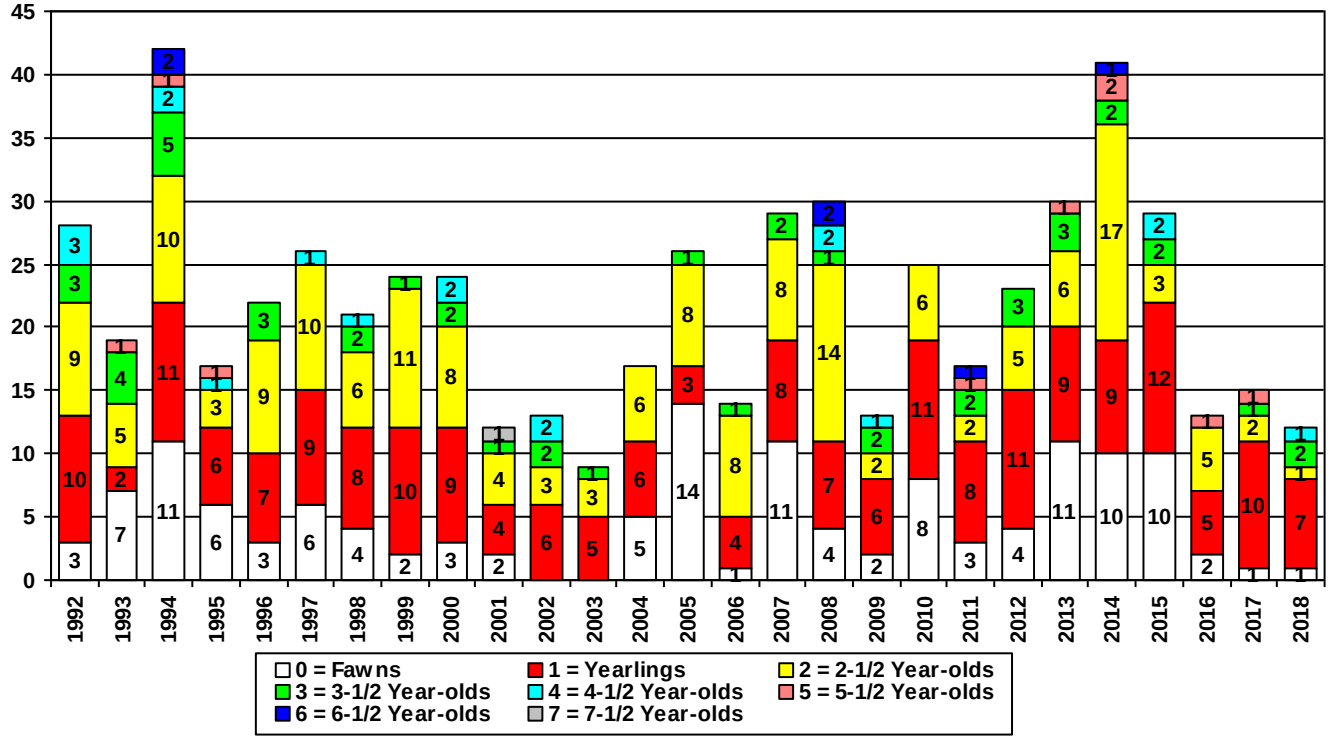
DATE: *26-Apr-19*

Table 5. Deer Kill Age Distribution

	MALE		FEMALE		TOTAL	
AGE	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**
0 = Fawns	0	0%	1	8%	1	3%
1 = Yearlings	9	50%	7	58%	16	53%
2 = 2-1/2 Year-olds	8	44%	1	8%	9	30%
3 = 3-1/2 Year-olds	1	6%	2	17%	3	10%
4 = 4-1/2 Year-olds	0	0%	1	8%	1	3%
5 = 5-1/2 Year-olds	0	0%	0	0%	0	0%
6 = 6-1/2 Year-olds	0	0%	0	0%	0	0%
7 = 7-1/2 Year-olds	0	0%	0	0%	0	0%
8 = >=8-1/2 Year-olds	0	0%	0	0%	0	0%
Totals	**18**	100%	**12**	100%	**30**	100%

Note: The fawn per yearling and adult female ratio (FDR) is 0.09 **(** 1 **/** 11 **)**

Figure 2. Female Deer Kill by Age Class By Year (including female fawns)



DMAP REPORT NAME : 2018 NSA Northwest Annex

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Figure 3. Yearling and Adult Male Deer Kill by Age Class by Year (male fawns not included)

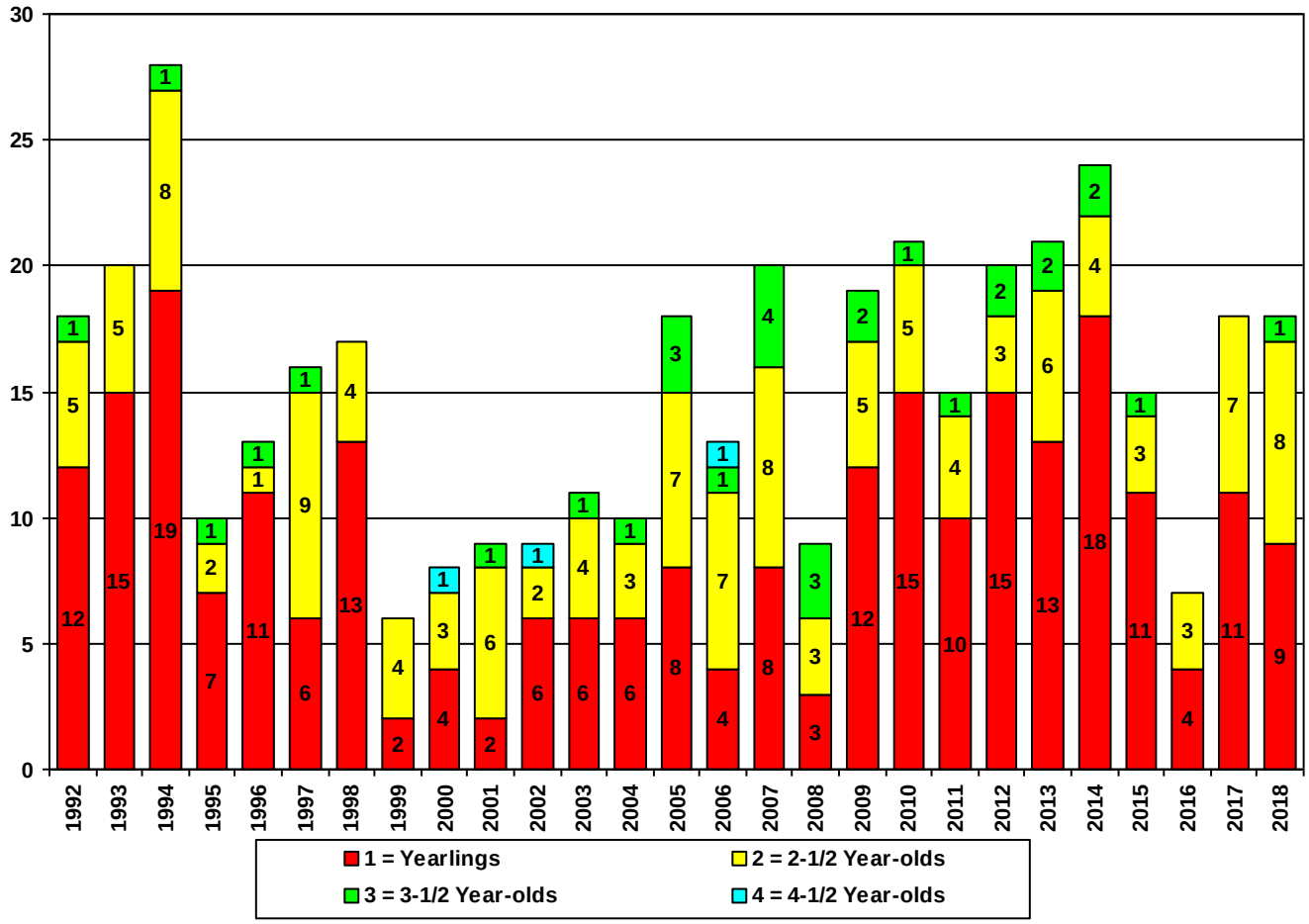

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Table 6. Statistics for Females

AGE	DRESSED WEIGHTS Avg.	No.	LACTATION RATES Percent	No.
0 = Fawns	47	1		
1 = Yearlings	71	7	33%	(1 / 3)
2 = 2-1/2 Year-olds	75	1	100%	(1 / 1)
3 = >=3-1/2 Year-olds	84	3	0%	(0 / 2)

Table 7. Statistics for Females History

SEASON	***AVERAGE DRESSED CARCASS WEIGHT*** FEMALE FAWNS	YEARLING FEMALES	ADULT FEMALES	**********LACTATION RATES********** YEARLING FEMALES	2-1/2 FEMALES	>=3-1/2 FEMALES	FAWN PER DOE RATIO
1992	35 (3)	59 (10)	65 (14)	(/ 9)	71% (5 / 7)	40% (2 / 5)	0.40 (10 / 25)
1993	38 (7)	67 (2)	73 (10)	(/ 2)	80% (4 / 5)	20% (1 / 5)	1.17 (14 / 12)
1994	64 (11)	74 (10)	69 (18)	10% (1 / 10)	20% (2 / 10)	20% (2 / 10)	0.58 (18 / 31)
1995	36 (6)	61 (6)	77 (5)	(/ 6)	67% (2 / 3)	50% (1 / 2)	0.91 (10 / 11)
1996	38 (3)	62 (7)	72 (12)	14% (1 / 7)	67% (6 / 9)	100% (3 / 3)	0.42 (8 / 19)
1997	44 (6)	62 (9)	75 (11)	33% (3 / 9)	80% (8 / 10)	100% (1 / 1)	0.50 (10 / 20)
1998	43 (4)	67 (8)	73 (9)	13% (1 / 8)	50% (3 / 6)	33% (1 / 3)	0.53 (9 / 17)
1999	46 (2)	70 (10)	78 (12)	10% (1 / 10)	82% (9 / 11)	(/ 1)	0.45 (10 / 22)
2000	38 (3)	67 (9)	74 (12)	11% (1 / 9)	50% (4 / 8)	25% (1 / 4)	0.48 (10 / 21)
2001	48 (2)	59 (4)	77 (6)	25% (1 / 4)	33% (1 / 3)	(/ 2)	0.60 (6 / 10)
2002	0 (0)	74 (5)	85 (7)	(/ 6)	(/ 3)	75% (3 / 4)	0.08 (1 / 13)
2003	0 (0)	77 (5)	74 (4)	20% (1 / 5)	33% (1 / 3)	100% (1 / 1)	0.11 (1 / 9)
2004	48 (5)	70 (6)	83 (6)	33% (2 / 6)	17% (1 / 6)	(/)	0.50 (6 / 12)
2005	45 (14)	66 (3)	79 (9)	33% (1 / 3)	50% (4 / 8)	100% (1 / 1)	1.17 (14 / 12)
2006	46 (1)	61 (4)	78 (8)	(/ 4)	43% (3 / 7)	(/ 1)	0.23 (3 / 13)
2007	51 (11)	75 (8)	79 (10)	13% (1 / 8)	38% (3 / 8)	(/ 2)	0.61 (11 / 18)
2008	46 (4)	70 (7)	82 (19)	17% (1 / 6)	23% (3 / 13)	(/ 4)	0.23 (6 / 26)
2009	42 (2)	85 (6)	86 (5)	(/ 6)	(/ 2)	(/ 3)	0.45 (5 / 11)
2010	51 (8)	75 (11)	88 (6)	(/ 11)	17% (1 / 6)	(/)	0.71 (12 / 17)
2011	49 (3)	71 (8)	80 (6)	57% (4 / 7)	100% (1 / 1)	100% (1 / 1)	0.29 (4 / 14)
2012	50 (4)	70 (11)	85 (8)	(/ 11)	60% (3 / 5)	33% (1 / 3)	0.26 (5 / 19)
2013	43 (11)	70 (9)	76 (10)	22% (2 / 9)	67% (4 / 6)	(/ 4)	0.74 (14 / 19)
2014	45 (10)	70 (9)	78 (22)	13% (1 / 8)	20% (3 / 15)	40% (2 / 5)	0.42 (13 / 31)
2015	45 (10)	67 (12)	83 (7)	25% (3 / 12)	33% (1 / 3)	25% (1 / 4)	0.63 (12 / 19)
2016	36 (2)	66 (5)	81 (6)	20% (1 / 5)	60% (3 / 5)	100% (1 / 1)	0.27 (3 / 11)
2017	38 (1)	71 (10)	82 (4)	10% (1 / 10)	50% (1 / 2)	(/ 2)	0.29 (4 / 14)
2018	46 (1)	69 (7)	80 (4)	33% (1 / 3)	100% (1 / 1)	(/ 2)	0.09 (1 / 11)

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Figure 4. Female Average Dressed Carcass Weight

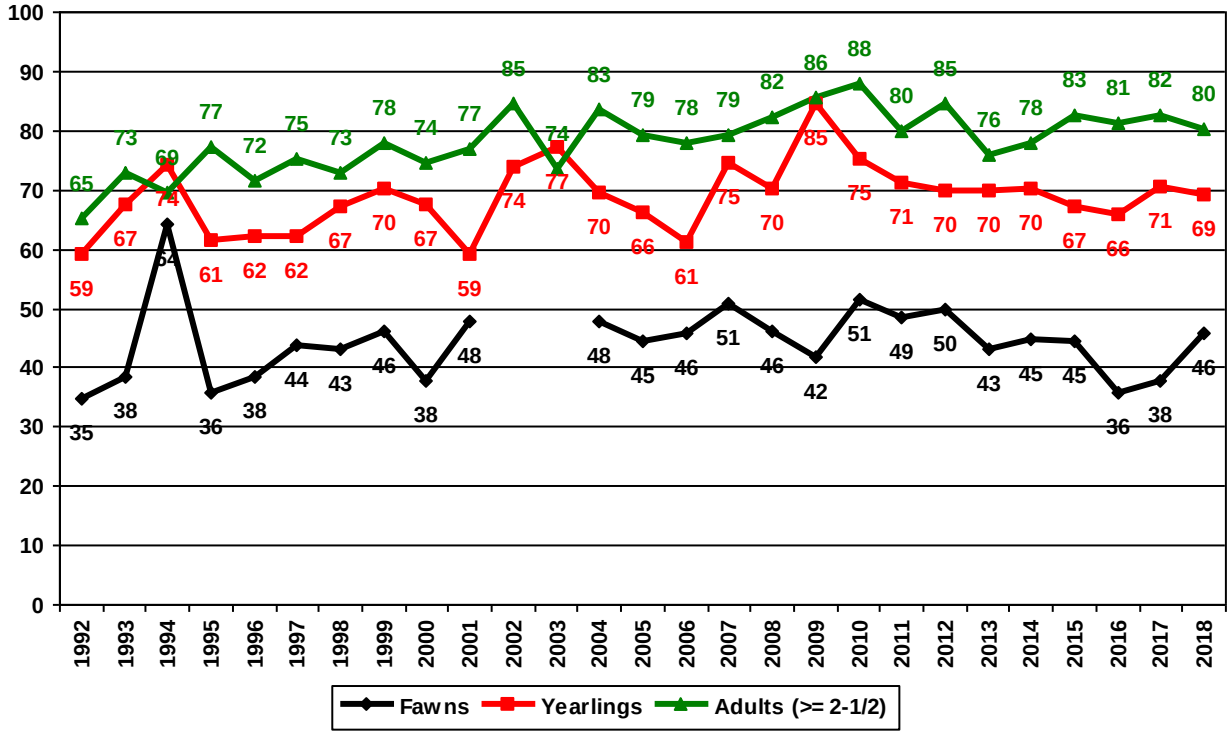

Figure 5. Female Lactation Rates

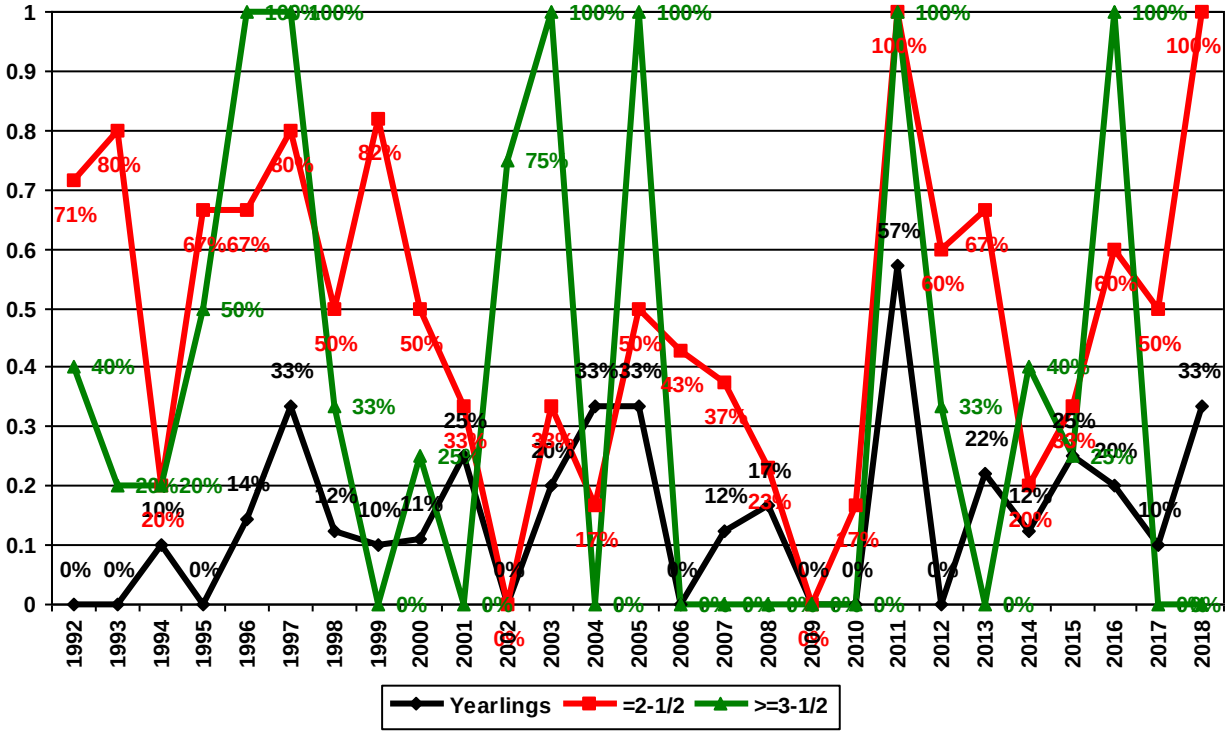

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Figure 6. Fawn Per Doe Ratio (FDR)

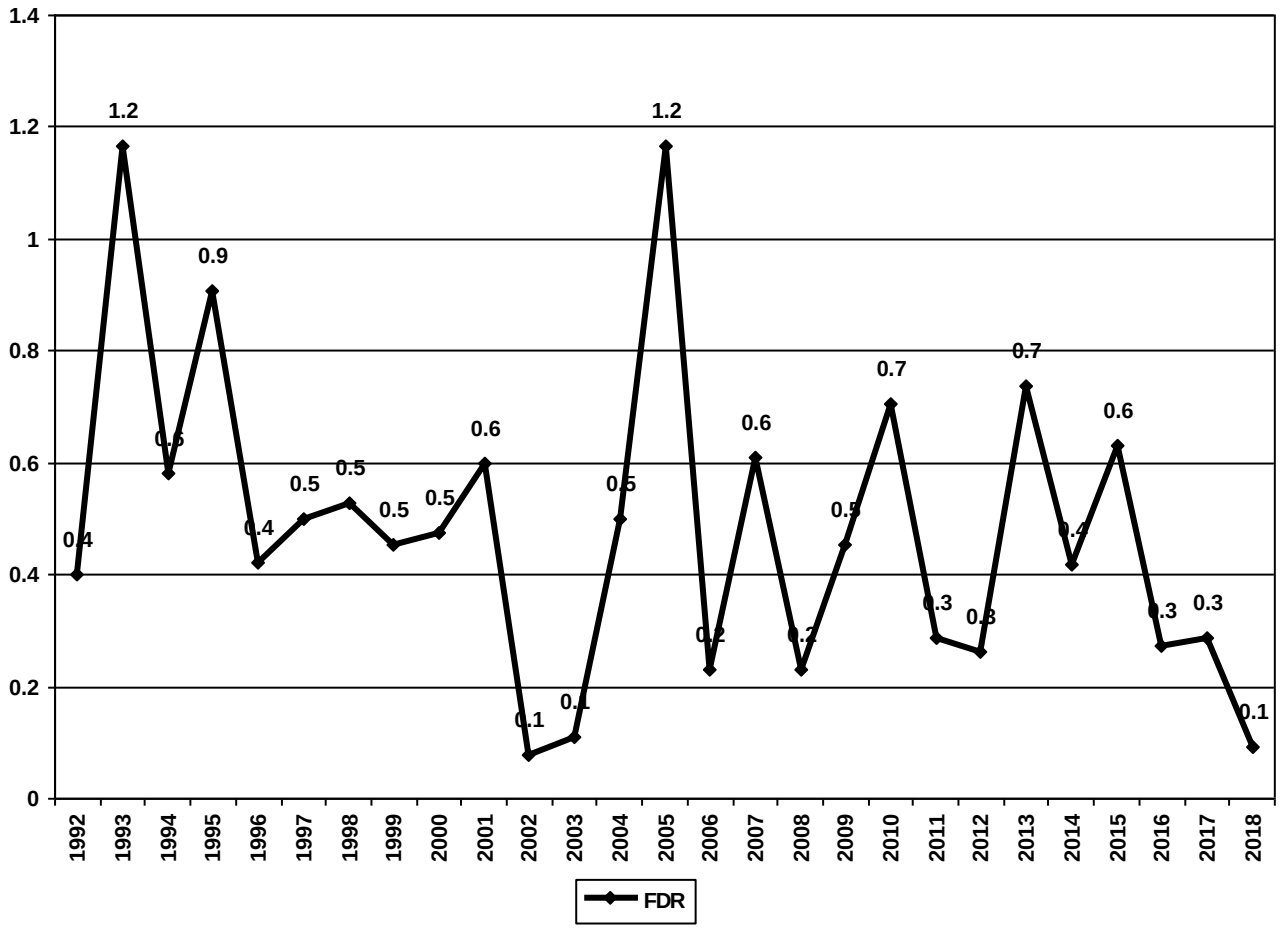

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Table 8. Statistics for Males

AGE	DRESSED WEIGHT Avg.	DRESSED WEIGHT No.	ANTLER POINTS Avg.	ANTLER POINTS No.	BEAM DIAMETER Avg.	BEAM DIAMETER No.	OUTSIDE SPREAD Avg.	OUTSIDE SPREAD No.
0 = Fawns		0						
1 = Yearlings	82	9	2.3	9	13.3	9	6.5	8
2 = 2-1/2 Year-olds	101	8	5.0	8	20.3	8	10.5	8
3 = >=3-1/2 Year-olds	95	1	4.0	1	12.0	1	6.6	1

Note: The percent yearling males in the adult antlered buck kill was 50% (9 / 18)

Table 9. Statistics for Males History

	**********AVERAGE DRESSED CARCASS WEIGHT**********			
	MALE FAWNS	YEARLING MALES	2 YEAR-OLD MALES	>=3 YEAR-OLD MALES	% YEARLING MALES
1992	46 (7)	82 (12)	109 (5)	137 (1)	67% (12 / 18)
1993	42 (7)	81 (15)	106 (5)	( )	75% (15 / 20)
1994	72 (7)	70 (18)	79 (8)	101 (1)	68% (19 / 28)
1995	53 (4)	85 (7)	97 (2)	119 (1)	70% (7 / 10)
1996	44 (5)	83 (11)	112 (1)	120 (1)	85% (11 / 13)
1997	48 (4)	94 (6)	108 (9)	114 (1)	38% (6 / 16)
1998	49 (5)	83 (13)	112 (4)	( )	76% (13 / 17)
1999	46 (8)	95 (2)	122 (4)	( )	33% (2 / 6)
2000	45 (7)	101 (4)	110 (3)	96 (1)	50% (4 / 8)
2001	44 (3)	80 (2)	106 (6)	114 (1)	22% (2 / 9)
2002	0 (0)	92 (6)	84 (2)	112 (1)	67% (6 / 9)
2003	42 (1)	84 (6)	120 (4)	121 (1)	55% (6 / 11)
2004	42 (1)	99 (6)	121 (3)	155 (1)	60% (6 / 10)
2005	0 (0)	90 (8)	116 (7)	128 (3)	44% (8 / 18)
2006	39 (2)	93 (4)	111 (7)	136 (2)	31% (4 / 13)
2007	0 (0)	94 (8)	108 (8)	101 (3)	40% (8 / 20)
2008	44 (2)	90 (3)	116 (3)	111 (3)	33% (3 / 9)
2009	56 (3)	78 (12)	115 (5)	116 (2)	63% (12 / 19)
2010	55 (3)	85 (15)	114 (5)	134 (1)	71% (15 / 21)
2011	42 (1)	83 (10)	97 (4)	132 (1)	67% (10 / 15)
2012	46 (1)	91 (15)	133 (3)	123 (2)	75% (15 / 20)
2013	50 (2)	90 (12)	104 (6)	133 (2)	62% (13 / 21)
2014	50 (3)	82 (18)	102 (4)	92 (2)	75% (18 / 24)
2015	48 (2)	96 (10)	112 (3)	121 (1)	73% (11 / 15)
2016	46 (1)	76 (4)	89 (3)	( )	57% (4 / 7)
2017	48 (3)	88 (11)	121 (7)	( )	61% (11 / 18)
2018	0 (0)	81 (9)	100 (8)	95 (1)	50% (9 / 18)

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Figure 7. Male Average Dressed Carcass Weights

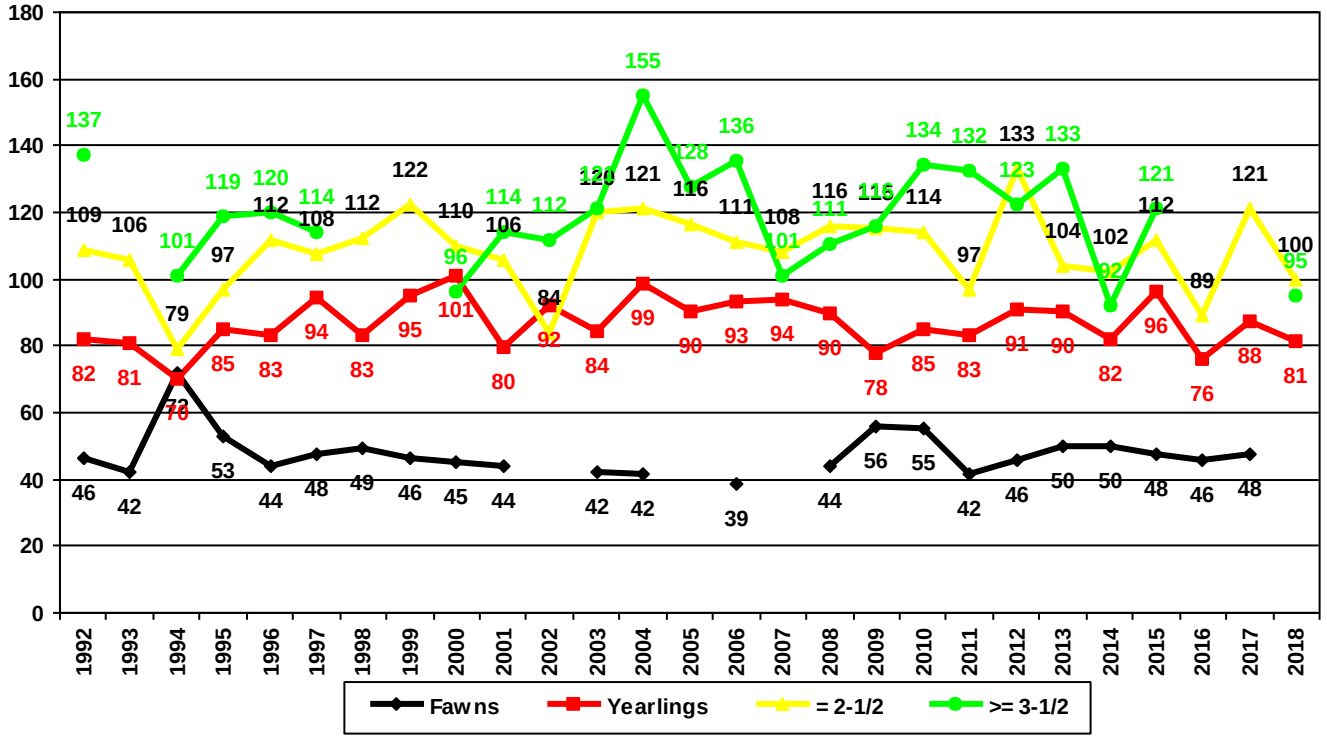

Figure 8. Adult Male Age Structure

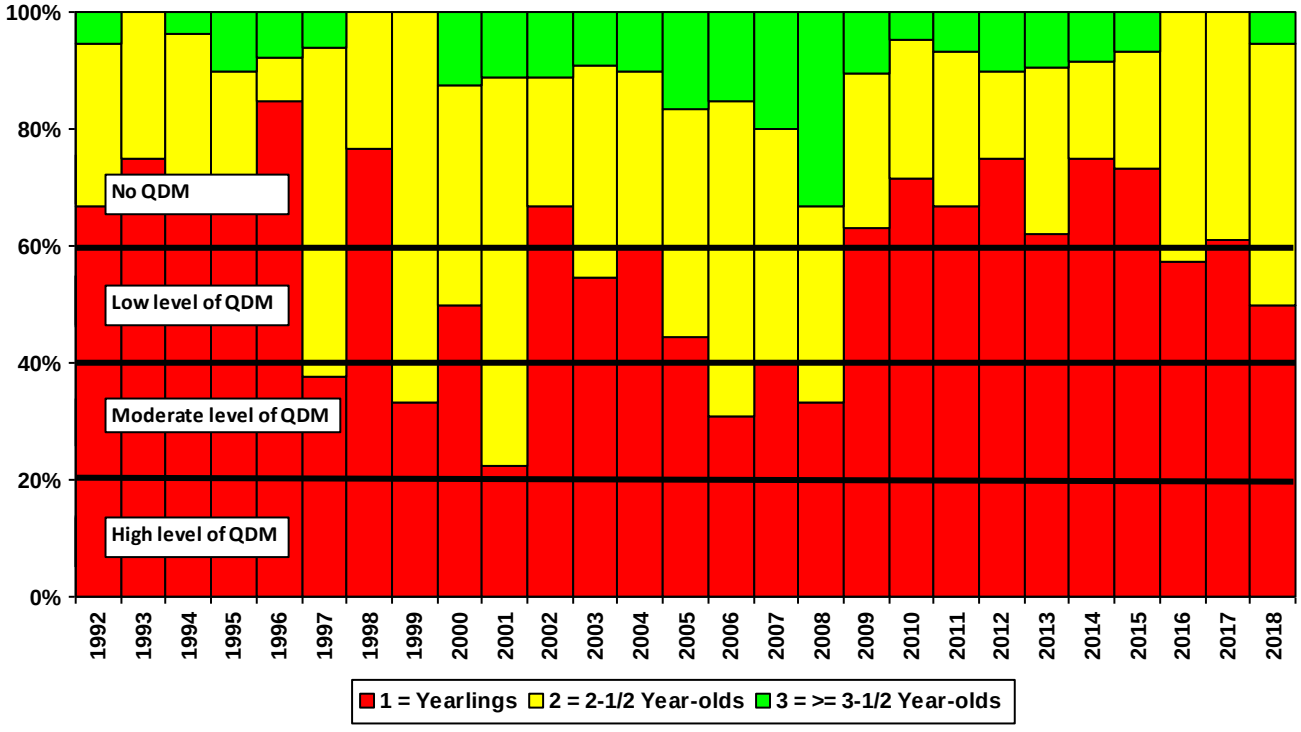

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Table 10. Average Antler Characteristics For 1-1/2 Year-old Males (Yearlings).

Season	Number of Antler Points		Antler Beam Diameter (mm)		Outside Antler Spread (in)	
1992	2.6	(10)	13.0	(10)		(0)
1993	2.4	(14)	13.3	(14)		(0)
1994	3.0	(9)	16.6	(9)		(0)
1995	2.4	(7)	14.9	(7)		(0)
1996	2.9	(8)	16.9	(8)		(0)
1997	3.2	(6)	16.8	(6)		(0)
1998	2.9	(12)	16.0	(11)		(0)
1999	4.0	(1)	27.0	(1)		(0)
2000	3.0	(4)	20.0	(2)	8.5	(2)
2001	5.0	(1)	19.0	(1)	6.0	(1)
2002	2.5	(6)	17.3	(6)	5.7	(5)
2003	2.0	(4)		(0)	7.0	(3)
2004	3.8	(6)	18.6	(5)	7.8	(6)
2005	3.3	(8)	8.0	(1)	6.9	(8)
2006	2.0	(4)	9.5	(2)	6.3	(4)
2007	2.8	(8)	16.6	(8)	7.0	(8)
2008	3.0	(3)	15.0	(2)	6.8	(3)
2009	2.0	(11)	13.1	(9)	4.9	(9)
2010	2.5	(15)	17.2	(15)	6.2	(15)
2011	2.3	(9)	14.9	(9)	5.7	(8)
2012	2.8	(13)	11.7	(13)	6.1	(12)
2013	2.4	(11)	13.8	(9)	6.4	(10)
2014	2.6	(18)	16.1	(16)	6.9	(18)
2015	2.8	(11)	12.6	(11)	6.5	(10)
2016	2.0	(4)	11.3	(3)	5.6	(4)
2017	2.5	(11)	13.6	(7)	6.3	(11)
2018	2.3	(9)	13.3	(9)	6.5	(8)

Figure 9. Average Antler Characteristics For 1-1/2 Year-old Males (Yearlings).

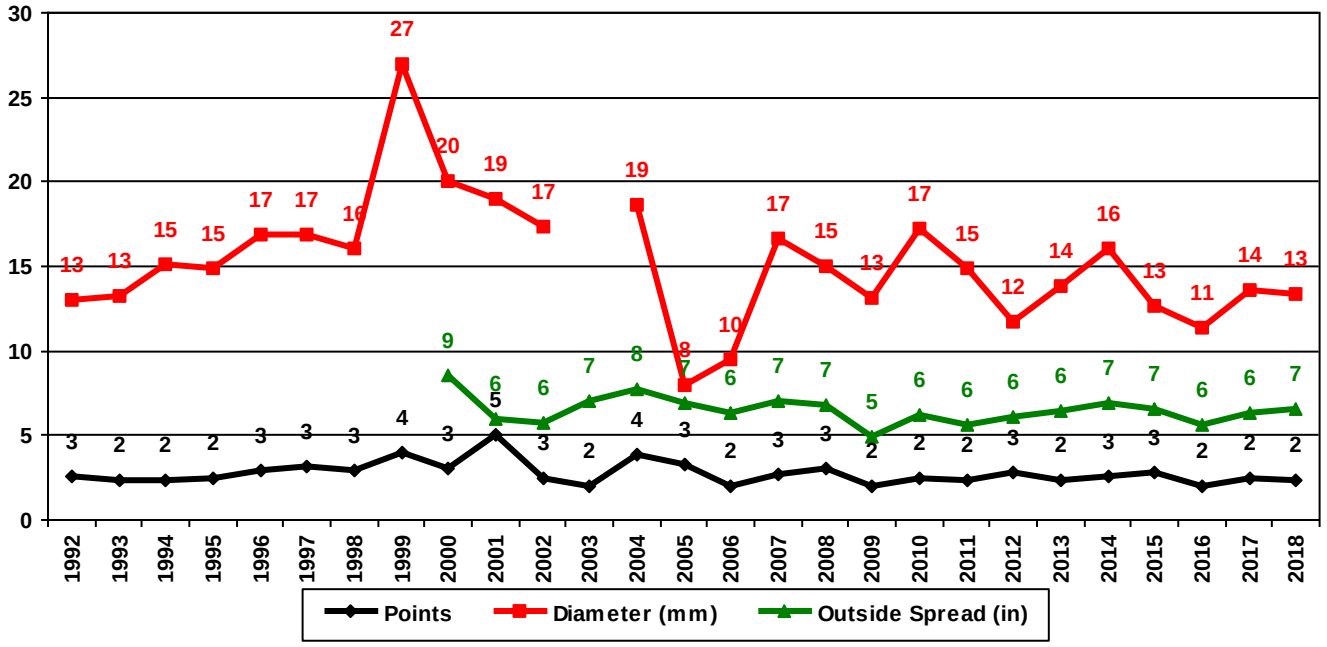

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Table 11. Average Antler Characteristics For 2-1/2 Year-old Males

Season	Number of Antler Points		Antler Beam Diameter (mm)		Outside Antler Spread (in)	
1992	4.8	(5)	17.8	(4)		(0)
1993	4.0	(5)	22.0	(4)		(0)
1994	2.3	(4)	17.5	(4)		(0)
1995	2.5	(2)	14.5	(2)		(0)
1996	6.0	(1)	26.0	(1)		(0)
1997	5.7	(9)	22.6	(9)		(0)
1998	5.3	(4)	24.0	(4)		(0)
1999	6.8	(4)	26.8	(4)		(0)
2000	6.0	(3)	17.5	(2)	13.0	(1)
2001	5.7	(6)	25.3	(6)	11.5	(4)
2002	3.0	(2)	20.5	(2)	6.6	(2)
2003	5.0	(4)	28.0	(2)	12.1	(4)
2004	5.0	(3)	22.5	(2)	13.3	(2)
2005	7.3	(7)		(0)	14.4	(7)
2006	5.1	(7)	17.2	(6)	10.6	(7)
2007	5.1	(8)	24.4	(8)	12.7	(7)
2008	6.3	(3)	26.0	(3)	10.6	(3)
2009	7.0	(5)	27.0	(5)	13.2	(5)
2010	5.8	(5)	26.0	(5)	14.1	(5)
2011	4.8	(4)	23.8	(4)	10.7	(3)
2012	3.7	(3)	16.3	(3)	8.8	(3)
2013	4.0	(6)	20.8	(6)	8.9	(6)
2014	4.0	(4)	23.8	(4)	11.9	(4)
2015	7.7	(3)	32.3	(3)	13.3	(3)
2016	5.0	(3)	17.0	(3)	8.2	(3)
2017	5.3	(7)	24.1	(7)	13.5	(7)
2018	5.0	(8)	20.3	(8)	10.5	(8)

Figure 10. Average Antler Characteristics For 2-1/2 Year-old Males.

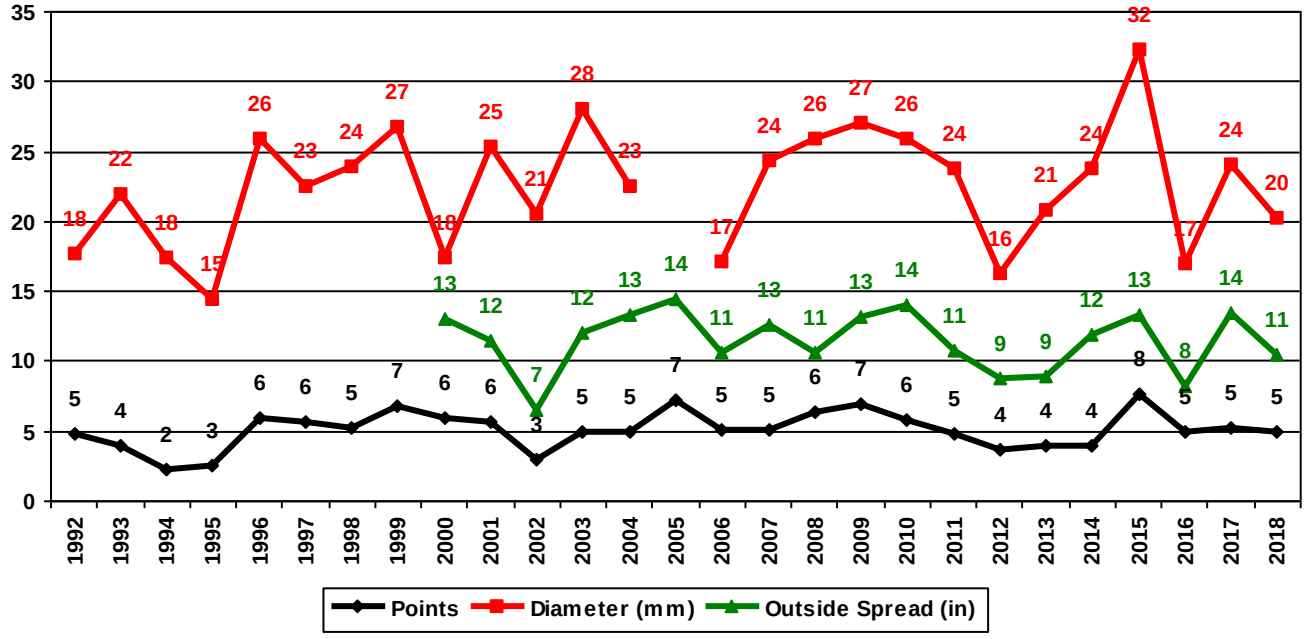

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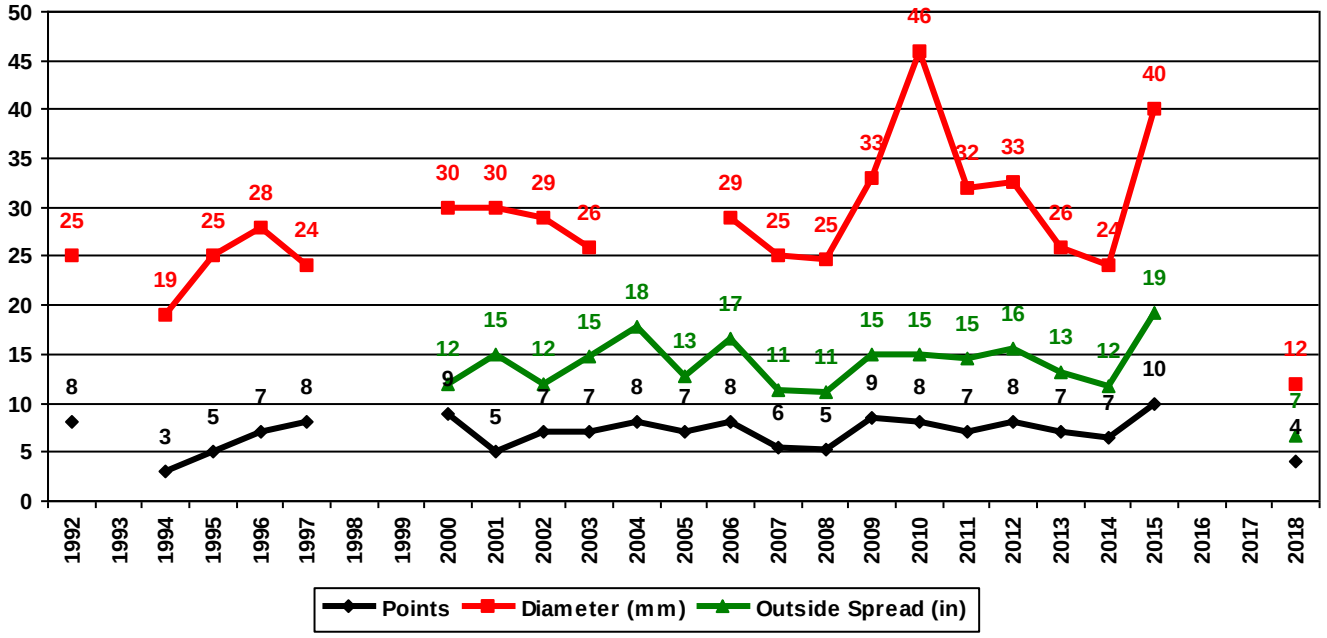
Table 12. Average Antler Characteristics For Males Greater Than Or Equal to 3-1/2 Years Of Age

Season	Number of Antler Points		Antler Beam Diameter (mm)		Outside Antler Spread (in)	
1992	8.0	(1)	25.0	(1)		(0)
1993		( )		( )		( )
1994	3.0	(1)	19.0	(1)		(0)
1995	5.0	(1)	25.0	(1)		(0)
1996	7.0	(1)	28.0	(1)		(0)
1997	8.0	(1)	24.0	(1)		(0)
1998		( )		( )		( )
1999		( )		( )		( )
2000	9.0	(1)	30.0	(1)	12.0	(1)
2001	5.0	(1)	30.0	(1)	15.0	(1)
2002	7.0	(1)	29.0	(1)	12.0	(1)
2003	7.0	(1)	26.0	(1)	14.8	(1)
2004	8.0	(1)		(0)	17.8	(1)
2005	7.0	(3)		(0)	12.8	(3)
2006	8.0	(2)	29.0	(2)	16.6	(2)
2007	5.5	(4)	25.0	(4)	11.3	(4)
2008	5.3	(3)	24.7	(3)	11.2	(3)
2009	8.5	(2)	33.0	(2)	15.0	(2)
2010	8.0	(1)	46.0	(1)	15.0	(1)
2011	7.0	(1)	32.0	(1)	14.5	(1)
2012	8.0	(2)	32.5	(2)	15.6	(2)
2013	7.0	(2)	26.0	(1)	13.3	(2)
2014	6.5	(2)	24.0	(2)	11.8	(2)
2015	10.0	(1)	40.0	(1)	19.3	(1)
2016		( )		( )		( )
2017		( )		( )		( )
2018	4.0	(1)	12.0	(1)	6.6	(1)

Figure 11. Average Antler Characteristics For Males Greater Than Or Equal to 3-1/2 Years Of Ag



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Enclosure 4. Commander, Navy Region Mid-Atlantic Instruction COMNAVREG MIDLANT INST) 11015.3 (Natural Resources Management for Fish and Wildlife, Feral Animals, Invasive Species, and Certain Pests)

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DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION, MID-ATLANTIC
6506 HAMPTON BLVD.
NORFOLK, VA 23508-1273

IN REPLY REFER TO:
COMNAVREG MIDLANT
INST 11015.3
REG ENG/Code 90
12 MAR 2003

COMNAVREG MIDLANT INSTRUCTION 11015.3

Subj: NATURAL RESOURCES MANAGEMENT FOR FISH AND WILDLIFE, FERAL ANIMALS, INVASIVE SPECIES, AND CERTAIN PESTS

Ref: (a) E.O. 13112
(b) NAVFAC P-73, Vol. II
(c) OPNAVINST 5090.1 (Series)
(d) 18 U.S. Code § 42
(e) 16 U.S. Code §§ 703-704
(f) 16 U.S. Code §§ 668-668c
(g) 16 U.S. Code § 1361, *et seq.*
(h) 50 C.F.R. pt. 10
(i) 50 C.F.R. pt. 21
(j) SECNAVINST 6401.1 (Series)
(k) NASOCEANAINST 3750.2 (Series)

1. Purpose. To prescribe procedures and assign responsibility for management and control of fish and wildlife, feral animals, invasive species, and certain pests within Commander, Navy Region, Mid-Atlantic (COMNAVREG MIDLANT) Area of Responsibility (AOR). This includes the areas of Naval Weapons Station (WPNSTA), Yorktown (including Cheatham Annex); Naval Air Station (NAS), Oceana (including Naval Auxiliary Landing Field [NALF] Fentress, Camp Pendleton, and Dam Neck Annex); Naval Station (NAVSTA), Norfolk (including St. Julien's Creek Annex and St. Helena Annex); Naval Support Activity (NAVSUPPACT), Norfolk (including Northwest Annex); Naval Amphibious Base (NAVPHIBASE), Little Creek; Fleet and Industrial Supply Center (FISC), Norfolk (Craney Island Fuel Depot and Yorktown Fuel Terminal); and Norfolk Naval Shipyard (NAVSHIPYD Norfolk), Portsmouth, VA (only New Gosport Annex, Scott Center Annex, and South Gate Annex).

2. Policy

a. Per references (a) through (c), the Navy is authorized to take measures to control invasive species.

b. References (d) through (g), the Lacey, Migratory Bird Treaty, Eagle Protection, and Marine Mammal Protection Acts, respectively, protect designated wildlife and control activity involving protected wildlife parts. Violations of these statutes may result in criminal prosecution. Regulations contained in references (h) and (i) implement reference (e) and list species protected by Federal law. Reference (j) describes government responsibility for preventing injury and diseases from animals.

3. Definitions

a. Per reference (a), an "invasive species" is a species that is non-native (or alien to the ecosystem under consideration), and whose introduction causes, or is likely to cause harm to economic, environmental, or human health.

b. Per reference (e), "take" means to pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

c. Per reference (c), "pest" refers to any organism (except for microorganisms that cause human or animal diseases) that adversely affects the well-being of humans or animals, attacks real property, supplies, equipment or vegetation, or is otherwise undesirable.

d. Per reference (j), "feral" refers to wild animals and unowned dogs, cats, or other domestic animals.

4. Responsibilities

a. Regional Engineer. The Commanding Officer, Navy Public Works Center/Regional Engineer (PWC/RE), Norfolk, as the Regional Environmental Program Manager, is responsible for management and control of, and for providing services pertaining to, fish and wildlife, feral animals, invasive species, and pests. On behalf of COMNAVREG MIDLANT, the Regional Engineer obtains natural resources permits required by Federal law to carry out this program. Regional Engineer authority, in natural resources matters, may be sub-delegated to a properly trained Regional Natural Resources Program Manager, under the supervision of the Regional Environmental Group Head.

(1) Environmental Services Desk. The PWC/RE Environmental Group provides pest management services through the Environmental Services Department. In addition, the Environmental Services Department responds to routine service calls for removal of non-migratory birds and control of feral animals. These services may be requested through the Environmental Services Desk at (757) 444-7528 during working hours and (757) 444-3477 after hours. Requests for services involving animals, such as sea turtles, marine mammals, game animals and migratory birds or raptors, not under the purview of the Environmental Services Department, will be referred by Service Desk personnel to Natural Resources Managers.

(2) Natural Resources Specialists. Under the direction of the Regional Natural Resources Program Manager, installation Natural Resource Specialists use integrated management practices and procedures to manage fish and wildlife and control certain feral, nuisance and invasive species. Per reference (k), Natural Resources personnel also develop and execute depredation and

dispersal procedures for Bird Animal/Aircraft Strike Hazard (BASH) purposes, and personally supervise these activities when lethal methods are required. Natural Resources Managers, and all other PWC/RE personnel involved in lethal control activities, must be properly trained and duly certified for all weapons employed in accordance with applicable regulations. These personnel are located in Storefront Compliance Departments of the Regional Environmental Group. Natural Resources personnel will also identify bird and/or other animal remains associated with aircraft mishaps in accordance with reference (k).

(3) Conservation Officers. Under the direction of Natural Resources Managers, Conservation Officers enforce fish and wildlife and other natural resources laws and regulations. They may conduct field inspections and employ approved control methods for certain species. Control measures include, but are not limited to, live trapping, relocation, and lethal methods. Conservation Officers also perform wildlife forensic investigations and respond to wildlife damage complaints.

(4) Regional Natural Resources Managers. Regional natural resources managers shall:

(a) Provide direction to natural resources managers and game wardens regarding the management of fish and wildlife and the control of feral animals, invasive species, and pests.

(b) Ensure appropriate approval and procedures are in place to properly issue, store, carry, and use firearms.

(c) Ensure the natural resource manager and game warden weapons qualifications cards are certified and remain current.

(d) Coordinate with local and regional security for required range time, qualifications, and DoD training as needed.

b. NAVSHIPYD Norfolk. Pest control services for NAVSHIPYD Norfolk are currently provided through government contract; these services may be requested through LANTNAVFACENGCOM at (757) 396-5121, extension 200.

c. Security Officers. Security Officers respond to emergency wildlife complaints and requests for services. Security Officers are an after-hours emergency contact point for Natural Resources Managers, Conservation Officers, and pest management personnel. Within existing resources and according to established training priorities, Security Officers also assist Natural Resources personnel in obtaining required weapons qualifications.

d. Airfield Facilities Division Officer. All bird/animal strikes should be investigated and reported in accordance with reference (k). Animal remains will be collected by the Airfield Facilities Division Officer and placed in appropriate BASH freezers located in Building 102 at NAS Oceana and LP-167 at Chambers Field, NAVSTA Norfolk.

e. Aviation Squadrons. All bird strikes must be reported in accordance with reference (k). Airfield Facilities or Natural Resources should be immediately contacted following any strike to ensure bird/animal remains are collected and identified.

5. Review. The Regional Natural Resources Program Manager is responsible for review and update of this instruction.

G. E. EICHERT
Chief of Staff

Distribution: www.cnrma.navy.mil

Enclosure 5. Chief of Naval Operations (CNO) Policy Letter on Feral Cats and Dogs

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DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

5090
Ser N456M/1U595820
10 JAN 2002

From: Chief of Naval Operations

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG POPULATIONS ON NAVY PROPERTY

Ref: (a) SECNAVINST 6401-1A, of 16 Aug 94, Veterinary Health Services
(b) AFPMB TIM #37, Guidelines for Reducing Feral/Stray Cat Populations on Military Installations in the United States
(c) OPNAVINST 6250.4B, dtd 27 Aug. 1998, Pest Management Programs
(d) Executive Order 13112 of 3 Feb 1999, Invasive Species

1. This letter clarifies the application of reference (a) regarding the prevention of free roaming (also called wild, feral or stray) cat and dog populations on Navy installations. The objective is to prevent injury or disease to Navy personnel, and eliminate adverse impacts on native wildlife. It requires Navy commands to institute pro-active pet management procedures in order to prevent establishment of free roaming cat and dog populations. Free roaming cats and dogs pose a potential public health threat to personnel on Navy installations, and they pose a threat to wildlife including endangered species and migratory birds.

2. Existing policy at Paragraph 4-2c(4) of reference (a) states "Dogs, cats, and other privately-owned or stray animals will not be permitted to run at large on military reservations." Consistent with this policy, Navy commands must ensure the humane capture and removal of free roaming cats and dogs. Consistent with this requirement, Trap/Neuter/Release (TNR) programs will no longer be established on Navy land. All existing TNR programs on Navy land must be terminated no later than 1 January 2003.

3. Responsible pet ownership is a key factor in eliminating free roaming cat and dog populations. In consultation with supporting Army Veterinary Office, installations shall implement appropriate pet management measures to preclude establishment

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG POPULATIONS ON NAVY PROPERTY

of feral cat/dog populations, including, but not limited to the following:

Require installation residents to keep and feed pet animals indoors or under close supervision when outdoors (such as on leash and collar or other physical control device - cage, fenced yard etc.).

Encourage neutering or spaying of cats and dogs before they reach reproductive age (exceptions to this policy can be made on a case by case basis as determined by the Installation Commander).

Require routine vaccinations of cats and dogs for rabies and other diseases as required by federal, state and local laws and ordnances. A current vaccination record is required at time of registration of pets.

Require microchipping registration (or other system of pet identification approved by supporting veterinary office) of all pet cats and dogs brought onto installations. Installation residents must register cats and dogs and have pets wear registration or identification tags at all times.

Prohibit the feeding of feral animals on the installation.

Provide educational materials to pet owners regarding installation regulations and general pet management.

Enforce prohibition of abandonment of animals on installations.

Comply with all humane and animal control regulations at the federal, state and local level (and their equivalents in host nation countries).

Navy installations in Europe that do not have a supporting veterinary office contact 100th Medical Detachment (VA HQ) (011) 49-622-177-2868; for all other locations that do not have a supporting veterinary office the POC is the VETCOM HQ, Commander (210) 221-6522.

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG POPULATIONS ON NAVY PROPERTY

4. Effective prevention, management and elimination of feral cat and dog populations requires close coordination and cooperation between natural resources, pest management, security, veterinary, and housing personnel to develop and implement an effective and humane program. Reference (b) provides information for preventing free roaming cat populations on military installations. General pest management guidelines are detailed in reference (c). Every effort should be made to work with other federal, state and local agencies to support reference (a) and reference (d) by eliminating free roaming cat and dog populations on Navy land. Navy commands should work with local animal control agencies to determine the best approach for the ultimate disposition of the captured animals. Every effort should be made, if practical, to find homes for adoptable feral cats and dogs.

5. My point of contact on this issue is Mr. Joe Cook, CNO N456M, at (703) 602-5335, or DSN 332-5335.

William G. Mattheis

WILLIAM G. MATTHEIS
Deputy Director, Environmental Protection, Safety and Occupational Health Division

Distribution:
CINCLANTFLT (N465)
CINCPACFLT (N465)
COMNAVRESFOR (01E, N46)
CNR (91)
CNET (44)
COMNAVSECGRU (N443)
COMNAVTELCOM (N451)
BUMED (NEGC-EPWR)
COMNAVAIRSYSCOM (AIR.OY)
COMSPAWARSYSCOM (07-1)
COMNAVSUPSYSCOM (4A2, 421)
COMNAVSEASYSCOM (SEA 00T)
COMNAVFACENGCOM (ENV, 09)
CINCUSNAVEUR (N4, N76)
COMSC (N00EP)
COMNAVMETOCCOM (N13)

Subj: POLICY LETTER PREVENTING FERAL CAT AND DOG POPULTIONS ON NAVY PROPERTY

Distribution:
CHBUMED (NEHC-EPWR)
DIRSSP (SP20161)
ONI (411)

Copy to:
OASN (I&E)
OAGC (I&E)
CNO, N44, N46, 09BF
CMC, LFL
COMNAVREG MIDLANT
COMNAVREG SE
NTC GREAT LAKES
COMNAVRESFOR
COMNAVREG SW
COMNAVREG PEARL HARBOR
COMNAVMARIANAS
COMNAVREG NW
CNFJ
CNFK
PACNAVFACENGCOM PEARL HARBOR HI (CODE 23)
LANTNAVFACENGCOM NORFOLK VA (CODE 2032)
SOUTHWESTNAVFACENGCOM SAN DIEGO CA (CODE 03EN)
SOUTHNAVFACENGCON CHARLESTON SC (CODE 064)
ENDFLDACT NE PHILADELPHIA PA (CODE 18)
ENGFLDACT WEST SAN BRUNO CA (CODE 053)
ENGFLDACT CHES WASHINGTON DC (CODE 20E)
ENGFLDACT NW POULSBO WA (CODE 05EC4)
CO PWC GREAT LAKES
CO PWC GUAM
CO PWC JACKSONVILLE
CO PWC NORFOLK
CO PWC PEARL HARBOR
CO PWC PENSACOLA
CO PWC SAN DIEGO
CO PWC SAN FRANSICO BAY
CO PWC WASHINGTON DC
CO PWC YOKOSUKA
CO CBC PORT HUENEME
CO CBC GULFPORT
OESO
MESO
DODVSA/OTSG (Chief Animal Medicine)

Enclosure 6. Pollinator-Friendly Management

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Pollinator Friendly Pesticide Applicator Best Management Practices

October 2014

Background

Pollinators, such as bees, bats, birds, and butterflies, are essential to the majority of the flowering plants in our environment and to the production of more than 130 different food crops. Pollinators are highly sensitive to many pesticides, especially insecticides. Your help as pest management personnel is critical to the continued safety of our food supply and environment. Proper pesticide use avoids harm to pollinators and their food sources, water, and habitats.

Use an integrated pest management (IPM) approach:

- Monitor and assess pest populations to determine if levels warrant control.
- Select the best combination of pest control options that minimizes risks to pollinators.

Read and Follow the Pesticide Label

On pesticide labels, look under the "Environmental Hazards" and "Directions for Use" headings for important information on protecting pollinators. Some labels warn against use of the product on blooming crops by stating, "Do not apply to blooming crops or weeds if bees are visiting in the treatment area." Some labels limit at-bloom applications to times when bees are not actively visiting, such as late evening. Apply the product in a manner consistent with the label directions.

Be Alert to Bloom

Presence of bloom is the key factor in pollinator exposure to pesticides. Honey bees and other pollinators are most at risk of poisoning when bee-toxic pesticides are applied to weeds or other vegetation that is blooming. Avoid applying any bee-toxic pesticides on blooming plants that attract bees. Keep pesticide drift from nearby blooming weeds that are attracting bees.

Timing of Pesticide Application

The time of pesticide application is very important. Apply pesticides that are toxic to bees in the evening when most honeybees have stopped foraging and returned to their hives. This allows the maximum time for the pesticide to decompose before the bees come into contact with it the next day.

Avoid Residual Toxicity

Use insecticides with short residuals. Do not apply insecticides having a long residual to blooming crops.

Check the Weather

Environmental conditions affect pesticide persistence. Daytime applications at low temperatures may cause some classes of pesticides to remain toxic much longer than during warm weather. Cloud cover also may prolong toxicity due to lower levels of ultraviolet light which breaks down many pesticides. Do not apply bee-toxic pesticides with extended residual toxicity on nights when dew is forecast. Dew may re-wet pesticides and increase bee exposure. Environmental conditions also affect bee activity. When high daytime temperatures encourage bees to begin foraging earlier or continue later than usual, adjust application times of bee-toxic pesticides accordingly. Experience shows that when bee-toxic pesticides are applied before or during cold nights, followed by warm summer days, the incidence of bee kills greatly increases.

Use Less Hazardous Pesticides

Neonicotinoid pesticides (i.e. pesticides with the active ingredient clothianidin, dinotefuron, imidacloprid, and thiamethoxam) may potentially cause adverse effects to pollinators. The EPA is taking steps to change these pesticide labels so they better protect bees by being clearer and more precise in their directions for pesticide application.

Use of neonicotinoid pesticides should be avoided in areas where pollinators may be present. Also avoid using them on any flowering plants. Use on flowering plants may result in exposure to bees even if applied when the plant is not flowering because they are taken up systemically and have a long residual.

Use the Least Hazardous Pesticide Formulation

Granular formulations are the least hazardous when bees are present because they are the least likely to drift. Dust and microencapsulated formulations are most hazardous to bees because they are similar in size to pollen and tend to stick to bee hairs. Dusts almost always drift more than other formulations. Emulsifiable concentrate formulations are usually less hazardous to bees than wettable powders because the powders remain toxic in the field longer. Spray formulations are usually safer to bees than dusts, but there are differences among spray types. Generally, water soluble formulations are safer than emulsifiable formulations, and fine sprays are less dangerous than coarse sprays. Sprays of undiluted pesticides may be more dangerous than diluted sprays.

Minimize Drift

Honey bees will visit the blooms of crops and/or weeds near target crops and be unintentionally impacted there by drift and pesticide residues. Keep the product on the intended area and apply pesticides with equipment that has been calibrated for the particular application. When appropriate, use ground applications instead of aerial applications to reduce risk of drift out of the target area.

Communicate with Beekeepers

Cooperation and communication among applicators and beekeepers greatly increases the likelihood of success in protecting pollinators and their habitats. Take the initiative to establish good relations and communication with commercial and local beekeepers. Notify beekeepers of future pesticide applications planned in the area so that they may attempt to protect their bees.

Learn about Local Regulations/Programs

Check for specific local ordinances pertaining to pollinators, especially beehive locations or designated preserves (if applicable). Some regions require that commercial beehive operations register the location where hives are being kept. Many states have regulations intended to reduce the hazard of insecticide applications to bees.

References

- The Center for Integrated Pest Management's Pollinator Protection: http://pesticidestewardship.org/pollinatorprotection/Pages/default.aspx
- EPA Pollinator Protection: http://www2.epa.gov/pollinator-protection

Contact Information

For more information regarding integrated pest management approaches, contact the installation Applied Biology Professional Pest Management Consultant. A list of Applied Biology contacts can be found at http://www.afpmb.org/content/navfac-applied-biology-center.

Enclosure 7. Nuisance Coyote & Nutria Management Plan

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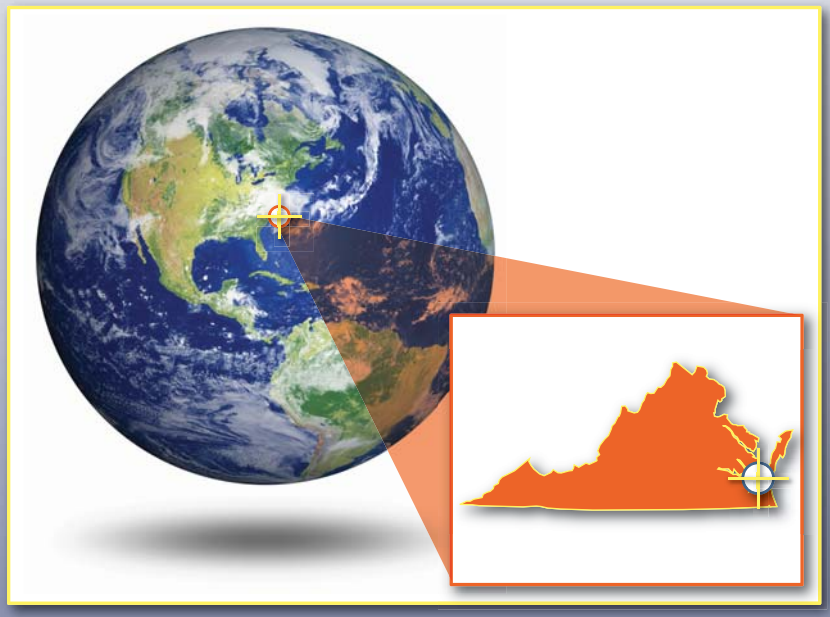
NAVFAC Atlantic Biological Resource Services

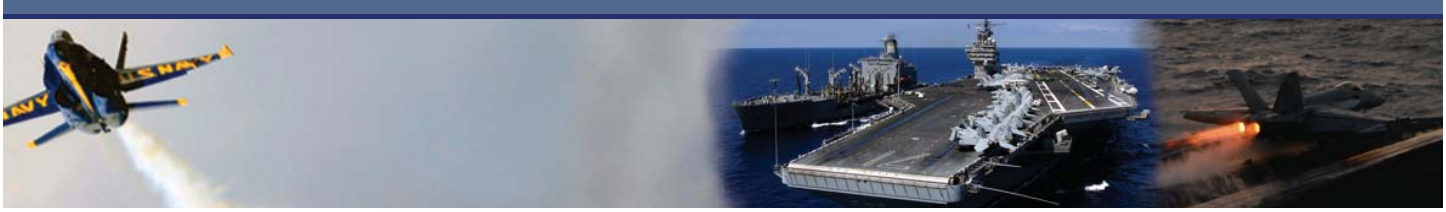
Contract: N62470-08-D-1008; Task Order: WE43

FINAL-August 2014

Nuisance Wildlife Management Plan, Version 1



Naval Support Activity Hampton Roads Northwest Annex, Chesapeake, Virginia and Currituck County, North Carolina



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NAVFAC Atlantic Biological Resource Services

Contract: N62470-08-D-1008; Task Order: WE43

Nuisance Wildlife Management Plan, Version 1

Naval Support Activity Hampton Roads Northwest Annex, Virginia and North Carolina

Final – August 2014

Prepared for:

NAVFAC Atlantic
6506 Hampton Blvd.
Norfolk, Virginia 23508

Prepared by:

Tetra Tech, Inc.
1320 North Courthouse Road, Suite 600
Arlington, VA 22201

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
ac	acre(s)
EO	Executive Order
ERL	environmental readiness levels
EV	Environmental
ha	hectare(s)
INRMP	Integrated Natural Resources Management Plan
MIDLANT	Mid-Atlantic
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NRM	Natural Resource Manager
NSAHR NWA	Naval Support Activity Hampton Roads Northwest Annex
OPNAVINST	Operational Navy Instruction
U.S.	United States
U.S.C.	U.S. Code
USDA-APHIS-WS	U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services Division
VAC	Virginia Administrative Code
VDGIF	Virginia Department of Game and Inland Fisheries
VFWIS	Virginia Fish and Wildlife Information Service

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1.0 INTRODUCTION

The U.S. Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic prepared this nuisance wildlife management plan for Naval Support Activity Hampton Roads Northwest Annex (NSAHR NWA) (Figure 1). The term nuisance wildlife includes species that adversely affect the well-being of domestic animals, other wildlife, property, or human health and safety. The Virginia Administrative Code (Title 4VAC15-20-160) lists the house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), black rat (*Rattus rattus*), coyote (*Canis latrans*), feral hog (*Sus scrofa*), nutria (*Myocastor coypus*), woodchuck (*Marmota monax*), European starling (*Sturnus vulgaris*), English sparrow (*Passer domesticus*), and pigeon (*Columba livia*) as nuisance species. All of these species are known to or have the potential to occur on NSAHR NWA. This plan is designed to address nuisance wildlife on NSAHR NWA and is designated as Version 1 to indicate that it is a living document to be updated as required to address changing conditions and new information as it becomes available.

Although all of these species occur or have the potential to occur at NSAHR NWA, coordination with installation personnel and local experts identified the coyote and nutria as the primary nuisance wildlife species of interest/concern at the time of this plan. Of the listed nuisance wildlife species, the occurrence of coyote and nutria was considered to have the greatest potential for adverse effects on NSAHR NWA. As a result of this determination, field surveys were initiated to gain baseline information on the occurrence of these two species and their potential habitats. The results of those surveys (Navy 2014a) are used herein to develop the guidance and recommendation for monitoring and control.

1.1 PURPOSE

The purpose of this management plan is to prevent nuisance wildlife from adversely affecting the military mission and operations on NSAHR NWA. This plan identifies and focuses management efforts and provides management guidelines for control of nuisance wildlife. This plan is recommended for implementation under the overarching guidance of NSAHR NWA's Integrated Natural Resources Management Plan (INRMP) (Navy 2014b).

1.2 GOALS AND OBJECTIVES

To effectively implement this management plan and evaluate its success, measurable goals and objectives must be identified. The goals include (1) informing installation personnel of the nuisance wildlife conditions and (2) minimizing nuisance wildlife concerns on NSAHR NWA. The objectives include (1) disseminating information on the occurrence and abundance of nuisance wildlife and (2) implementing management actions to prevent nuisance wildlife from becoming a threat to NSAHR NWA military mission and operations. Measures of success include the dissemination of fact sheets on nuisance wildlife and the number of nuisance complaints received. Implementation of this plan requires the cooperation of the installation commander and key persons within the chain of command affecting natural resources management.

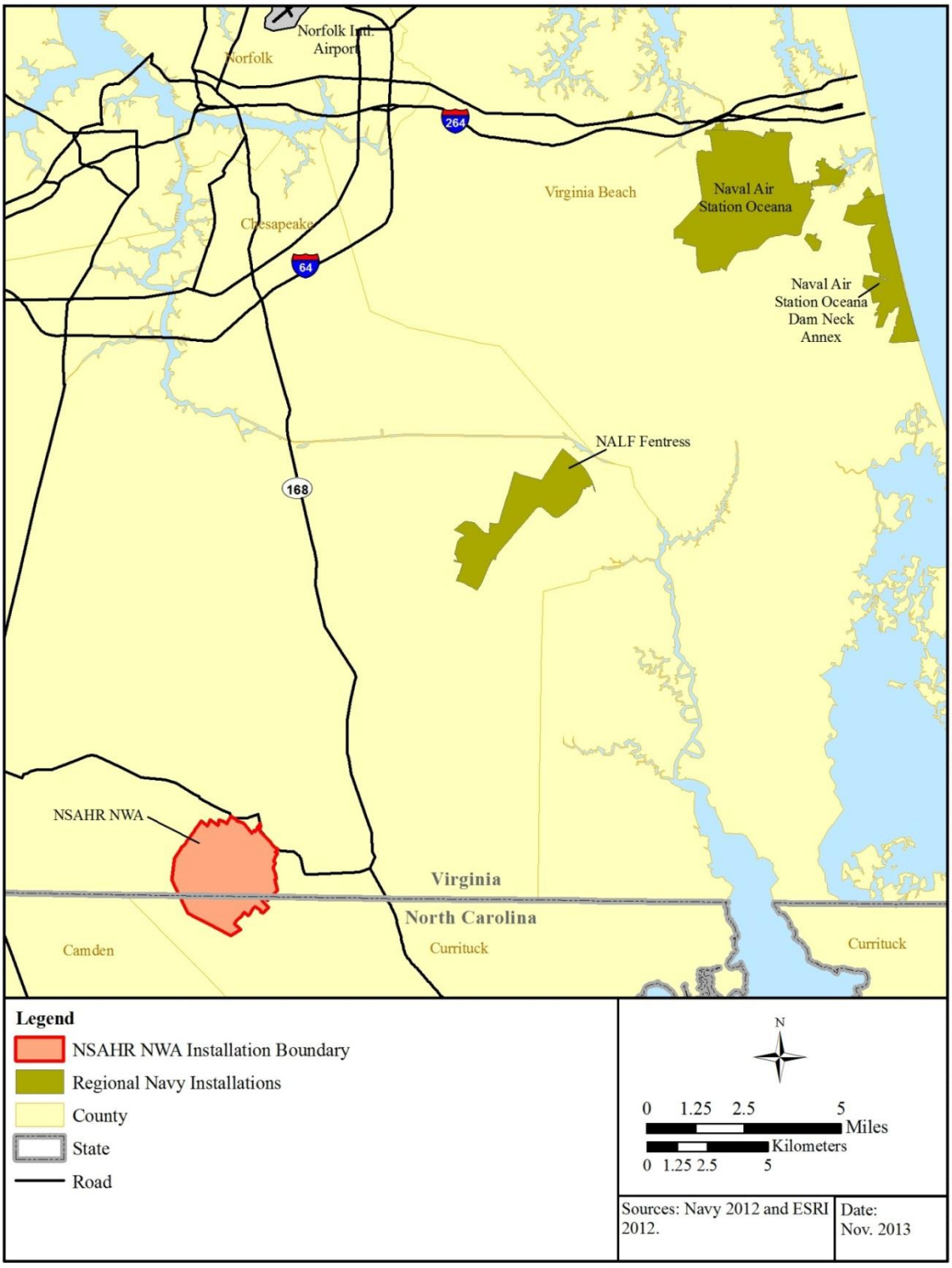

Figure 1. General Location of NSAHR NWA.

1.3 NATURAL RESOURCES OVERVIEW

Natural resources management on NSAHR NWA is part of a region-wide Navy natural resources program that is overseen by the mid-Atlantic regional natural resources program manager. The Natural Resources Manager (NRM), stationed at Naval Air Station (NAS) Oceana, supervises natural resources management activities on NSAHR NWA. Program administration includes 10 management issues and concerns. The primary natural resources issues are listed below.

- Wetlands and Water Quality
- Urban Forest Management and Landscaping
- Agricultural Outlease
- Forest Management
- Outdoor Recreation and Environmental Awareness
- Integrated Pest Management
- Fish and Wildlife Management
- Rare, Threatened, and Endangered Species Protection
- Forest Management
- Integrated Pest Management

There are three predominant land use areas recognized for planning of natural resources management activities. The land use areas include core management (urban/developed areas), operations (mission support areas), and forest conservation areas. Nuisance wildlife issues from coyote and nutria could occur in all areas of NSAHR NWA, but would be of greatest concern in the urban/developed and mission support areas.

2.0 ROLES AND RESPONSIBILITIES

Navy program requirements for ensuring military readiness and sustainability while complying with natural resource protection laws, and conserving and managing natural resources includes coordination of roles and responsibilities. Specific assignment of responsibilities, centralized supervision, professionally trained personnel, and stakeholder coordination are necessary for managing natural resources, including nuisance wildlife, on Navy lands as specified in the Operational Navy Instruction Manual (OPNAVINST 5090.1D, M-5090.1), *Environmental Readiness Program*. Coordination with state and other federal agencies enhances the Navy's ability to achieve stewardship of natural resources in support of readiness and sustainability.

2.1 STATE

The Virginia Department of Game and Inland Fisheries (VDGIF) is responsible for non-migratory game and non-game wildlife management in the Commonwealth of Virginia. Department biologists can assist planning and compliance with state regulations pertaining to the management of wildlife, including nuisance species. VDGIF provides additional information on coyote control at http://www.dgif.virginia.gov/wildlife/problems/coyotes/, including the no kill permit requirement, continuous open season, no Sunday hunting or killing permitted, and requirement to contact the Commonwealth Attorney's office for local information regarding legal methods of animal removal (some cities or counties have stricter regulations than state law). The Invasive Species Working Group of Virginia was established in 2009 by the General Assembly (Code of Virginia § 2.2-220.2) to develop a state invasive species management plan and list of invasive species that pose the greatest threat to the Commonwealth (Virginia Invasive Species Working Group 2012). The nutria is included in the list of invasive species that are actively managed or monitored in Virginia.

2.2 FEDERAL

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services Division (USDA-APHIS-WS) is the federal program authorized by law to reduce damage caused by wildlife in accordance with the Animal Damage Control Act of 1931, as amended (7 U.S. Code [U.S.C.] 426-426c) and the Rural Development, Agriculture, and Related Agencies Appropriations Act of 1988 (7 U.S.C. 426c). USDA-APHIS-WS provides technical assistance for control of nuisance wildlife. Their mission is to provide federal leadership and expertise to resolve wildlife conflicts and allow people and wildlife to coexist. Additional information is provided at www.aphis.usda.gov/wildlife_damage. Executive Order (EO) 13112, *Invasive Species,* directs USDA-APHIS-WS to provide national leadership and oversight in managing invasive species, including nuisance wildlife, in cooperation with other federal agencies. All USDA-APHIS-WS wildlife damage management is conducted in compliance with state and federal relevant laws, regulations, policies, orders, and procedures.

2.3 DEPARTMENT OF DEFENSE

Management of nuisance wildlife concerns is specified in the NSAHR NWA INRMP (Navy 2014b). EO 11987, *Exotic Organisms*, and EO 13112 address the control of invasive, non-native species on federal facilities. Procedures and responsibilities for management and control of

nuisance wildlife are prescribed in COMNAVREG MIDLANT INST 11015.3 (*Natural Resources Management for Fish and Wildlife, Feral Animals, Invasive Species, and Certain Pests*) (Appendix A). These documents direct installations to prevent introductions, conduct surveys on the distribution and abundance of non-native species, and to provide management for their control.

NAVFAC MIDLANT is responsible for management and control of, and providing services pertaining to, fish and wildlife, feral animals, invasive species, and pests. Pest management services are provided through the Environmental Services Department, which responds to routine service calls for removal of non-migratory birds and control of feral animals. Requests for services involving animals not under the purview of the Environmental Services Department are referred to NRMs.

Natural Resource Specialists, under the direction of the Regional Natural Resources Program Manager, are responsible for implementation of practices and procedures to manage fish and wildlife and control certain feral, nuisance, and invasive species. Under the direction of NRMs, Conservation Officers are responsible for enforcing fish and wildlife and other natural resources laws and regulations. They may conduct field inspections and employ approved control methods for certain species, perform wildlife forensic investigations, and respond to wildlife damage complaints.

Authority and responsibility for nuisance wildlife ultimately resides with the NAVFAC MIDLANT Core Environmental (EV) director. The NAVFAC MIDLANT CORE EV director may delegate this authority to the NAVFAC MIDLANT Core and/or the NAVFAC MIDLANT Installation NRM. The NAVFAC MIDLANT CORE EV director or an appointed delegate maintains the permits necessary for controlling species protected by federal or state law.

3.0 INSTALLATION DESCRIPTION

NSAHR NWA (Figure 2) was established by the Navy in 1951 for use by the Navy as a radio receiving station. NSAHR NWA is located along the southeastern border of Virginia and the northeastern border of North Carolina. The installation encompasses approximately 3,661 acres (ac, 1,481 hectares [ha]); most (75 percent) is in Chesapeake, Virginia, and the remaining 25 percent is in Currituck County, North Carolina. The surrounding area is largely undeveloped and is comprised of agricultural land and forested wetlands. The mission is to coordinate the provision of shore activity support to tenant commands and to the operational forces of the United States and its allies as required. This installation description is taken from the INRMP (2014b), which provides more detailed information on the physical and biological resources that are abbreviated below.

3.1 PHYSICAL RESOURCES

NSAHR NWA is located in Virginia's outer Atlantic Coastal Plain. The climate is moderated by the Atlantic Ocean; January is typically the coldest month (average 32.6^{o} Fahrenheit [F], 0.3^{0} Celsius [C]) and July is typically the warmest month (average 87.4^{o} F, 30.8^{0} C). The area receives an average of 45.7 inches of rain per year. The normal growing season (daily minimum temperatures higher than 32° F, 0.0^{0} C) is approximately 250 days from 22 March to 21 November.

The outer Atlantic Coastal Plain physiographic province is characterized as flat with low relief and elevations of 0–60 feet (0–18 meters) above mean sea level. The eastern half of NSAHR NWA has elevations of 5 to 20 feet (1.5 to 6 meters) above mean sea level. The western half is lower and is generally 5 feet above mean sea level.

Half of the soils on NSAHR NWA are hydric and have severe constrains for development due to wetness. The hydric soil associations encompass approximately 90 percent of the land area. Eight soil types are classified as Prime Farmland.

NSAHR NWA lies in the Chowan River–Dismal Swamp Basin, which is bordered by the James River Basin to the north and drains southward to the Albemarle Sound in North Carolina. The 100-year floodplain occurs on a small portion of NSAHR NWA.

3.2 BIOLOGICAL RESOURCES

Wetlands occur on 1,518 ac (614 ha), widely scattered across NSAHR NWA. All the wetlands are classified as palustrine and most is palustrine forested wetland.

The vegetative communities on NSAHR NWA include mesic mixed hardwood forest, nonriverine swamp forest, nonriverine pine-hardwood forest, coastal plain/piedmont bottomland forest, loblolly pine stands, and early successional communities. The fauna is generally representative of the natural areas of southeastern Virginia and northeastern North Carolina, with a diversity of mammals, reptiles and amphibians, fish, and birds. No federally-listed terrestrial wildlife species are known to occur on NSAHR NWA. The Virginia state-endangered canebrake rattlesnake (*Crotalus horridus*) and dismal swamp southeastern shrew (*Sorex longirostris fisheri*) are known to occur on NSAHR NWA. No North Carolina listed species are known to occur.

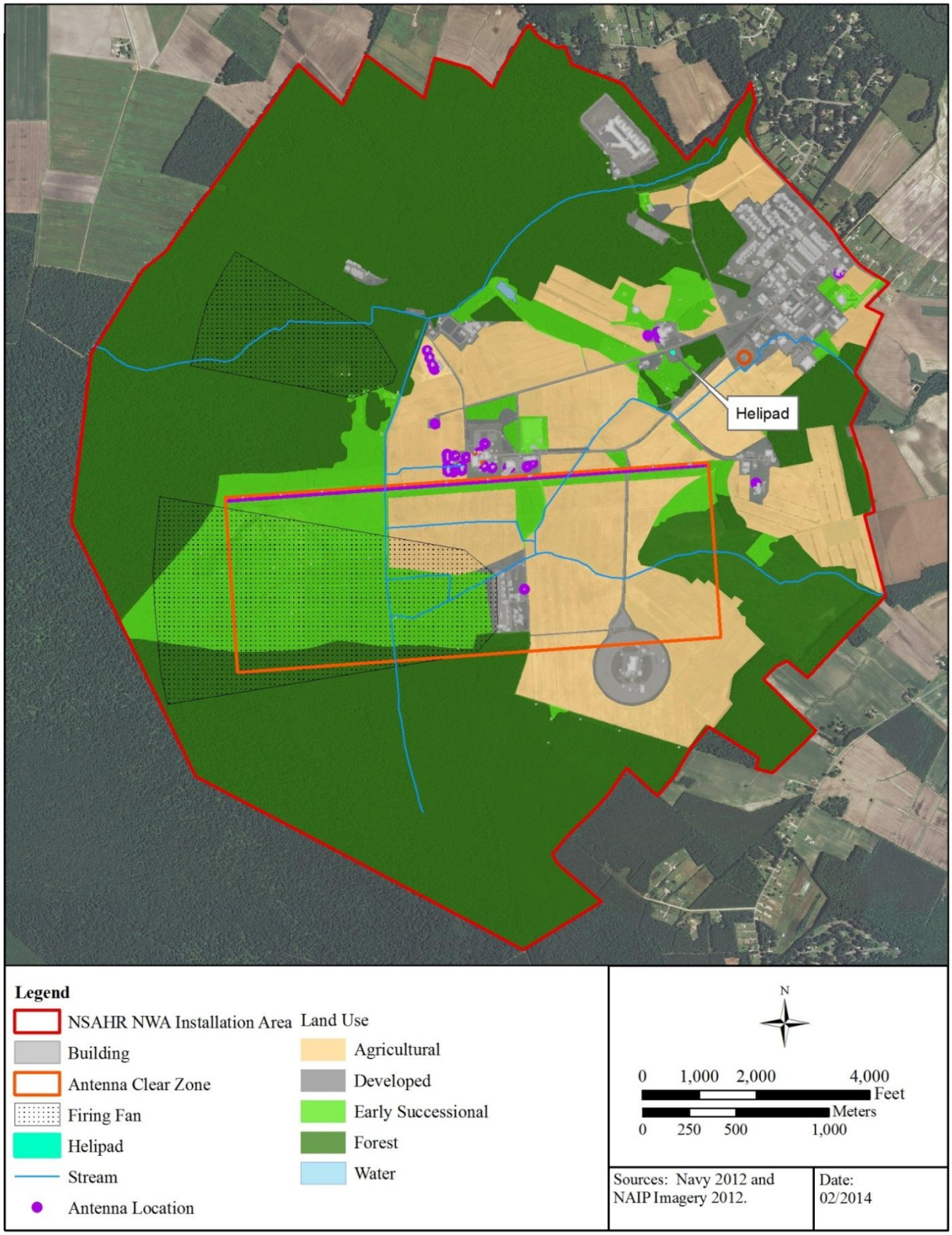

Figure 2. NSAHR NWA Land Use Areas.

4.0 NUISANCE WILDLIFE

The house mouse, Norway rat, black rat, European starling, English sparrow, and pigeon are known to or likely occur at NSAHR NWA. The bird and small mammal species at the time of this plan, do not pose a significant threat to the health and safety of personnel or the military mission.

The VDGIF has created a feral hog committee to address the growing feral hog problem in Virginia (http://www.dgif.virginia.gov/wildlife/feral-hogs/). At the time of this plan, no feral hogs are reported as occurring on NSAHR NWA; however, recent VDGIF reports indicate that feral hogs are in the vicinity. The woodchuck is present everywhere in Virginia except the eastern shore and the extreme southeastern corner of the state. Although the feral hog has the potential to someday expand its range to NSAHR NWA and the woodchuck does occur at NSAHR NWA, at the time of this plan the feral hog and woodchuck do not present significant threats to the health and safety of personnel or the military mission.

Of the 10 species listed as nuisance wildlife in Virginia, the coyote and nutria were considered to have the greatest potential to adversely affect mission activities on NSAHR NWA. Early detection and rapid response management of coyote and nutria is required to avoid harm to the well-being of domestic animals, other wildlife, property, or human health and safety. Accordingly, the other listed species are not considered further in this management plan. As new information becomes available on the distribution and abundance of nuisance wildlife and their potential impact on NSAHR NWA, an updated version of this management plan will be prepared. Brief background information for the coyote and nutria are presented within the following sections.

Prevention or control of wildlife damage, which often includes removal of the animals responsible for the damage, is an essential and responsible part of wildlife management (The Wildlife Society 1990).

4.1 COYOTE

Historically, coyotes were most commonly found on the Great Plains of North America. Their range now includes all of the continental United States (USDA 2011). The coyote was first observed in Virginia in the early 1950s (VFWIS 2013a). The coyote's great adaptability to almost any circumstances has led to its widespread occurrence. Factsheets (USDA 2011) with additional information are provided in Appendix B.

Coyotes are about the size and weight of a medium-sized dog. Coyotes in the eastern United States are typically larger than coyotes elsewhere. The average weight of females is 35 pounds (15 kilograms [kg]) and average weight of males is 40 pounds (18 kg) (VDGIF n.d.).

Male and female coyotes form a pair bond and defend a home range that may range from 1,000 acres (404 ha) to 25,000 acres (10,117 ha). There is currently no published data on home-range sizes in the mid-Atlantic region (Mastro 2011). Litters range from 3 to 12 pups and may be born between late March and May. Coyotes have a high reproductive rate; both mates and offspring from a previous litter contribute to feeding the pups (VDGIF n.d.).

The coyote is a habitat generalist and thrives in a wide variety of habitats. Being primarily nocturnal and secretive during the daytime hours, some dense cover nearby is often associated with coyote habitats. Small mammals and deer make up the majority of their diet, although vegetation and fruits are often listed as food items.

The coyote occurs throughout the Commonwealth of Virginia. Coyote populations in forested landscapes are generally less abundant than in their preferred habitats of semi-forested or open farm and pasture lands. Hunter surveys by the VDGIF have been the only estimates of coyote abundance and indicate that the coyote population is more abundant in counties west of the Blue Ridge Mountains (VDGIF n.d.).

Coyotes can carry rabies, which is contagious to humans. Typical signs of rabies include drooling, convulsions, circling, disorientation, partial paralysis, unprovoked aggression, and uncharacteristic tameness. If a person is bitten by a coyote, the animal should be captured without damaging the head and kept for analysis. The NRM should be immediately contacted for coordination with USDA-APHIS–WS to analyze the animal for rabies.

The coyote is filling an ecological niche that was void since the extirpation of wolves from Virginia around the beginning of the 20th century. In addition to preying on small (e.g., rodents and birds) to large (e.g., turkeys and deer) prey species, coyotes tend to kill or exclude red fox from their territories and thus potentially limit red fox population abundance (VDGIF n.d.). Coyotes are opportunistic feeders and will also take advantage of carrion, livestock, and pets (VFWIS 2013a).

Coyotes can be a nuisance to residents and present hazards to operating on NSAHR NWA. Animals that lose their natural fear of humans are more likely to pose a danger to humans and adversely impact the military mission. If food is deliberately or inadvertently provided by people, coyotes quickly learn not to fear humans. They will take advantage of easy food sources and their boldness to occupy residential areas could endanger human health and safety. Encouraging coyote avoidance behavior of humans by zero tolerance of coyotes around residences and facilities reduces the threat of coyotes in an area.

4.2 NUTRIA

The nutria is a large semi-aquatic mammal native to South America that has been introduced to numerous countries around the world, primarily for fur farming. Nutria are often confused with beavers or muskrats; however, nutria are much smaller than the beaver and much larger than the muskrat. Nutria have a thin, rounded, and pointed tail; beavers have a broad, horizontally flattened tail and muskrats have a vertically flattened tail. Nutria's hind legs are much longer than the front legs, giving the species a hunched appearance when on land. Nutria's prominent incisors are yellow to dark orange (LeBlanc 1994). Factsheets (USDA 2010) with additional information are provided in Appendix B.

Nutria are large rodents and average 12 pounds (5.4 kg). Males can grow to 20 pounds (9 kg) and females grow to 18 pounds (8 kg). Mature adults measure 2 feet (0.6 meters) in length (LeBlanc 1994). Nutria are almost entirely herbivorous and eat animal material incidentally when they feed on plants. Nutria consume a large variety of aquatic, semi-aquatic, and terrestrial plants including agricultural crops, lawn grasses, and ornamental plants.

Nutria have a very high reproductive potential; they are polygamous, breed throughout the year, and can produce up to three litters per year. Litter size varies between 2 and 11 and the gestation period is only four months. The young are precocial, leaving the nest or burrow and feeding on solids within one day of birth. Sexual maturity is reached at approximately six months (VFWIS 2013b).

The nutria in Virginia originated from releases in Dorchester County, Maryland in 1943 to establish an experimental fur station at the Blackwater National Wildlife Refuge (Maryland Sea Grant 2013). By 1998, the nutria population in the refuge had increased to 50,000. Initiated in 2002, the Chesapeake Bay Nutria Eradication Project has reduced nutria populations to near zero on 150,000 wetland acres (USFWS 2012).

The first record of nutria in Virginia was in 1956. Coordinated nutria monitoring efforts in Virginia began in 2012 and populations are believed to be limited to the southeast corner of the state. Recent data by VDGIF indicate that nutria numbers and distribution appear to be increasing and the threat to Virginia wetlands may be increasing (VDGIF 2012).

Nutria are capable of carrying diseases, pathogens, and infections. Nutria are susceptible to rabies, equine encephalomyelitis, paratyphoid, salmonellosis, pappilomatosis, leptospirosis, toxoplasmosis, richettsia, coccidiosis, and sarcoporidiosis. Nutria also host a wide variety of internal and external parasites (Sheffels and Sytsma 2007). Pathogens and parasites can be transmitted to humans, livestock, and pets (LeBlanc 1994).

Damage to vegetation and crops; banks of ditches, lakes, and other water bodies; and vegetation destruction in marshes and other wetlands caused by nutria are a direct result of feeding and burrowing. Nutria have caused widespread ecosystem changes by decimating native plants that hold marsh soils together and support the survival of native wildlife species. Burrowing is the most commonly reported damage caused by nutria. Burrows can weaken roadbeds, ditches, stream banks, dams, and dikes, which could collapse when the soil is saturated or when subjected to the weight of heavy equipment (USDA 2010). The subsequent damage from nutria burrowing activity has the potential to adversely impact water management and drainage efforts.

Adverse impacts on biodiversity by nutria foraging have been documented to directly and indirectly harm native flora and fauna (Sheffels and Sytsma 2007). Where at-risk species occur and there is concern for potential listing and designation of critical habitat, nutria presence could only worsen the concern because of their foraging and burrowing activities. The potential for adverse impacts on biodiversity and contributing to species listings ultimately threatens the military mission.

5.0 NUISANCE WILDLIFE AT NSAHR NWA

As stated earlier, all of the state identified nuisance wildlife occur or have the potential to occur on NSAHR NWA. However, coyote and nutria were determined to present the greatest threat to the military mission due to their potential impacts on biodiversity, natural ecosystems, water control structures, as well as potential threats to human health and safety. To better understand the distribution and abundance of these two species, field surveys were initiated to provide support to this management plan.

Field surveys for coyote and nutria were conducted between January 16 and February 15, 2013. Prior to the 2013 surveys, there were no formal surveys, inventories, or assessments conducted for nuisance wildlife species on NSAHR NWA. The nuisance wildlife surveys are summarized in *NSAHR NWA Nuisance Wildlife Survey: Coyote* and Nutria (Navy 2014a). If additional nuisance species are determined to be of interest to the installation, similar studies and reports can be planned and generated to provide support for revisions of this management plan. The coyote and nutria survey results summaries and understanding of these species and threats on NSAHR NWA is provided in the following sections.

5.1 COYOTE

5.1.1 Survey, Abundance, and Distribution

Eleven remote camera scent stations were installed on NSAHR NWA to trap (photograph) coyotes to document occurrence and obtain baseline information for future comparisons. Placement of the scent station locations was based on aerial imagery assessments and field evaluations. Stations were placed at locations across the installations and focused on a variety of habitats, as coyote were expected to occur almost anywhere on the installation. Large wetland and inundated areas were avoided. Bait and lure (attractants) were used at each station and cameras were deployed for six camera days (24-hour periods). One of the 11 cameras recorded a single coyote visit during the survey period. One coyote was caught on camera and the detection index of 0.015 coyotes per camera night was recorded.

This camera station survey documented presence of the coyote at NSAHR NWA and provided preliminary and scientific based information on abundance. Similar future studies could allow more inferences on abundance or changes in abundance. In general, the coyote is likely to inhabit almost all areas of the installation and is even likely to venture into developed areas. The coyote is probably no more abundant at NSAHR NWA than on adjacent lands.

5.1.2 Threats

The coyote is not known currently to present significant threats to the mission or human health and safety at NSAHR NWA. There are no reports of human/coyote conflicts for this installation; however, the coyote has the potential to be a threat of zoonotic disease transfer to humans and other wildlife, especially if it becomes overabundant. Coyotes are attracted to open areas of airfields and runways where small mammals are often found in greater abundance or carrion may occur as a result of air strikes and vehicle collisions. Conversely, coyotes are top predators and likely provide some level of control of deer, wild turkey, and waterfowl populations that also present air strike hazards. Coyotes will also use open air fields to mark territories and as travel

lanes between habitats. Coyotes may den within dry culverts or within constructed embankments within open fields or agricultural fields. BirdStrike.org reports that over 1,030 civil aircraft collisions with deer and 400 collisions with coyotes were reported in the United States, 1990-2012.

KEEP THE WILD IN WILDIFE

ENCOURAGE COYOTE AVOIDANCE BEHAVIOR OF HUMANS (VDGIF)

Coyotes are wary creatures and are usually not aggressive toward humans except when humans attempt to feed or interact with them. Approaching any wildlife may provoke an attack if the animal feels threatened. Before confronting a coyote near a residence or any other human living space, be sure there is a safe position for escape in the event there is an unlikely attack and then scare off the animal by practicable means. Although there are very few recorded instances of coyotes attacking humans in the United States, coyotes that have contracted rabies may attack humans without warning. The possibility of an attack should always be considered for any close encounter with a coyote.

Coyotes typically hunt small mammals (i.e., mice, voles, and rabbits), but they will also make a meal of a pet cat if given the opportunity. Coyotes are medium-sized carnivores that are very territorial in nature, and generally will not tolerate other dogs in their territories, especially when coyotes are caring for their young between March and August. The territorial nature of coyotes poses a real risk to small, free-roaming dogs and cats. Dogs (especially small dogs) should be restrained on a leash when walking them outdoors. Pets are also vulnerable to attacks by coyotes when tethered outside; therefore, outdoor pets should be kept in a coyote-proof enclosure (7-foot high fence with outward slanting overhang) to prevent coyotes from attacking and killing a pet animal.

5.1.3 Current Management

Under the Code of Virginia (Title 4 VAC 15-20-160) the coyote is a nuisance species and may be killed at any time and in any manner allowed by law. According to VDGIF regulations, no hunting license is required to shoot nuisance wildlife. Under Virginia law, nuisance wildlife species can be killed at any time and in any manner that is legal under state and local laws. The Navy obtains a Kill Permit from VDGIF to be able to take coyote on NSAHR NWA any day of the year due to human health and safety concerns. However, for recreational trapping a trapping license is required to take coyote by legal trapping methods. It is not legal to live-trap nuisance wildlife and move them to another location. Hunting and trapping are permitted on NSAHR NWA; these recreational activities could contribute to control efforts for coyotes. An average of 425 hunting permits is sold each year for NAS Oceana, NAS Oceana Dam Neck Annex, Naval Auxiliary Landing Field Fentress, and Naval Support Activity Hampton Roads Northwest Annex.

5.2 NUTRIA

5.2.1 Survey, Abundance, and Distribution

Surveys were conducted to identify the available habitats for nutria on NSAHR NWA. Biologists reviewed aerial photography and other remote sensing data, coordinated with local experts from the USDA, and searched the available habitats for nutria and nutria field sign to assess

occupancy. A 50-foot (15-meter) buffer was added to streams and a 25-foot (7.6-meter) buffer was added to ditches to create polygons of potential habitat. Areas not considered to be viable habitat by the USDA experts were removed from the draft potential habitat map.

Approximately 284 ac (115 ha) of potential habitat were field surveyed to verify its designation as habitat and investigate nutria occupancy. All potential habitats were searched by biologists walking throughout the areas for nutria, tracks, scat, slides, and eat-out areas. Following the field surveys and further coordination with the USDA experts, 88 ac (25 ha) of potential nutria habitat was identified on NSAHR NWA. Nutria were observed on the installation, tracks were observed at several locations, and potential den sites were found along ditch banks. The data indicate that low numbers of nutria could be present. Future surveys in the designated habitat areas could be used to determine changes in the occurrence of nutria and level of potential habitat on NSAHR NWA.

5.2.2 Threats

The nutria is not currently known to present significant threats to the mission or human health and safety because of the low-level population that likely exist on NSAHR NWA. The nutria is documented in association with agricultural crop damage/crop loss and also with the destruction of stormwater control ditches that keep the installation from flooding. Farmers are required to factor in 10% crop loss due to wildlife damage. Although the data indicate the presence of low numbers, nutria could soon become a nuisance on NSAHR NWA and require management for control because of their high reproductive potential.

Nutria pose a general threat to the environment because of their foraging and burrowing habitats in wetlands, drainage ways, and croplands. Nutria can cause widespread ecosystem changes because of their destructive habits and in some areas the loss of soils and vegetation has caused permanent damage to ecosystems (USFWS 2012). The loss of vegetation increases erosion and reduces critical habitat for many species, including sensitive plant species, shorebirds, and waterfowl (Chesapeake Bay Nutria Working Group 2003).

Nutria can be infected with the bacterial disease tularemia, which can be transmitted to humans. Nutria droppings may contaminate water with giardia and cause infections when contaminated water is ingested. These infections cause flu-like symptoms in humans. Anyone handling a nutria should wear rubber gloves, and wash their hands well when finished.

5.2.3 Current Management

As a nuisance species (Title 4VAC15-20-160), nutria can be trapped year round for eradication. A trapping license is required for recreational trapping. As previously mentioned, it is not legal to live-trap nuisance wildlife and move them to another location. Nutria can also be taken by use of a firearm or other weapon at any time (except on Sunday). The NSAHR NWA INRMP lists the nutria as a nuisance species for management due to their non-native and invasive status. Shooting is recommended in the INRMP as the most effective method of control. Hunting and trapping are permitted on NSAHR NWA and these recreational activities could contribute to control efforts for nutria.

6.0 NUISANCE WILDLIFE MANAGEMENT

6.1 COYOTE

Prior to this plan, there was no plan for coyote management other than the general guidelines provided with the INRMP for nuisance wildlife control. The cited survey conducted in 2013 and this plan's attention to this species are due to its known presence and potential to quickly become problematic for the installation if disease or overabundance creates conflict with natural fauna or the military mission. As a result of the current condition, this plan focuses on treatment of individual incidents and provides guidance for the continuation of monitoring and additional studies to expand the coyote knowledge base.

6.1.1 Incidents/Encounters

All coyote encounters that are determined to be a threat or were reported as potential threat to installation personnel, visitors, or pets will be reported to the installation NRM. The report will include the location, the number of coyotes, and a description of the encounter or threat. The report should express the desire of the person (s) to have the situation resolved. Repeated incidents or problematic individual or groups of coyotes posing a non-immediate threat will each be evaluated by the NRM. The manager will develop a plan of action that may include passive actions (e.g., keep pets inside, habitat management) or more direct actions such as the removal of the coyote or group. If removal is warranted, the section below outlines the method for conducting such removal. Immediate threats to humans and pets will be handled by installation law enforcement officers at their discretion and reported to the NRM. Simple sightings of coyotes are not reportable incidents or encounters; a sighting must be accompanied by some sense of abnormal behavior or threat to safety.

6.1.2 Natural Fauna Conflicts

The impact of coyote on natural fauna, and therefore ecosystem health and biodiversity is unknown for NSAHR NWA. However, the coyote is native to the area and should be considered a natural predator and efforts to reduce or control the population should only be implemented if warranted. In a review of the effects of coyote control on their prey, Henke (1995) concluded that coyotes are often removed from an area because of their predatory nature, regardless of the effect such removal may have on the ecosystem. Questions to consider before concluding coyote removal is warranted include (1) will coyote control produce the desired effects, (2) would the increase in desired fauna expected as a result of coyote control be within the habitat carrying capacity, and (3) would coyote mortality be replaced with other mortality factors acting in a compensatory manner.

Coyotes are described as a keystone species (i.e., their presence effects other species around them). Coyotes tend to kill or exclude foxes from their territories and may subsequently limit fox population abundance. Studies have concluded that foxes are not eliminated but just become less common where coyotes occur. The coyote may indirectly benefit ground-nesting birds, by reducing ground-nest predators. In this way, coyotes help to maintain balance in the food web below and around them. Future study could focus on overabundance impacts on sensitive or

game species and/or consideration of its temporary control of sensitive or game species restoration opportunities (e.g., dismal swamp southeastern shrew, bobwhite quail).

6.1.3 Removal/Control

If the NRM determines that a removal action should be undertaken for population control, the manager will contact the USDA-APHIS–WS with the request. This will open the consultation phase and the NRM and WS will determine the best course of action to handle the removal attempt. There are several removal methods available including toxicants, trapping, and shooting (see Appendix B fact sheets for additional information). The selected method(s) will need to be adapted to the situation and left to the WS professionals or installation safety officers to implement. The NRM takes action for the removal of the occasional nuisance or sick animal call.

All coyotes that are taken, that area suspected of rabies will be tested for rabies. The NRM after review of the incident/encounter reports will determine if the rabies test is warranted and provide the direction to test to WS personnel. Any animal that is suspected to be sick or behaving abnormally (without obvious issues, such as a broken leg) should be tested. In addition, any coyotes taken or found dead that exhibit disease will be reported to the NRM. The NRM will provide direction on the need for a necropsy to WS personnel.

6.1.4 Habitat

Habitat management against the coyote is not practicable because the opportunistic nature of its foraging habits facilitates its occurrence in all habitat types. Eliminating brushy areas, dense thickets, and similar areas around residences, airfields, and facilities that coyotes may use as cover or foraging sites could be the focus of habitat management. However, these habitats also provide food and cover for many native species, so these efforts to reduce habitat should only be considered as responsive action rather than a proactive action. The NRM should coordinate with Public Works Department personnel responsible for grounds maintenance to eliminate habitats if it is determined to be the desired management action.

6.1.5 Survey

The 2013 nuisance wildlife survey for coyote provided an index of coyote abundance and should be replicated to determine changes in the occurrence of coyotes (Navy 2014a). The cameras should be deployed in the station locations that were used in 2013 for consistency and trend analysis. In addition, consistent tracking of data on coyotes and incident/encounters reported under implementation of this plan should provide additional insights on coyote abundance and better quantify the nuisance level.

6.2 NUTRIA

Other than the general guidelines provided in the INRMP for nuisance wildlife control, this plan provides the only guidance for nutria management on NSAHR NWA. This plan provides guidance for the continuation of monitoring and additional studies to expand the nutria knowledge base.

6.2.1 Removal/Control

The NRM should be notified upon first observance of a nutria(s) on the installation. Removal of all nutria is warranted because of their invasiveness and damage potential. Natural resources personnel will document the recommendations for removal. If the NRM determines that a removal action should be undertaken, the NRM will contact the USDA-APHIS–WS with the request. This will open the consultation phase and NRM and WS will determine the best course of action to handle the removal attempt. There are several removal methods available including toxicants, trapping, and shooting (see Appendix B fact sheets for additional information). The selected method(s) will need to be adapted to the situation and implemented by the WS professionals.

6.2.2 Habitat

Nutria use a wide variety of habitats including farm ponds and other freshwater impoundments, drainage canals, rivers and bayous, freshwater and brackish marshes, swamps, and combinations of various wetland types. Freshwater marshes are the preferred habitat. Nutria do not use well-drained land that is free of dense, weedy vegetation. Eliminating brush, weeds, and thickets adjacent to ditches, drainages, and waterways to reduce food and cover will discourage nutria use. Drainages that retain water may be used by nutrias as travel routes; eliminating standing water and ensuring positive drainage will reduce their attractiveness. Nutria prefer to burrow on steep slopes to allow tunneling upward for establishing the den site above the water level. Den entrances may be located at or below the water level. They can be discouraged by keeping side slopes to a 3:1 or less ratio, and by controlling vegetation growth (i.e., routine mowing). Contouring bank slopes at less than 45° will discourage borrowing.

6.2.3 Survey

The 2013 nuisance wildlife survey for nutria confirmed the presence of nutria and should be replicated to determine changes in the occurrence of nutria. The potential habitats identified in 2013 should be surveyed using the same procedures for consistency and trend analysis. In addition to replicating the survey conducted in the winter of 2013, field surveys should be conducted in spring, summer, and fall to gather information on reproduction (observations of young of the year).

6.3 PROJECT IMPLEMENTATION

General guidelines to help reduce the potential for nuisance wildlife problems on NSAHR NWA are listed below.

1. Do not feed coyotes.
2. Secure garbage receptacles to avoid providing a potential food supply.
3. Conduct scheduled inspections of facilities to minimize nuisance wildlife entry.
4. Do not leave unconsumed pet food outdoors.
5. Remove or clean-up bird feeders if nuisance wildlife are attracted to the area.
6. Clear brushy areas around residences and facilities to reduce hiding and foraging cover.
7. Periodically inspect the major drainage ditches for nutria sign.
8. Contact the NRM to evaluate all nuisance wildlife concerns.

Environmental program priorities for control of nuisance wildlife are defined using environmental readiness levels (ERL) as specified in OPNAVINST 5090.1D, M-5090.1 and recurring or non-recurring natural resources management requirements as specified in the Department of Defense Instruction 4715.03, *Natural Resources Conservation Program*. Recognition of the potential for nuisance wildlife to threaten human health and safety or the military mission and determination that management action is necessary meet the ERL 4 funding priority and also contribute to investments in environmental leadership and general proactive environmental stewardship. The designation of enhancement actions beyond compliance for non-recurring natural resources management requirements is consistent with implementation of management actions to prevent nuisance wildlife from becoming a threat to NSAHR NWA military mission and operations. Table 1 provides the project implementation schedule for nuisance wildlife control on NSAHR NWA.

Table 1. Project Implementation Schedule.

Project No.	Project Description	Schedule
1	Distribute the USDA-APHIS–WS factsheets (Appendix B) on coyote and nutria to raise environmental awareness of nuisance wildlife on NSAHR NWA.	Recurring bi-annually, 2 times/year (Earth Day event and beginning of hunting season)
2	Conduct reconnaissance inspections of housing and facilities areas to look for incorrectly secured garbage receptacles that could become a food source for nuisance wildlife. Report corrective actions required to the Regional Environmental Program Manager.	Recurring bi-monthly, 6 times/year
3	Conduct reconnaissance inspections of housing and facilities areas to look for required actions to clear brush that could provide hiding and foraging cover for nuisance wildlife. Report corrective actions required to the Regional Environmental Program Manager.	Recurring bi-monthly, 6 times/year
4	Conduct reconnaissance inspections of roadsides and trails to look for evidence of coyote tracks and denning sites for early detection and rapid response. Coyotes may dig their own den or enlarge another animals den to the size that would accommodate a medium-sized dog. Report corrective actions required to the Regional Environmental Program Manager.	Recurring bi-monthly, 6 times/year
5	Conduct reconnaissance inspections of major drainage ditches to look for evidence of nutria burrowing activity	Recurring bi-monthly,

Project No.	Project Description	Schedule
	and denning as a means of early detection and rapid response. Report corrective actions required to the Regional Environmental Program Manager.	6 times/year
6	Replicate the 2013 nuisance wildlife surveys and expand the survey period seasonally to assess occurrences and determine the need for control of coyotes and nutrias. Report corrective actions required to the Regional Environmental Program Manager.	Recurring bi-annually, every other year

7.0 EDUCATION, TRAINING, AND PUBLIC OUTREACH

Public perception is an important consideration in management for nuisance wildlife problems. Misinformation leads to implementation of inappropriate management actions and unintended outcomes. Dissemination of current and factual information on the extent of nuisance wildlife problems is key to successful implementation of nuisance wildlife management. The following considerations for stakeholder coordination and public involvement provide the NRM opportunities to promote education, training, and public outreach for nuisance wildlife management on NSAHR NWA.

7.1 STAKEHOLDER COORDINATION

In 2011, the Mid-Atlantic Panel on Aquatic Invasive Species and the Virginia Tech Conservation Management Institute funded a collaborative project in Virginia to examine the expanding nutria population and to initiate the process of developing and implementing an eradication strategy. A steering committee of representatives from state and federal agencies has been formed to coordinate detection and response actions, maintain databases and records of nutria sightings, and prioritize future collaborations. The Virginia point of contact is Ray Fernald, 804-367-8364, Ray.Fernald@dgif.virginia.gov. Additional information on the Mid-Atlantic Panel on Aquatic Invasive Species is available at http://www.midatlanticpanel.org/.

Cooperation and coordination with external stakeholders is an integral part of the Navy's natural resources program. The NRM should coordinate annually with VDGIF and USDA-APHIS–WS for current information regarding nuisance wildlife management. The Virginia Wildlife Services point of contact is David Allaben, 804-739-7739, david.j.allaben@aphis.usda.gov. Additional information on nuisance wildlife assistance is available at http://www.aphis.usda.gov/wildlife_damage/state_office/virginia_info.shtml. In addition, the NRM should coordinate with the VDGIF and USDA-APHIS–WS stakeholders prior to any determination to conduct nuisance wildlife management actions on NSAHR NWA.

7.2 EMAMMAL

eMammal (http://emammal.wordpress.com/author/emammal/) is a project where citizen scientists work in collaboration with researchers at the Smithsonian Institution and North Carolina State University to document mammals throughout the mid-Atlantic region. Citizen volunteers place "camera traps", infrared activated cameras, across the landscape in parks and other natural areas to collect photos of mammals. These photos help researchers answer questions about mammal distribution and abundance and use this information for conservation. The Smithsonian Institution presents projects that have used camera traps for conservation at http://siwild.si.edu/about.cfm. The NRM could use eMammal to promote volunteerism in natural resources and as an additional means of increasing environmental awareness of nuisance wildlife concerns on NSAHR NWA.

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APPENDIX A
COMNAVREG MIDLANT INSTRUCTION 11015.3
NATURAL RESOURCES MANAGEMENT FOR FISH AND WILDLIFE, FERAL ANIMALS, INVASIVE SPECIES, AND CERTAIN PESTS

(The MIDLANT region is canceling this instruction and expects the installations to create equivalent instructions or to reference their INRMPs and associated SOPs as appropriate)

DEPARTMENT OF THE NAVY
COMMANDER
NAVY REGION, MID-ATLANTIC
6506 HAMPTON BLVD.
NORFOLK, VA 23508-1273

IN REPLY REFER TO:
COMNAVREG MIDLANT
INST 11015.3
REG ENG/Code 90
12 MAR 2003

COMNAVREG MIDLANT INSTRUCTION 11015.3

Subj: NATURAL RESOURCES MANAGEMENT FOR FISH AND WILDLIFE, FERAL ANIMALS, INVASIVE SPECIES, AND CERTAIN PESTS

Ref: (a) E.O. 13112
(b) NAVFAC P-73, Vol. II
(c) OPNAVINST 5090.1 (Series)
(d) 18 U.S. Code § 42
(e) 16 U.S. Code §§ 703-704
(f) 16 U.S. Code §§ 668-668c
(g) 16 U.S. Code § 1361, *et seq.*
(h) 50 C.F.R. pt. 10
(i) 50 C.F.R. pt. 21
(j) SECNAVINST 6401.1 (Series)
(k) NASOCEANAINST 3750.2 (Series)

1. Purpose. To prescribe procedures and assign responsibility for management and control of fish and wildlife, feral animals, invasive species, and certain pests within Commander, Navy Region, Mid-Atlantic (COMNAVREG MIDLANT) Area of Responsibility (AOR). This includes the areas of Naval Weapons Station (WPNSTA), Yorktown (including Cheatham Annex); Naval Air Station (NAS), Oceana (including Naval Auxiliary Landing Field [NALF] Fentress, Camp Pendleton, and Dam Neck Annex); Naval Station (NAVSTA), Norfolk (including St. Julien's Creek Annex and St. Helena Annex); Naval Support Activity (NAVSUPPACT), Norfolk (including Northwest Annex); Naval Amphibious Base (NAVPHIBASE), Little Creek; Fleet and Industrial Supply Center (FISC), Norfolk (Craney Island Fuel Depot and Yorktown Fuel Terminal); and Norfolk Naval Shipyard (NAVSHIPYD Norfolk), Portsmouth, VA (only New Gosport Annex, Scott Center Annex, and South Gate Annex).

2. Policy

a. Per references (a) through (c), the Navy is authorized to take measures to control invasive species.

b. References (d) through (g), the Lacey, Migratory Bird Treaty, Eagle Protection, and Marine Mammal Protection Acts, respectively, protect designated wildlife and control activity involving protected wildlife parts. Violations of these statutes may result in criminal prosecution. Regulations contained in references (h) and (i) implement reference (e) and list species protected by Federal law. Reference (j) describes government responsibility for preventing injury and diseases from animals.

3. Definitions

a. Per reference (a), an "invasive species" is a species that is non-native (or alien to the ecosystem under consideration), and whose introduction causes, or is likely to cause harm to economic, environmental, or human health.

b. Per reference (e), "take" means to pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.

c. Per reference (c), "pest" refers to any organism (except for microorganisms that cause human or animal diseases) that adversely affects the well-being of humans or animals, attacks real property, supplies, equipment or vegetation, or is otherwise undesirable.

d. Per reference (j), "feral" refers to wild animals and unowned dogs, cats, or other domestic animals.

4. Responsibilities

a. Regional Engineer. The Commanding Officer, Navy Public Works Center/Regional Engineer (PWC/RE), Norfolk, as the Regional Environmental Program Manager, is responsible for management and control of, and for providing services pertaining to, fish and wildlife, feral animals, invasive species, and pests. On behalf of COMNAVREG MIDLANT, the Regional Engineer obtains natural resources permits required by Federal law to carry out this program. Regional Engineer authority, in natural resources matters, may be sub-delegated to a properly trained Regional Natural Resources Program Manager, under the supervision of the Regional Environmental Group Head.

(1) Environmental Services Desk. The PWC/RE Environmental Group provides pest management services through the Environmental Services Department. In addition, the Environmental Services Department responds to routine service calls for removal of non-migratory birds and control of feral animals. These services may be requested through the Environmental Services Desk at (757) 444-7528 during working hours and (757) 444-3477 after hours. Requests for services involving animals, such as sea turtles, marine mammals, game animals and migratory birds or raptors, not under the purview of the Environmental Services Department, will be referred by Service Desk personnel to Natural Resources Managers.

(2) Natural Resources Specialists. Under the direction of the Regional Natural Resources Program Manager, installation Natural Resource Specialists use integrated management practices and procedures to manage fish and wildlife and control certain feral, nuisance and invasive species. Per reference (k), Natural Resources personnel also develop and execute depredation and

dispersal procedures for Bird Animal/Aircraft Strike Hazard (BASH) purposes, and personally supervise these activities when lethal methods are required. Natural Resources Managers, and all other PWC/RE personnel involved in lethal control activities, must be properly trained and duly certified for all weapons employed in accordance with applicable regulations. These personnel are located in Storefront Compliance Departments of the Regional Environmental Group. Natural Resources personnel will also identify bird and/or other animal remains associated with aircraft mishaps in accordance with reference (k).

(3) Conservation Officers. Under the direction of Natural Resources Managers, Conservation Officers enforce fish and wildlife and other natural resources laws and regulations. They may conduct field inspections and employ approved control methods for certain species. Control measures include, but are not limited to, live trapping, relocation, and lethal methods. Conservation Officers also perform wildlife forensic investigations and respond to wildlife damage complaints.

(4) Regional Natural Resources Managers. Regional natural resources managers shall:

(a) Provide direction to natural resources managers and game wardens regarding the management of fish and wildlife and the control of feral animals, invasive species, and pests.

(b) Ensure appropriate approval and procedures are in place to properly issue, store, carry, and use firearms.

(c) Ensure the natural resource manager and game warden weapons qualifications cards are certified and remain current.

(d) Coordinate with local and regional security for required range time, qualifications, and DoD training as needed.

b. NAVSHIPYD Norfolk. Pest control services for NAVSHIPYD Norfolk are currently provided through government contract; these services may be requested through LANTNAVFACENGCOM at (757) 396-5121, extension 200.

c. Security Officers. Security Officers respond to emergency wildlife complaints and requests for services. Security Officers are an after-hours emergency contact point for Natural Resources Managers, Conservation Officers, and pest management personnel. Within existing resources and according to established training priorities, Security Officers also assist Natural Resources personnel in obtaining required weapons qualifications.

d. Airfield Facilities Division Officer. All bird/animal strikes should be investigated and reported in accordance with reference (k). Animal remains will be collected by the Airfield Facilities Division Officer and placed in appropriate BASH freezers located in Building 102 at NAS Oceana and LP-167 at Chambers Field, NAVSTA Norfolk.

e. Aviation Squadrons. All bird strikes must be reported in accordance with reference (k). Airfield Facilities or Natural Resources should be immediately contacted following any strike to ensure bird/animal remains are collected and identified.

5. Review. The Regional Natural Resources Program Manager is responsible for review and update of this instruction.

G. E. EICHERT
Chief of Staff

Distribution: www.cnrma.navy.mil

APPENDIX B
Nuisance Wildlife Factsheets

APHIS Coyote
APHIS Nutria
NC Coyote
VA Coyote
MD Nutria
NC Nutria

Wildlife Services
Protecting People
Protecting Agriculture
Protecting Wildlife

Factsheet
December 2011

Coyotes in Towns and Suburbs

Wildlife Services (WS), a program of the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), provides Federal leadership and expertise to resolve wildlife conflicts that threaten the Nation's agricultural and natural resources, human health and safety, and property.

As coyotes have become more common in urban and suburban settings, WS has received increased calls in every State to address coyote-related damage. Often the damage is linked to human activity that attracts the animals. WS can assist with problems using an integrated approach.

Historically, coyotes were most commonly found on the Great Plains of North America. Their range now extends from Central America to the Arctic. Except for Hawaii, coyotes live in all of the United States, Canada, and Mexico. More coyotes exist today than when the U.S. Constitution was signed.

Almost no animal in America is more adaptable to changing conditions than the coyote. Coyotes can live just about anywhere. They are found in deserts, swamps, tundra, grasslands, brush, and dense forests, from below sea level to high mountains. They have also learned to live in suburbs and cities like Denver, Los Angeles, New York, and Phoenix.

One of the keys to the coyote's success is its diet. A true scavenger, the coyote will eat just about anything. Identified as a killer of sheep, poultry, and deer, the coyote will also eat snakes and foxes, doughnuts and sandwiches, rodents and rabbits, fruits and vegetables, birds, frogs, grass and grasshoppers, pet cats and cat food, pet dogs and dog food, carrion, and just plain garbage.

Coyotes are active mainly during the night, but they can also move about during the day. Most sightings of coyotes occur during the hours close to sunrise and sunset.

Adult coyotes weigh between 20 and 45 pounds. Females are generally smaller than males, and western coyotes are generally smaller than eastern coyotes.

Coyotes look like small collie dogs. They have erect pointed ears, slender muzzle, and a bushy tail. Most coyotes are brownish gray in color with a light gray to cream-colored belly. However, a coyote's color varies and may be somewhat darker or lighter depending upon the geographic region and the time of year. Most coyotes have dark or black hairs over their back and tail.

Coyotes quickly learn not to fear humans and develop a dependency on easy food sources.

A high reproductive rate and the rapid growth of its offspring also aid in the coyote's success. Coyotes breed in February and March, and pups are born about 60 days later. During this time, territorial male coyotes do not tolerate other canines in their territory; many conflicts between coyotes and domestic dogs result from this territorial behavior. An average coyote litter contains four or five pups, born in dens. In urban environments, dens can be in storm drains, under storage sheds, in holes dug in vacant lots, parks, or golf courses, or any other dark, dry place.

Coyote pups are cared for, fed, and protected by both parents. The pups mature quickly and can eat meat and move about well by the time they are a month old. By 6 months, pups have permanent teeth and are taught to hunt for food. During this time of pup rearing, the amount of food that coyotes hunt and eat increase significantly. As a result, conflicts between coyotes and humans are common. It is not unusual to observe a family of coyotes traveling through urbanized areas such as parks or golf courses. If food is deliberately or inadvertently provided by people, the pups quickly learn not to fear humans and develop a dependency on easy food sources.

The pups are fully independent at about 9 months, and they disperse. During the next year, these young adults may be seen as nuisances in urban/suburban areas while they seek safe living areas away from established coyote territories. A few pups may stay with the parents, forming family groups as population densities increase or where food is abundant, such as in urbanized areas. Coyotes adapting to an urban environment can become bolder because they are less likely to be harmed and more likely to associate people with an easy and dependable food source.

Urban Area Coyote

Coyotes have learned that small dogs and cats are easy prey. Newspapers across the country have carried stories of coyotes harassing leashed dogs on walks with their owners in and near parks and golf courses within city limits. Calls to WS for help or information about urban coyotes often pertain to the animals attacking pets, eating garbage, or simply coming too close to houses or people on foot.

Remember, all wild animals are unpredictable and caution is the watchword when they are around. Don't ever put food out to lure them closer. Nearly all wild animal bites occur when people attempt to feed wildlife or treat them like domestic animals.

Here are some steps you can take to reduce the chance of human-coyote conflicts:

- Do not feed coyotes!
- Eliminate sources of water, particularly in dry climates.
- Bird feeders should be positioned so that coyotes cannot get feed. Coyotes are attracted by bread, table scraps, and even seed. They may also be attracted by the birds and rodents that come to feeders.
- Do not discard edible garbage where coyotes can get to it.
- Secure garbage containers and eliminate garbage odors.
- Feed pets indoors whenever possible. Pick up any leftovers if feeding outdoors. Store pet and livestock feed where it is inaccessible to wildlife.
- Trim and clean, near ground level, any shrubbery that provides hiding cover for coyotes or prey.
- Fencing your yard could deter coyotes. The fence should be at least 6 feet high with the bottom extending at least 6 inches below ground level for best results.
- Don't leave small children unattended outside if coyotes have been frequenting the area.
- Don't allow pets to run free. Keep them safely confined and provide secure nighttime housing for them. Walk your dog on a leash and accompany your pet outside, especially at night. Provide secure shelters for poultry, rabbits, and other vulnerable animals.

- Discourage coyotes from frequenting your area. If you start seeing coyotes around your home or property, chase them away by shouting, making loud noises, or throwing rocks.

  These steps may decrease the frequency of coyote sightings in your area if practiced continuously. However, coyotes are adaptable to change and are quick to learn new ways of survival. Occasional sightings most likely will continue. By making life for coyotes in your neighborhood more difficult, you will increase the likelihood that they will go somewhere else.

Suburban/Semi-rural

"Hobby farms" and "ranchettes" are more common today than ever before. Many Americans are enjoying a return to the rural lifestyle, living on a few acres and keeping poultry, horses, and other livestock. Many of these new "farmers" and "ranchers" are shocked to discover that coyotes kill and eat pets, poultry, and stock.

WS suggests (and offers technical assistance for) the following nonlethal methods to reduce coyote damage:

- Use net-wire or electric fencing to keep coyotes away from livestock.
- Shorten the length of calving or lambing seasons.
- Confine livestock in a coyote-proof corral at night when coyotes are most likely to attack livestock.
- Use lights above corrals.
- Remove dead livestock so coyotes won't be attracted to scavenge.
- Remove habitats that provide homes to natural prey of coyotes, like rabbits, from lambing and calving areas.
- Use strobe lights and sirens to scare coyotes away.
- Use guard animals, such as dogs, donkeys, and llamas, to protect livestock.

Additional Information

For more information about this and other WS programs contact your WS State office at 1–866–4–USDA–WS (1–866–487–3297) or visit www.aphis.usda/wildlife_damage. WS is not the sole source for wildlife damage management services; these services may be available from private sector providers.

WS Wildlife Services

Protecting People | Protecting Agriculture | Protecting Wildlife

United States Department of Agriculture
Animal and Plant Health Inspection Service

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Wildlife Services
Protecting People
Protecting Agriculture
Protecting Wildlife

Factsheet

October 2010

Nutria, an Invasive Rodent

Wildlife Services (WS), a program within the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), provides Federal leadership and expertise to resolve wildlife conflicts that threaten the Nation's agricultural and natural resources, human health and safety, and property.

The increased population and range of invasive species can harm native ecosystems, impact agricultural resources, and increase disease transmission. Under an Executive Order that directs Federal agencies to address invasive species damage, the WS program works to control and prevent damage caused by nutria.

The nutria (*Myocastor coypus*), a large, semi-aquatic rodent native to South America, originally was brought to the United States in 1889 for its fur. When the nutria fur market collapsed in the 1940s, thousands of nutria were released into the wild by ranchers who could no longer afford to feed and house them. Entrepreneurs began selling the herbivores to control noxious weeds. Wildlife agencies further expanded the range of the nutria by introducing the species into new areas of the United States. While the nutria did devour weeds and overabundant vegetation, they also destroyed native aquatic vegetation, crops, and wetland areas.

Recognized in the United States as an invasive wildlife species, nutria have been found in 22 States, and are currently established in 16 States. The nutria's relatively high reproductive rate combined with a lack of population controls have resulted in a proliferation of the species. In many regions they cause severe damage. Nutria are most abundant in the Gulf Coast States, but they also cause problems in other southeastern States and along the Atlantic coast. In addition to damaging vegetation and crops, nutria destroy the banks of ditches, lakes, and other water bodies. Of greatest significance, however, is the permanent damage nutria can cause to marshes and other wetlands.

In these areas, nutria feed on native plants that hold wetland soil together. The destruction of this vegetation intensifies the loss of coastal marshes that has been stimulated by rising sea levels.

Identification

Nutria are approximately 2-feet long, with a large head, short legs and a stout body that appears hump-backed on land. They are dark brown in color, although occasional light-colored and albino animals are observed. Because nutria spend much of their time in the water,

A small bay area along Maryland's Chesapeake Bay shows recovery in the 2 years after invasive nutria were removed by Wildlife Services biologists and specialists.

they are highly adapted for a semi-aquatic existence.

Their hind feet are partially webbed for swimming, and their eyes, ears, and nostrils are set high on their heads, so they can stay above the waterline when swimming. Nutria are excellent swimmers, and valves in their nostrils and mouths seal out water when submerged to swim or feed. When pursued, they can swim long distances underwater, seeing well enough to evade capture. Female nutria have teats located high on their backs so that their young can suckle when floating in the water. From a distance, nutria often are mistaken for beavers and muskrats. All three species are dark brown in color and semi-aquatic with large front teeth that are yellow to orange in color. However, at 15- to 20-pounds for a large adult, nutria are about one-third the size of an adult beaver (45 pounds) and 5 to 8 times larger than an adult muskrat (2–4 pounds).

Sometimes mistaken for beaver or muskrat, some characteristics can assist in identifying nutria. These include large front teeth that are yellow to orange in color; a heavy, rat-like tail thinly covered in bristly hairs; and noticeable white whiskers that protrude from either side of their nose and can be easily seen from a distance (USFWS photo).

Additionally, the tails and whiskers of the three species are distinctly different. Beavers have large broad flat tails that they often smack loudly on the water to signal alarm. Muskrats have long narrowly flattened tails that can be seen whipping snake-like behind when swimming the water. Nutria have a heavy, rat-like tail thinly covered in bristly hairs that trails smoothly behind when swimming. In northern climates, nutria often suffer frostbite to their tails and may retain only a stub tail following a cold winter. Another distinguishing characteristic of nutria are the long (3–5 inch) noticeable white whiskers that protrude from either side of their nose and can be easily seen from a distance. Beaver and muskrat have subtle black whiskers that can only be viewed from very close.

Nutria adapt to a wide variety of habitats but are usually closely associated with water. In the United States, the largest nutria populations are located in freshwater marshes in coastal areas along Gulf Coast States. These regions have an abundance of small trees, shrubs, and vegetation with underwater roots and surface leaves. In these areas, nutria live in farm ponds and other fresh water impoundments, drainage canals, rivers, bayous, freshwater and brackish marshes, and swamps. In cities, they can be found under buildings, in overgrown lots, on golf courses, and in storm drains.

Beaver create lodges from mud and sticks and muskrat create mounded huts from mud and vegetation. Nutria do not create their own shelters from the elements. Nutria sometimes live in burrows; in

Included in the nutria's preferred diet are the roots, rhizomes and tubers of cattails, cordgrass, and bulrush.

marshes they often create flat, nest-like platforms of dead vegetation for feeding, loafing, grooming, and birthing. Sometimes, nutria will burrow into muskrat houses and displace their residents.

Damage

Nutria damage is evident to varying degrees in every area they are found. Burrowing causes the most noticeable damage. Nutria are notorious in Louisiana and Texas for undermining and breeching water-retention levees in flooded fields used to produce rice and crawfish. Nutria burrows also can damage flood-control levees that protect low-lying areas; weaken the foundations of reservoir dams, buildings, and roadbeds; and erode the banks of streams, lakes, and ditches.

Nutria damage, however, is not limited to burrowing. Depredation on crops is well documented.

In the United States, sugarcane and rice are the primary crops damaged by the nutria. Grazing on rice plants can significantly reduce yields, with severe localized loss. Other crops damaged by the nutria include corn, milo, sugar and table beets, alfalfa, wheat, barley, oats, peanuts, various melons, and a variety of vegetables. This depredation can lead to significant losses, especially for small farmers.

The negative impact this invasive species has on native vegetation and associated wetlands is critically important. In Louisiana, some nutria feed on seedling bald cypress with such intensity that the trees cannot survive. Similarly, nutria can severely damage coastal marshes by decimating native plants that hold marsh soils together and support the survival of native wildlife species. The impact of nutria on disappearing marshlands along the Gulf Coast and the Chesapeake Bay in Maryland has been well documented. Nutria have caused widespread ecosystem changes. In some cases, nutria damage to marsh vegetation and soils is so severe that these resources are permanently lost. The destruction of these marshlands also increases the vulnerability of adjacent upland sites to erosion and flooding during storms.

Nutria also can impact public health and safety. The rodents can serve as hosts for several pathogens, including tuberculosis and septicemia, which can infect people, pets, and livestock. In addition, nutria can carry parasites, such as blood flukes, tapeworms, and liver flukes and a nematode known to cause a rash called "nutria itch." Many of these organisms—found in nutria feces and urine—can contaminate drinking water supplies and swimming areas.

Highly adapted for a semi-aquatic existence, from a distance, nutria often are mistaken for beavers and muskrats while swimming.

How Wildlife Services Manages the Damage

WS is authorized by Congress to resolve damage caused by wildlife. A 1997 Executive Order also directs USDA to provide national leadership and oversight in managing invasive species, such as the nutria, in cooperation with other Federal agencies.

When requested, WS provides nutria assistance; WS program specialists work closely with Federal, State, and local governments to develop comprehensive management plans that include

Their eating, digging, rooting, and swimming causes massive erosion, converting healthy marsh and habitat for native species into open water habitat.

provisions for protecting native vegetation, marsh soil, and other natural resources against nutria damage.

Preventive measures should be used whenever possible, especially in areas where nutria damage is common. Habitat management can help reduce rodent numbers by manipulating vegetation and water sources attractive to nutria. Small areas, such as gardens, can be enclosed by partially buried fences. Wire tubes can be used to protect bald cypress and other tree seedlings from nutria damage and bulkheads can be used to deter burrowing into banks. These methods can be expensive to implement and are not always effective or practical.

When damage cannot be resolved by nonlethal measures, WS has the expertise to remove nutria populations in problem areas. Relocation is not a viable option; nutria are an invasive species that threaten both native wildlife species and vegetation. Relocating nutria to a new area just relocates the problem, and can lead to the establishment of new nutria colonies and new damage concerns.

Additional Information

For more information about this and other WS programs or to request assistance from your WS State office call 1-866-4USDA-WS (1-866-487-3297). Find more information at www.aphis.usda.gov/wildlife_damage.

WS Wildlife Services

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USDA

United States Department of Agriculture

Animal and Plant Health Inspection Service

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Coexisting with Coyotes

U.S. Fish and Wildlife

If you live in North Carolina, you've probably seen a coyote, or know someone who has.

The animal's unique ability to adapt to a wide range of habitats, including suburban environments, along with rapid human population growth across the state, has led to an increase in sightings. While in most cases coyotes are harmless, people can take steps to prevent conflicts with the animals.

Coyote Quick Facts

National Park Service

Where did coyotes come from?
Coyotes were once found only in the mid-western portion of North America. But as Europeans settled across the country, the subsequent landscape changes, coupled with elimination of wolves, allowed the coyote to expand its range toward the eastern United States. By the 1980s coyotes started to appear in western North Carolina as a result of natural range expansion from our neighboring states. Coyotes are now established in all 100 counties of North Carolina and live in many towns.

What do coyotes look like?
Often described as a "mangy-looking dog," coyotes weigh about 20-45 pounds (similar to a mid-sized dog) with, typically, reddish to dark gray thick fur. They have long slender snouts, a bushy tail and pointed ears.

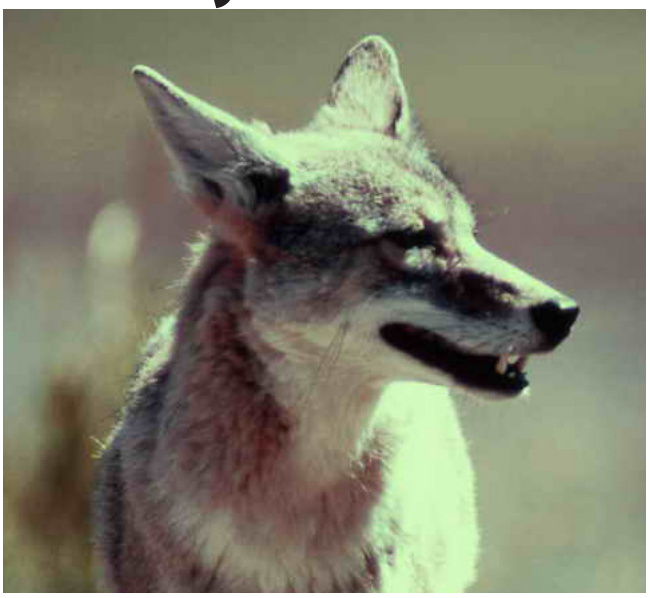
Do they make noise?
Yes, coyotes howl. While some find it unnerving, this howl serves many purposes, none of which are malicious. If you hear a family of coyotes howling, it is easy to think that the area is overflowing with coyotes. In reality, there are usually only 2-6 coyotes, including the pups.

Will coyotes attack me or my child?
Attacks on people, including children, are extremely rare. Normal coyote behavior is to be curious, but wary, when close to humans. Like other wildlife, they will become bold and habituated if people feed them, either purposely or inadvertently, such as with garbage or outdoor pet food. They rarely contract rabies.

Will coyotes attack my pet?
Possibly. Coyotes view outdoor cats and small unleashed dogs as prey, while larger dogs are viewed as threats to their territory and/or their pups. Coyotes are most likely to confront larger dogs during the mating and pup birthing period, January through June.

What should I do if I see a coyote?
Simply seeing a coyote is not cause for concern. If you see a coyote frequently, you and your neighbors should take steps to prevent conflicts with it and other wildlife.

Preventing Conflicts with Coyotes



National Park Service

To prevent problems with coyotes:

- **Secure garbage** in containers with tight-fitting lids, and take them out in the morning of pick up, not the night before. Coyotes and other wildlife will scavenge trash.
- **Don't feed or try to pet** coyotes. Feeding a coyote rewards it for coming in close proximity to people. Once a coyote becomes habituated, it loses its natural wariness of people and may become bold and aggressive.
- **Protect your pets by keeping them inside**, leashed, or inside a fenced area.
- **Install coyote-proof fencing** around your home to protect unsupervised pets.
- **Feed pets indoors** or remove food when your pet is finished eating outside. Coyotes and other wildlife are attracted to pet food left outdoors.
- **Keep bird-feeder areas clean**. Use bird feeders that keep seed off the ground. Coyotes are attracted to small animals congregating on the ground. If coyotes are frequently seen, remove all feeders.
- **Close off crawl spaces** under sheds and porches. Coyotes and other wildlife may use these spaces for resting and raising young.
- **Cut back brushy edges** in your yard, which provide cover for coyotes.
- Don't be intimidated by a coyote. Maintain its wariness by throwing a small object, such as a tennis ball, at it, making a loud noise or spraying it with a hose. Let it know it is unwelcome near your home.
- **Clear fallen fruit** from around fruit trees.
- **Educate your neighbors.** Your efforts to prevent coyote conflicts will be less effective if some neighbors are still providing foods.
- **Allow hunters or trappers** access to your property, so the local coyote population can be managed. Coyotes avoid areas in which threats are perceived.

If you already have a problem with a coyote:

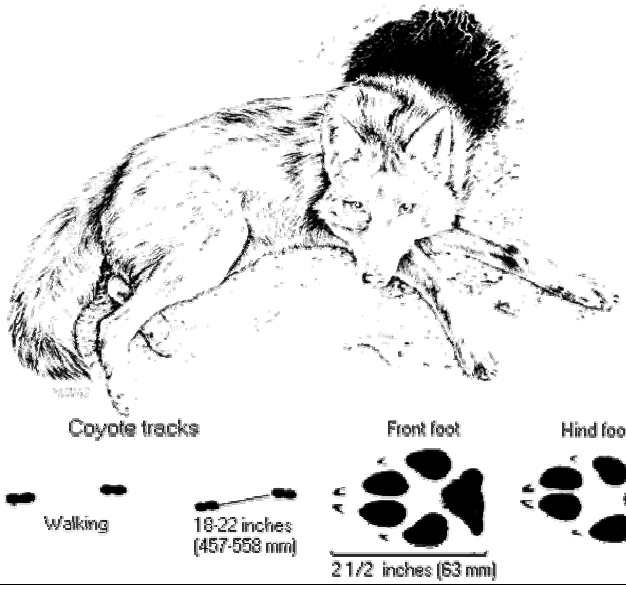
- **Implement the non-lethal steps** described above.
- **Contact a Wildlife Damage Control Agent**, a private individual who charges for his/her services. A list is available at www.ncwildlife.org under "Coexisting with Wildlife."
- **Contact a licensed trapper** during the regulated trapping season. See the list at www.ncwildlife.org under "Coexisting with Wildlife."
- **Coyotes can be hunted** year-round using firearms and archery equipment. However, check to see if local ordinances restrict the discharge of firearms. A landowner can shoot a coyote in the act of causing damage.

NORTH CAROLINA Wildlife RESOURCES COMMISSION

N.C. Wildlife Resources Commission
1751 Varsity Drive
Raleigh, NC 27606
(919) 707-0040
www.ncwildlife.org

VIRGINIA DEPARTMENT OF GAME AND INLAND FISHERIES

LIVING WITH THE COYOTE IN VIRGINIA



The coyote population in Virginia continues to become more abundant and is distributed throughout the Commonwealth. To avoid conflicts with coyotes, it is important to understand coyote behavior and to consider the following advice:

❖ **KEEP THE WILD IN WILDIFE – ENCOURAGE COYOTE AVOIDANCE BEHAVIOR OF HUMANS**

REMOVE ACCESS TO UNNATURAL FOOD SOURCES: Unnatural man-made food sources alter coyote behavior and may result in coyotes becoming tolerant of and dependent on humans. In addition, feeding or unintentionally providing a food source (such as pet food on your porch or in your back yard) over a long period of time may result in coyotes becoming less wary of your presence or actions. **Such behavior may result in coyotes becoming bold and even aggressive towards humans.** If you feed pets in your yard or on your porch, feed only enough food that can be completely consumed by your pet in a short amount of time. Secure garbage cans and lids in order to prevent coyotes from overturning the can for an easy meal.

DEFEND YOUR LIVING SPACE: Tolerating coyotes around your residence may result in coyotes becoming less wary of your presence or actions. **Such behavior may result in coyotes becoming bold and even aggressive around humans.** It is the responsibility of everyone living in a residential community to dissuade coyotes from occupying or using space in areas frequented by humans. When coyotes attempt to extend their living space to include space around your residence, find a safe position that affords you an opportunity to escape an unlikely attack, and yell, throw non-edible objects in the direction of the coyote, or otherwise convey to any "trespassing" animal that it is not welcome in your "space".

❖ **AVOID COYOTE PREDATORY AND TERRITORIAL BEHAVIOR**

PEOPLE: Approaching any wildlife may provoke an encounter if the animal feels cornered or restricted in movement. This is particularly true of animals that have become accustomed to the presence of humans and their activities as a consequence of being fed, or because of access to a readily available food source such as pet food or refuse in a garbage can or compost pile. **Be aware that coyotes in other eastern states have attacked and severely injured small toddlers when left unattended for even a short period of time. Although the likelihood of such an attack is very remote, never leave small children unattended in areas frequented by coyotes.**

Consider removing habitat that provides protective cover for coyotes and their prey such as small rodents. Modifying such habitat around residential areas will dissuade coyotes from using the space as a part of a territory or home range and will reduce the likelihood of conflicts.

PETS: The territorial nature of predatory coyotes poses a real risk to small, free-roaming dogs and cats. Keep small dogs restrained on a leash when walking them outdoors and avoid walking in areas where coyotes are raising their pups from March – August. **Be aware that there have been a few recorded instances of coyotes attacking small dogs on a leash.**

Small dogs and cats are also vulnerable to attacks by coyotes when tethered outside of your house or even on your porch. Small dogs and cats should be kept in an enclosure when kept outdoors in order to prevent coyotes from attacking and killing a pet animal. **Even though a fence may dissuade coyotes from attacking your pet, be aware that coyotes can jump over fences less than 7-feet high and can climb over taller fencing that does not have an outward slanting overhang.**

LIVESTOCK: Contact the Virginia Department of Agriculture and Consumer Services - USDA Wildlife Services Virginia Cooperative Coyote Damage Control Program at 540-381-7387 to obtain information and assistance on preventing and alleviating coyote damage to livestock or other agricultural products.

THE COMMONWEALTH OF VIRGINIA
VIRGINIA DEPARTMENT OF GAME AND INLAND FISHERIES
P.O. BOX 11104, 4010 WEST BROAD STREET
RICHMOND, VIRGINIA 23230-1104
(804) 367-1000 http://www.dgif.virginia.gov

The Department of Game and Inland Fisheries shall afford to all persons an equal access to Department programs and facilities without regard to race, color, religion, national origin, disability, sex or age. If you believe that you have been discriminated against in any program, activity or facility, please write to: Virginia Department of Game & Inland Fisheries, Attn: Compliance Officer, 4010 W. Broad St., Richmond, VA 23230-1104

VIRGINIA DEPARTMENT OF GAME AND INLAND FISHERIES

COYOTE INFORMATION

HISTORY OF THE COYOTE IN VIRGINIA: The coyote is not a native species of Virginia, and was first observed in the very western regions of the Commonwealth in the early 1950s.

DESCRIPTION: Coyotes are about the size and weight of a medium-sized dog. They generally have longer and thicker hair or fur than a dog. Their long black tipped tail is usually bushy and is pointed downward rather than outward or upward. The fur of the coyote in Virginia can vary from blond, light reddish-brown or tan, grayish black, or black with a small white blaze in the center of the chest. The coyote ears are pointed and erect, and the snout is relatively long and slender. The coyote in the eastern United States is typically larger than coyotes in the western United States. Female coyotes weigh on average 30 – 40 pounds, and male coyotes weigh on average 35 – 45 pounds. Coyotes can weigh as much as 60 pounds.

DISTRIBUTION AND ABUNDANCE: The coyote is distributed throughout the Commonwealth and prefers semi-forested or open farm and pasture lands. Coyote populations in more forested landscapes are generally less abundant and typically exhibit different foraging and social behaviors depending on forest prey species size and abundance. Surveys of hunter harvest of coyotes as well as surveys of hunter observations of coyotes while hunting big game indicate that the coyote population is more abundant in counties west of the Blue Ridge Mountains.

HABITS: Coyotes are elusive and normally avoid humans. They can be active at anytime of day or night, but are more typically observed at dawn and dusk. The coyote communicates by barking, yelping, and howling. Male and female coyotes form a pair bond and establish and defend a territory were they raise 3-12 pups that are born anytime between late March and May. The pups are fed by both the male and female, and sometimes by one or two offspring from a previous litter. The pups may disperse and leave the parents territory anytime after August. However, the parents may tolerate the pups occupying their territory as late February if prey resources are plentiful and large in size (e.g. deer). They remain active and do not hibernate in dens regardless of winter severity. Coyotes will develop a "search image" for a prey type that is more easily scavenged or killed. A coyote's "search image" includes visual, auditory, and olfactory senses. When the abundance of a specific prey decreases to the point that a coyote is opportunistically finding and consuming more of a different prey resource than it is actually hunting for, the search image of the coyote will change to reflect the more abundant or most easily accessible food resource available in it's home range. The habitat and space that the coyote hunts in may also change depending on the type of habitat that the predator is more likely to fill its belly. In situations where wild game is stocked to reestablish populations for hunting, or situations where livestock are raised and maintained throughout the year, coyotes may artificially retain a search image for the artificially abundant game or livestock that also tend to be more vulnerable to predation.

FOOD: The coyote is an opportunistic forager that will consume anything of nutritional value. They do not specialize in hunting and killing only one type of prey, and they will not turn down an easy meal if they happen to stumble onto other prey that they were not hunting for. Consequently, coyotes will prey and scavenge on anything including vegetable matter and fruits, insects, and the meat of wildlife killed or scavenged. Although coyotes generally prey on small rodents, rabbits, birds, snakes and frogs, they will kill larger animals such as big game and livestock during periods when the larger prey are more vulnerable to predation (e.g., turkey on nests; deer fawns in the spring and summer; lambs, kid goats, and newborn calves). The coyote will not pass up a free meal to feed its belly with artificial food resources. They will scavenge exposed garbage or other refuse, and may even kill and consume house cats.

LEGAL STATUS: The coyote is legally classified as a nuisance species and may be killed at anytime, except coyotes may not be killed with a gun, firearm, or other weapon on Sunday.

ECOLOGY: The coyote, a medium sized canid predator, occupies an ecological niche that has been void since the extirpation of wolves from Virginia around the beginning of the 20th century. In addition to inflicting mortality on small as well as large prey species such as beaver, turkey and deer, coyotes tend to kill or exclude red fox from their territories in red fox habitat and may subsequently limit red fox population abundance. The coyote may also indirectly benefit ground-nesting bird species, such as Bobwhite quail, by killing or excluding ground-nest predators such as raccoon, opossum and skunks.

MANAGEMENT: Coyote populations, not unlike all wildlife populations, will continue to grow until their numbers are limited by food availability or space. Unlike most wildlife populations, the reproductive potential of coyotes is such that harvesting coyotes for recreation or fur pelts or other economic incentive will not generally have any impact on limiting or even reducing the abundance of the coyote population. In general, increasing coyote mortality through hunting and trapping will tend to only change the age distribution of the population rather than change pre-whelping population density.

When populations of game species decline, hunters and some game resource managers may sensibly conclude that coyote predation on game is reducing or limiting game populations. Under certain conditions coyote predation has been shown to limit the abundance of big game populations. However, under normal conditions – that is when there is an abundance of game habitat available and the game population has not been decimated by disease or by another catastrophic mortality factor – **predation will rarely limit the population abundance of a game species**. In fact, it is more often the case that overall prey abundance and diversity will dictate the total number of coyotes that can thrive in a given area. If you feel coyotes are reducing big game populations in your area, please obtain a copy of "Coyote Management Strategies to Enhance Big Game Survival" for information on determining if it is necessary and feasible to manage coyote predation in your area.

INTERACTION WITH PETS: Coyotes are medium sized carnivores that are very territorial in nature, and generally will not tolerate other coyotes or dogs trespassing in their territories. This behavior is even more pronounced when coyotes are caring for their young anytime between March and August. For this reason, **coyotes have been known to show aggression and attack or even kill free-roaming small domestic dogs and cats that live within a coyote family's territory.** Attacks have also been known to occur in the yard or on the porch of houses.

INTERACTION WITH HUMANS: There are very few recorded instances of coyotes attacking humans in the United States. Coyotes that have contracted rabies, as is the case with any domestic animal or wildlife that contracts rabies, may attack humans without warning. However, **there are very few recorded instances of non-rabid coyotes actually attacking humans unprovoked.** In most cases where coyotes act aggressively towards humans, a coyote is responding to the presence of a dog with the human and the aggression occurs within a few hundred yards of a den with pups. In those instances where coyotes have actually attacked humans, coyote populations were very abundant and coyotes were residing and foraging for food in residential areas. In most cases, the attacks occurred on small children, and may have been due to hunger or due to the territorial nature of the coyote to exclude small "animals" from it's territory.

Aquatic Invasive Species
in the Chesapeake Bay

A MARYLAND SEA GRANT BRIEF

Nutria

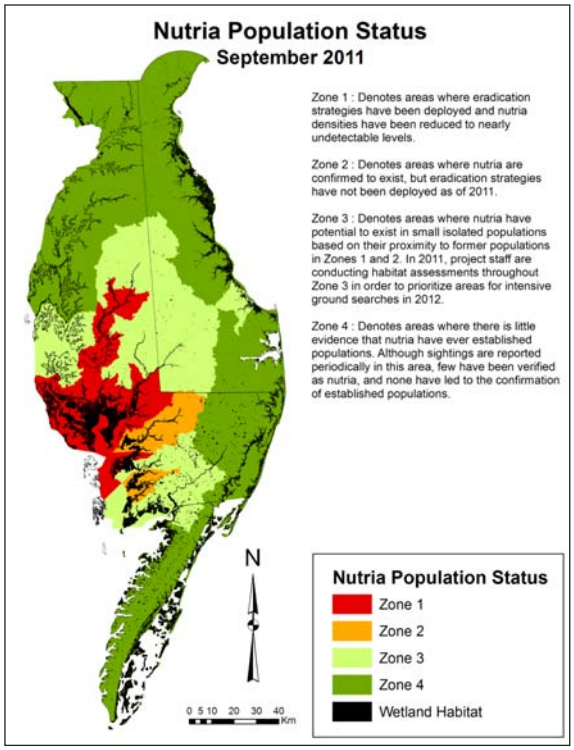
What Are Nutria?

Nutria (*Myocastor coypus*) are prolific aquatic rodents native to South America. They were introduced into the United States during the late 1800s and early 1900s to establish a fur farm industry. However, nutria farming was not successful, and nutria were intentionally released into the wild or translocated to the Southeast to serve as "weed cutters" to control undesirable vegetation.

The species was first introduced into Maryland's Lower Eastern Shore in 1943 in order to establish an experimental fur station at the Blackwater National Wildlife Refuge. The nutria population in the wildlife refuge increased to approximately 50,000 by the early 1990s.

Why Are They Harmful to the Chesapeake Bay?

Feeding behaviors by nutria are extremely damaging to marsh ecosystems. Nutria can eat 25 percent of their body weight in a single day. They consume plants by excavating the roots, creating circles of mudflats called "eat outs." As a result, these areas become highly susceptible to erosion, and the wetlands are quickly converted to open water, removing valuable habitat for native species. Nutria also create deep swimming channels through marshes, fragmenting the area and preventing marsh-dependent species from using all of the available habitat. Over 7,000 acres of marshland in Blackwater National Wildlife Refuge have been destroyed since the introduction of nutria — almost half the refuge's total acreage.



What Is Being Done to Control Them?

Management efforts to control or eradicate nutria in Maryland began in the late 1980s. They led to the development in 2000 of a three-year pilot program. It brought together state, federal, and private organizations to investigate

and apply the most successful methods. These include sending out teams to track and trap the animals.

In 2002 the Chesapeake Bay Program (CBP), in partnership with Maryland Sea Grant, sponsored a workshop aimed at developing Baywide management strategies for problematic invasive species, including nutria. In 2003 President George W. Bush signed a law that provided $20 million over five years for nutria eradication in Maryland. The CBP — the partnership of federal and state agencies that oversees Bay restoration efforts — concluded that the nutria populations needed to be eliminated throughout the Chesapeake Bay region, not just in Maryland. The CBP created a Chesapeake Bay Nutria Working Group in 2003 to develop a Baywide management plan, which set a target date of 2009 to eradicate the animals.

What is Their Status?

Management efforts have resulted in substantial progress in controlling the nutria population in the Chesapeake region. As of 2004, nutria have been completely eradicated from Blackwater National Wildlife Refuge. Intensive surveys conducted throughout the Delmarva Peninsula from 2010 to 2012 indicate that the remaining nutria populations are confined to Maryland's Lower Shore in Wicomico and Somerset Counties, primarily in the Wicomico and Manokin rivers. Eradication efforts continue, and resource managers hope to remove the remaining populations within a few years.

For More Information

Chesapeake Bay Nutria Eradication Project
(U.S. Fish & Wildlife Service)
http://www.fws.gov/chesapeakenutriaproject/Index.html

Nutria and Blackwater Refuge
(U.S. Fish & Wildlife Service)
http://www.fws.gov/blackwater/nutriafact.html

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NUTRIA

Fig. 1. Nutria (*Myocastor coypus*)

Damage Prevention and Control Methods

Exclusion

Protect small areas with partially buried fences.

Wire tubes can be used to protect baldcypress or other seedlings but are expensive and difficult to use.

Use sheet metal shields to prevent gnawing on wooden and styrofoam structures and trees near aquatic habitat.

Install bulkheads to deter burrowing into banks.

Cultural Methods and Habitat Modification

Improve drainage to destroy travel lanes.

Manage vegetation to eliminate food and cover.

Contour stream banks to control burrowing.

Plant baldcypress seedlings in the fall to minimize losses.

Restrict farming, building construction, and other "high risk" activities to upland sites away from water to prevent damage.

Manipulate water levels to stress nutria populations.

Frightening

Ineffective.

Repellents

None are registered. None are effective.

Toxicants

Zinc phosphide on carrot or sweet potato baits.

Fumigants

None are registered. None are effective.

Trapping

Commercial harvest by trappers.

Double longspring traps, Nos. 11 and 2, as preferred by trappers and wildlife damage control specialists.

Body-gripping traps, for example, Conibear® Nos. 160-2 and 220-2, and locking snares are most effective when set in trails, den entrances, or culverts.

Live traps should be used when leghold and body-gripping traps cannot be set.

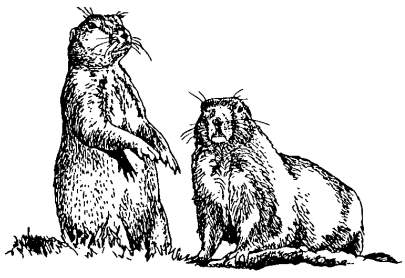
Long-handled dip nets can be used to catch unwary nutria.

Shooting

Effective when environmental conditions force nutria into the open. Night hunting is illegal in many states.

Other Methods

Available control techniques may not be applicable to all damage situations. In these cases, safe and effective methods must be tailored to specific problems.



PREVENTION AND CONTROL OF WILDLIFE DAMAGE — 1994

Cooperative Extension Division
Institute of Agriculture and Natural Resources
University of Nebraska - Lincoln

United States Department of Agriculture
Animal and Plant Health Inspection Service
Animal Damage Control

Great Plains Agricultural Council
Wildlife Committee

B-71

Identification

The nutria (*Myocastor coypus,* Fig. 1) is a large, dark-colored, semiaquatic rodent that is native to southern South America. At first glance, a casual observer may misidentify a nutria as either a beaver (*Castor canadensis*) or a muskrat (*Ondatra zibethicus*), especially when it is swimming. This superficial resemblance ends when a more detailed study of the animal is made. Other names used for the nutria include coypu, nutria-rat, South American beaver, Argentine beaver, and swamp beaver.

Nutria are members of the family Myocastoridae. They have short legs and a robust, highly arched body that is approximately 24 inches (61 cm) long. Their round tail is from 13 to 16 inches (33 to 41 cm) long and scantily haired. Males are slightly larger than females; the average weight for each is about 12 pounds (5.4 kg). Males and females may grow to 20 pounds (9.1 kg) and 18 pounds (8.2 kg), respectively.

The dense grayish underfur is overlaid by long, glossy guard hairs that vary in color from dark brown to yellowish brown. The forepaws have four well-developed and clawed toes and one vestigial toe. Four of the five clawed toes on the hind foot are interconnected by webbing; the fifth outer toe is free. The hind legs are much larger than the forelegs. When moving on land, a nutria may drag its chest and appear to hunch its back. Like beavers, nutria have large incisors that are yellow-orange to orange-red on their outer surfaces.

In addition to having webbed hind feet, nutria have several other adaptations to a semiaquatic life. The eyes, ears, and nostrils of nutria are set high on their heads. Additionally, the nostrils and mouth have valves that seal out water while swimming, diving, or feeding underwater. The mammae or teats of the female are located high on the sides, which allows the young to suckle while in the water. When pursued, nutria can swim long distances under water and see well enough to evade capture.

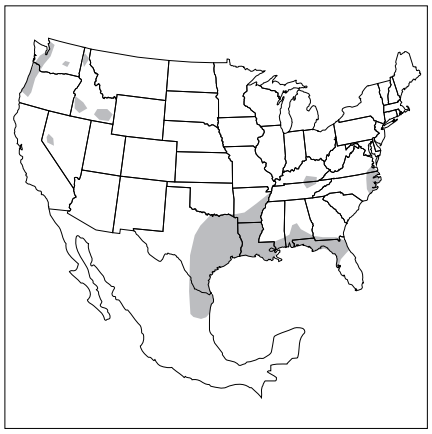


Fig. 2. Range of the nutria introduced in North America.

Range

The original range of nutria was south of the equator in temperate South America. This species has been introduced into other areas, primarily for fur farming, and feral populations can now be found in North America, Europe, the Soviet Union, the Middle East, Africa, and Japan. *M. c. bonariensis* was the primary subspecies of nutria introduced into the United States.

Fur ranchers, hoping to exploit new markets, imported nutria into California, Washington, Oregon, Michigan, New Mexico, Louisiana, Ohio, and Utah between 1899 and 1940. Many of the nutria from these ranches were freed into the wild when the businesses failed in the late 1940s. State and federal agencies and individuals translocated nutria into Alabama, Arkansas, Georgia, Kentucky, Maryland, Mississippi, Oklahoma, Louisiana, and Texas, with the intent that nutria would control undesirable vegetation and enhance trapping opportunities. Nutria were also sold as "weed cutters" to an ignorant public throughout the Southeast. A hurricane in the late 1940s aided dispersal by scattering nutria over wide areas of coastal southwest Louisiana and southeast Texas.

Accidental and intentional releases have led to the establishment of widespread and localized populations of nutria in various wetlands throughout the United States. Feral animals have been reported in at least 40 states and three Canadian provinces in North America since their introduction. About one-third of these states still have viable populations that are stable or increasing in number. Some of the populations are economically important to the fur industry. Adverse climatic conditions, particularly extreme cold, are probably the main factors limiting range expansion of nutria in North America. Nutria populations in the United States are most dense along the Gulf Coast of Louisiana and Texas (Fig. 2).

Habitat

Nutria adapt to a wide variety of environmental conditions and persist in areas previously claimed to be unsuitable. In the United States, farm ponds and other freshwater impoundments, drainage canals with spoil banks, rivers and bayous, freshwater and brackish marshes, swamps, and combinations of various wetland types can provide a home to nutria. Nutria habitat, in general, is the semiaquatic environment that occurs at the boundary between land and permanent water. This zone usually has an abundance of emergent aquatic vegetation, small trees, and/or shrubs and may be interspersed with small clumps and hillocks of high ground. In the United States, all significant nutria populations are in coastal areas, and freshwater marshes are the preferred habitat.

Food Habits

Nutria are almost entirely herbivorous and eat animal material (mostly insects) incidentally, when they feed on plants. Freshwater mussels and crustaceans are occasionally eaten in some parts of their range. Nutria are opportunistic feeders and eat approximately 25% of their body weight daily. They prefer several small meals to one large meal.

The succulent, basal portions of plants are preferred as food, but nutria also eat entire plants or several different parts of a plant. Roots, rhizomes, and tubers are especially important during winter. Important food plants in the

United States include cordgrasses (*Spartina* spp.), bulrushes (*Scirpus* spp.), spikerushes (*Eleocharis* spp.), chafflower (*Alternanthera* spp.), pickerelweeds (*Pontederia* spp.), cattails (*Typha* spp.), arrowheads (*Sagittaria* spp.), and flatsedges (*Cyperus* spp.). During winter, the bark of trees such as black willow (*Salix nigra*) and baldcypress (*Taxodium distichum*) may be eaten. Nutria also eat crops and lawn grasses found adjacent to aquatic habitat.

Because of their dexterous forepaws, nutria can excavate soil and handle very small food items. Food is eaten in the water; on feeding platforms constructed from cut vegetation; at floating stations supported by logs, decaying mats of vegetation, or other debris; in shallow water; or on land. In some areas, the tops of muskrat houses and beaver lodges may also be used as feeding platforms.

General Biology, Reproduction, and Behavior

General Biology

In the wild, most nutria probably live less than 3 years; captive animals, however, may live 15 to 20 years. Predation, disease and parasitism, water level fluctuations, habitat quality, highway traffic, and weather extremes affect mortality. Annual mortality of nutria is between 60% and 80%.

Predators of nutria include humans (through regulated harvest), alligators (*Alligator mississippiensis*), garfish (*Lepisosteus* spp.), bald eagles (*Haliaeetus leucocephalus*), and other birds of prey, turtles, snakes such as the cottonmouth (*Agkistrodon piscivorus*), and several carnivorous mammals.

Nutria densities vary greatly. In Louisiana, autumn densities of about 18 animals per acre (44/ha) have been found in floating freshwater marshes. In Oregon, summer densities in freshwater marshes may be 56 animals per acre (138/ha). Sex ratios range from 0.6 to 1.6 males per female.

In summer, nutria live on the ground in dense vegetation, but at other times of the year they use burrows. Burrows may be those abandoned by other animals such as armadillos (*Dasypus novemcinctus*), beavers, and muskrats, or they may be dug by nutria. Underground burrows are used by individuals or multigenerational family groups.

Burrow entrances are usually located in the vegetated banks of natural and human-made waterways, especially those having a slope greater than 45°. Burrows range from a simple, short tunnel with one entrance to complex systems with several tunnels and entrances at different levels. Tunnels are usually 4 to 6 feet (1.2 to 1.8 m) long; however, lengths of up to 150 feet (46 m) have been recorded. Compartments within the tunnel system are used for resting, feeding, escape from predators and the weather, and other activities. These vary in size, from small ledges that are only 1 foot (0.3 m) across to large family chambers that measure 3 feet (0.9 m) across. The floors of these chambers are above the water line and may be covered with plant debris discarded during feeding and shaped into crude nests.

In addition to using land nests and burrows, nutria often build flattened circular platforms of vegetation in shallow water. Constructed of coarse emergent vegetation, these platforms are used for feeding, loafing, grooming, birthing, and escape, and are often misidentified as muskrat houses. Initially, platforms may be relatively low and inconspicuous; however, as vegetation accumulates, some may attain a height of 3 feet (0.9 m).

Reproduction

Nutria breed in all seasons throughout most of their range, and sexually active individuals are present every month of the year. Reproductive peaks occur in late winter, early summer, and mid-autumn, and may be regulated by prevailing weather conditions.

Under optimal conditions, nutria reach sexual maturity at 4 months of age. Female nutria are polyestrous, and nonpregnant females cycle into estrus ("heat") every 2 to 4 weeks. Estrous is maintained for 1 to 4 days in most females. Sexually mature males can breed at any time because sperm is produced throughout the year.

The gestation period for nutria ranges from 130 to 132 days. A postpartum estrus occurs within 48 hours after birth and most females probably breed again during that time.

Litters average 4 to 5 young, with a range of 1 to 13. Litter sizes are generally smaller during winter, in suboptimal habitats, and for young females. Females often abort or assimilate embryos in response to adverse environmental conditions.

Young are precocial and are born fully furred and active. They weigh approximately 8 ounces (227 g) at birth and can swim and eat vegetation shortly thereafter. Young normally suckle for 7 to 8 weeks until they are weaned.

Behavior

Nutria tend to be crepuscular and nocturnal, with the start and end of activity periods coinciding with sunset and sunrise, respectively. Peak activity occurs near midnight. When food is abundant, nutria rest and groom during the day and feed at night. When food is limited, daytime feeding increases, especially in wetlands free from frequent disturbance.

Nutria generally occupy a small area throughout their lives. In Louisiana, the home range of nutria is about 32 acres (13 ha). Daily cruising distances for most nutria are less than 600 feet (183 m), although some individuals may travel much farther. Nutria move most in winter, due to an increased demand for food. Adults usually move farther than young. Seasonal migrations of nutria may also occur. Nutria living in some agricultural areas move in from marshes and swamps when crops are planted and leave after the crops are harvested.

Nutria have relatively poor eyesight and sense danger primarily by hearing. They occasionally test the air for scent. Although they appear to be

clumsy on land, they can move with surprising speed when disturbed. When frightened, nutria head for the nearest water, dive in with a splash, and either swim underwater to protective cover or stay submerged near the bottom for several minutes. When cornered or captured, nutria are aggressive and can inflict serious injury to pets and humans by biting and scratching.

Damage and Damage Identification

Kinds of Damage

Nutria damage has been observed throughout their range. Most damage is from feeding or burrowing. In the United States, most damage occurs along the Gulf Coast of Louisiana and Texas. The numerous natural and human-made waterways that traverse this area are used extensively for travel by nutria.

Burrowing is the most commonly reported damage caused by nutria. Nutria are notorious in Louisiana and Texas for undermining and breaking through water-retaining levees in flooded fields used to produce rice and crawfish. Additionally, nutria burrows sometimes weaken flood control levees that protect low-lying areas. In some cases, tunneling in these levees is so extensive that water will flow unobstructed from one side to the other, necessitating their complete reconstruction.

Nutria sometimes burrow into the styrofoam flotation under boat docks and wharves, causing these structures to lean and sink. They may burrow under buildings, which may lead to uneven settling or failure of the foundations. Burrows can weaken roadbeds, stream banks, dams, and dikes, which may collapse when the soil is saturated by rain or high water or when subjected to the weight of heavy objects on the surface (such as vehicles, farm machinery, or grazing livestock). Rain and wave action can wash out and enlarge collapsed burrows and compound the damage.

Nutria depredation on crops is well documented. In the United States, sugarcane and rice are the primary crops damaged by nutria. Grazing on rice plants can significantly reduce yields, and damage can be locally severe. Sugarcane stalks are often gnawed or cut during the growing season. Often only the basal internodes of cut plants are eaten. Other crops that have been damaged include corn, milo (grain sorghum), sugar and table beets, alfalfa, wheat, barley, oats, peanuts, various melons, and a variety of vegetables from home gardens and truck farms.

Nutria girdle fruit, nut, and shade trees and ornamental shrubs. They also dig up lawns and golf courses when feeding on the tender roots and shoots of sod grasses. Gnawing damage to wooden structures is common. Nutria also gnaw on styrofoam floats used to mark the location of traps in commercial crawfish ponds.

At high densities and under certain adverse environmental conditions, foraging nutria can significantly impact natural plant communities. In Louisiana, nutria often feed on seedling baldcypress and can cause the complete failure of planted or naturally-regenerated stands. Overutilization of emergent marsh plants can damage stands of desirable vegetation used by other wildlife species and aggravate coastal erosion problems by destroying vegetation that holds marsh soils together. Nutria are fond of grassy arrowhead (*Sagittaria platyphylla*) tubers and may destroy stands propagated as food for waterfowl in artificial impoundments.

Nutria can be infected with several pathogens and parasites that can be transmitted to humans, livestock, and pets. The role of nutria, however, in the spread of diseases such as equine encephalomyelitis, leptospirosis, hemorrhagic septicemia (Pasteurellosis), paratyphoid, and salmonellosis is not well documented. They may also host a number of parasites, including the nematodes and blood flukes that cause "swimmer's-itch" or "nutria-itch" (*Strongyloides myopotami* and *Schistosoma mansoni*), the protozoan responsible for giardiasis (*Giardia lamblia*), tapeworms (*Taenia* spp.), and common liver flukes (*Fasciola hepatica*). The threat of disease may be an important consideration in some situations, such as when livestock drink from water contaminated by nutria feces and urine.

Damage Identification

The ranges of nutria, beavers, and muskrats overlap in many areas and damage caused by each may be similar in appearance. Therefore, careful examination of sign left at the damage site is necessary to identify the responsible species.

On-site observations of animals and their burrows are the best indicators of the presence of nutria. Crawl outs, slides, trails, and the exposed entrances to burrows often have tracks that can be used to identify the species. The hind foot, which is about 5 inches (13 cm) long, has four webbed toes and a free outer toe. A drag mark left by the tail may be evident between the footprints (Fig. 3).

Droppings may be found floating in the water, along trails, or at feeding sites. These are dark green to almost black in color, cylindrical, and approximately 2 inches (5 cm) long and 1/2 inch (1.3 cm) in diameter. Additionally, each dropping usually has deep, parallel grooves along its entire length (Fig. 4).

Trees girdled by nutria often have no tooth marks, and bark may be peeled from the trunk. The crowns of seedling trees are usually clipped (similar to rabbit [*Sylvilagus* spp.] damage) and discarded along with other woody portions of the plant.

In rice fields, damage caused by nutria, muskrats, and Norway rats (*Rattus norvegicus*) can be confused. Nutria and muskrats damage rice plants by clipping stems at the water line in flooded fields; Norway rats reportedly clip stems above the surface of the water (E. A. Wilson, personal communication).

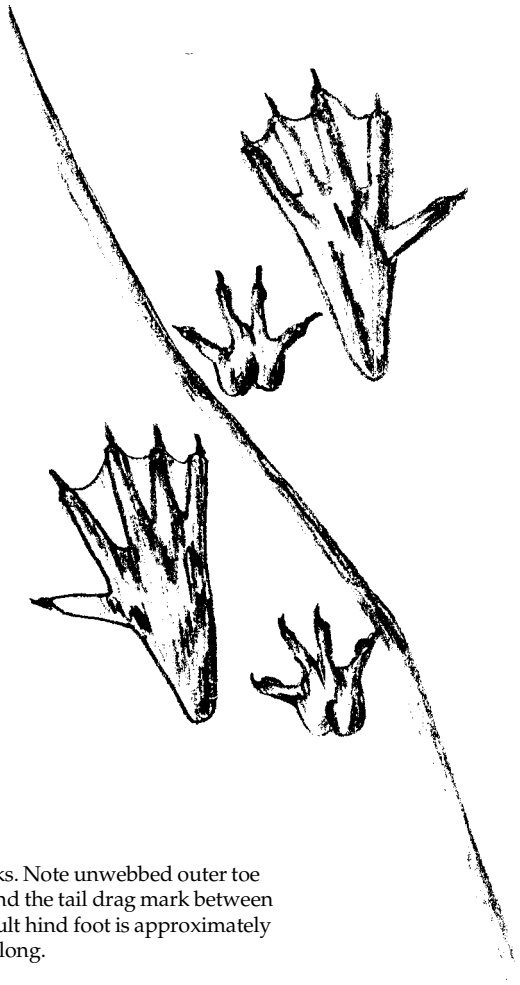


Fig. 3. Nutria tracks. Note unwebbed outer toe on the hind foot and the tail drag mark between the tracks. The adult hind foot is approximately 5 inches (12.7 cm) long.

Fig. 4. Nutria dropping in relation to a 2-inch (5.1-cm) camera lens cover. Note longitudinal grooves along the length of the dropping.

Legal Status

Nutria are protected as furbearers in some states or localities because they are economically important. Permits may be necessary to control animals that are damaging property. In other areas, nutria have no legal protection and can be taken at any time by any legal means. Consequently, citizens experiencing problems with nutria should be familiar with local wildlife laws and regulations. Complex problems should be handled by professional wildlife damage control specialists who have the necessary permits and expertise to do the job correctly. Your state wildlife agency can provide the names of qualified wildlife damage control specialists and information on pertinent laws and regulations.

Damage Prevention and Control Methods

Preventive measures should be used whenever possible, especially in areas where damage is prevalent. When control is warranted, all available techniques should be considered before a control plan is implemented. The objective of control is to use only those techniques that will stop or alleviate anticipated or ongoing damage or reduce it to tolerable levels. In most cases, successful control will depend on integrating a number of different techniques and methods.

Timing and location of control activities are important factors governing the success or failure of any control project. Control in sugarcane, for example, is best applied during the growing season, after damage has started. At this time, nutria in affected areas are relatively stationary and concentrated in drainages adjacent to fields. Conversely, efforts to protect rice field levees or the shorelines of southern lakes and ponds should be initiated during the winter when animals are mobile and concentrated in major ditches and other large bodies of water.

Nutria are best controlled where they are causing damage or where they are most active. Baiting is sometimes used to concentrate nutria in specific locations where they can be controlled more easily. After the main concentrations of nutria are removed, control efforts should be directed at removing wary individuals.

Exclusion

Fences, walls, and other structures can reduce nutria damage, but high costs usually limit their use. As a general rule, barriers are too expensive to be used to control damage to agricultural crops. Low fences (about 4 feet [1.2 m]) with an apron buried at least 6 inches (15 cm) have been used effectively to exclude nutria from home gardens and lawns. Sheet metal shields can be used to prevent gnawing damage to wooden and styrofoam structures and trees. Barriers constructed of sheet metal can be expensive to erect and unsightly.

Protect baldcypress and other seedlings with hardware cloth tubes around individual plants or wire mesh fencing around the perimeter of a stand. Extensive use of these is neither practical nor cost-effective. Plastic seedling protectors are not effective in controlling damage to baldcypress seedlings because nutria can chew through them.

Sheet piling, bulkheads, and riprap can effectively protect stream banks from burrowing nutria. Installation requires heavy equipment and is expensive. Use is usually restricted to industrial or commercial applications.

Cultural Methods and Habitat Modification

Land that is well-drained and free of dense, weedy vegetation is generally unattractive to nutria. Use of other good farming practices, such as precision land leveling and weed management, can minimize nutria damage in agricultural areas.

Draining and Grading. Any drainage that holds water can be used by nutria as a travel route or home site. Consequently, eliminate standing water in drainages to reduce their attractiveness to nutria. This may be extremely difficult or impossible to accomplish in low-lying areas near coastal marshes and permanent bodies of water. Higher sites, such as those used for growing sugarcane and other crops, are better suited for this type of management.

On poorly drained soils, contour small ditches to eliminate low spots and sills and enhance rapid drainage. Use precision leveling on well-drained soils to eliminate small ditches that are occasionally used by nutria.

Grading and bulldozing can destroy active burrows in the banks of steep-sided ditches and waterways. In addition, contour bank slopes at less than 45° to discourage new burrowing. Sculpting rice field levees to make them gently sloping is similarly effective. Continued deep plowing of land undermined by nutria can destroy shallow burrow systems and discourage new burrowing activity.

Vegetation Control. Eliminate brush, trees, thickets, and weeds from fence lines and turn rows that are adjacent to ditches, drainages, waterways, and other wetlands to discourage nutria. Burn or remove cleared vegetation from the site. Brush piles left on the ground or in low spots can become ideal summer homes for nutria.

Water Level Manipulation. Many low-lying areas along the Gulf Coast are protected by flood control levees and pumps that can be used to manipulate water levels. By dropping water levels during the summer, stressful drought conditions that cause nutria to concentrate in the remaining aquatic habitat can be simulated, thus increasing competition for food and space, exposure to predators, and emigration to other suitable habitat. Raising water levels in winter will force nutria out of their burrows and expose them to the additional stresses of cold weather. Water level manipulation is expensive to implement and has not yet been proven to be effective. Nevertheless, this method should be considered when a comprehensive nutria control program is being developed.

Other Cultural Methods. Alternate field and garden sites should be considered in areas where nutria damage has occurred on a regular basis. New fields, gardens, and slab-on-grade buildings should be located as far as possible from drainages, waterways, and other water bodies where nutria live.

Late-planted baldcypress seedlings are less susceptible to damage by nutria than those planted in the spring. For this reason, plant unprotected seedlings in the early fall when alternative natural foods are readily available.

Frightening

Nutria are wary creatures and will try to escape when threatened. Loud noises, high pressure water sprays, and other types of harassment have been used to scare nutria from lawns and golf courses. The success of this type of control is usually short-lived and problem animals soon return. Consequently, frightening as a control technique is neither practical nor effective.

Repellents

No chemical repellents for nutria are currently registered. Other rodent repellents (such as Thiram) may repel nutria, but their effectiveness has not been determined. Use of these without the proper state and federal pesticide registrations is illegal.

Toxicants

Zinc Phosphide. Zinc phospide is the only toxicant that is registered for controlling nutria. Zinc phosphide is a Restricted Use Pesticide that can only be purchased and applied by certified pesticide applicators or individuals under their direct supervision. It is a grayish-black powder with a heavy garlic-like smell and is widely used for controlling a variety of rodents. When used properly, zinc phosphide poses little hazard to nontarget species, humans, pets, or livestock.

Zinc phosphide is highly toxic to wildlife and humans, so all precautions and instructions on the product label

should be carefully reviewed, understood, and followed precisely. Use an approved respirator and wear elbow-length rubber gloves when handling this chemical to prevent accidental poisoning. Mix and store baits treated with zinc phosphide only in well-ventilated areas to reduce exposing humans to chemical fumes and dust. When possible, mix zinc phosphide at the baiting site to avoid having to store and transport treated baits. Never transport mixed bait or open zinc phosphide containers in the cab of any vehicle. Store unused zinc phosphide in a dry place in its original watertight container because moisture causes it to deteriorate. Immediately wash off any zinc phosphide that gets on the skin.

Past studies have shown that zinc phosphide can kill over 95% of the nutria present along waterways when applied to fresh baits at a 0.75% (7,500 ppm) rate. Today, the use of zinc phosphide at this concentration is illegal. Federal and state registrations, however, allow lower rates to be used. For example, the label held by USDA-APHIS-ADC (EPA Reg. No. 56228-9) allows for a maximum 0.67% (6,700 ppm) treatment rate. At this rate, approximately 94 pounds (42.7 kg) of bait can be treated with 1 pound (0.4 kg) of 63.2% zinc phosphide concentrate.

Where to Bait. The best places to bait nutria are in waterways, ponds, and ditches where permanent standing water and recent nutria sign are found. Baiting in these areas increases efficiency and reduces the likelihood that nontarget animals will be affected. Small chunks of unpeeled carrots, sweet potatoes, watermelon rind, and apples can be used as bait.

The best baiting stations for large waterways are floating rafts spaced 1/4 to 1/2 mile (0.4 to 0.8 km) apart throughout the damaged area. In ponds, use one raft per 3 acres (1.2 ha). Rafts measuring 4 feet (1.2 m) square or 4 x 8 feet (1.2 x 2.4 m) are easily made from sheets of 3/8- to 3/4-inch (1.0- to 1.9- cm) exterior plywood and 3-inch (7.6-cm) styrofoam flotation. Install a thin wooden strip around the perimeter of the raft's surface to keep bait from rolling into the water. The raft should float 1 to 4 inches (2.5 to 10.2 cm) above the surface and should be anchored to the bottom with a heavy weight or tied to the shore (Fig. 5).

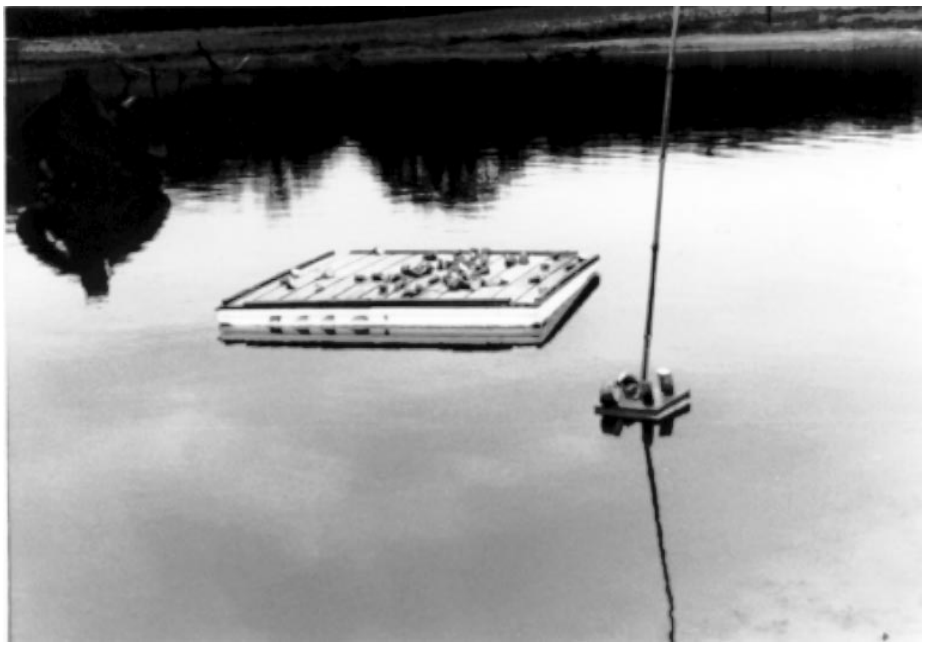


Fig. 5. Examples of a 4-foot (1.2-m) square raft (left) and a 6-inch (15.2-cm) square baiting board, which are used to concentrate nutria for shooting, trapping, or poisoning. These baiting platforms are constructed of plywood and styrofoam and baited with sweet potatoes.

In small ditches or areas where nutria densities are low, use 6-inch (15.2-cm) square floating bait boards made of wood and styrofoam, in lieu of rafts (Fig. 5). These can be maintained in place with a long slender anchoring pole made of bamboo, reed, or other suitable material that is placed through a hole in the center of the platform. This allows the board to move up and down as water levels change. Attach baits to small nails driven into the surface of the platform. Bait boards should be spaced 50 to 100 feet (15.2 to 30.5 m) apart in areas where nutria are active.

Other natural sites surrounded by water can also be baited for nutria. Small islands, exposed tree stumps, floating logs, and feeding platforms are excellent baiting sites. Avoid placing baits on muskrat houses and beaver lodges. Baits can be attached to trees, stumps, or other structures with small nails and should be kept out of the water.

Baiting on the ground should only be used when water sites are unsuitable or lacking. Ground baiting is justified and effective when eliminating the last few nutria in a local population. Use care when ground baiting because baits may be accessible to nontarget animals and humans. Place ground baits near sites of nutria activity, such as trails and entrances to burrows.

Prebaiting. Prebaiting is a crucial step when using zinc phosphide because it leads to nutria feeding at specific sites on specific types of food (such as the baits; carrots or sweet potatoes are preferred). Nutria tend to be communal feeders, and if one nutria finds a new feeding spot, other nutria in the area will also begin feeding there.

To prebait, lightly coat small (approximately 2-inch [5.1-cm] long) chunks of untreated bait with corn oil. Place the bait at each baiting station in late afternoon, and leave it overnight. Use no more than 10 pounds (4.5 kg) of bait per raft, 4 pieces of bait per baiting board, or 2 to 5 pieces at other sites at one time. Prebaiting should continue at least 2 successive nights after nutria begin feeding at a baiting site. Large

(more than 1 week) gaps in the prebaiting sequence necessitate that the process be started over.

Observations of prebaited sites will help you decide how the control program should proceed. If nontarget animals are feeding at these sites (as determined by sign or actual observations of animals), then prebaiting should start over at another location. Prepare and apply zinc phosphide-treated baits when nutria become regular users of prebaited baiting stations and nontarget animals are not a problem.

Applying Zinc Phosphide. Prepare zinc phosphide baits as needed to prevent deterioration. Treated baits are prepared in 10-pound (4.5-kg) batches (enough to treat one raft) by using the following ingredients: 10 pounds (4.5 kg) of bait (carrots or sweet potatoes are preferred), prepared as for prebaiting; 1 fluid ounce or 2 tablespoons (30 ml) of corn oil; and 1.7 ounces or 7.5 tablespoons (48.2 g) of 63.2% zinc phosphide concentrate.

To prepare treated baits, add corn oil to the bait in a 5 gallon (18.9 l) plastic or metal container. Stir the mixture until the bait is lightly coated with corn oil. Sprinkle zinc phosphide over the mixture and stir until the bait is uniformly coated. Treated baits have a shiny black appearance and should be dried for about 1 hour in a well-ventilated area until the color changes to a dull gray. Properly dried baits are weather-resistant and remain toxic until they deteriorate. Although treated baits can survive light rain, they should not be used when heavy rains are expected or on open water that is subject to heavy wave action.

The amount of untreated bait eaten the last night of prebaiting determines how much treated bait should be used on the first night. When all or most of the untreated prebait is gone from baiting stations by morning, the same amount of treated bait is used on the stations the following night (e.g., up to 10 pounds [4.5 kg] per raft, 4 pieces per baiting board, and 2 to 5 pieces at other sites). When smaller quantities are eaten, reduce the amount of treated bait that is used per station proportionately. When only a few pieces of prebait on a raft are eaten, the raft should be removed and replaced with several scattered baiting boards.

The quantity of treated bait eaten each treatment night is the quantity that should be put out the following afternoon. Continue baiting until no more bait is being taken. Most nutria can be controlled after 4 nights of baiting. When densities are high, control may require more time.

Post-Control Procedures. Usually only 25% of the poisoned nutria die where they can be found. Many nutria die in dens, dense vegetation, and other inaccessible areas. Carcasses of nutria killed with zinc phosphide should be collected as soon as possible and disposed of by deep burial or burning to prevent exposure of domestic and wild scavengers to undigested stomach material containing zinc phosphide. Dispose of any leftover treated bait in accordance with label directions.

Cessation of damage is the best indicator that zinc phosphide is controlling problem animals. You can quantify the reduction in nutria activity by putting out untreated bait at baiting stations after the last application of zinc phosphide. The amount eaten at this time is compared to the amount of bait eaten on the last night of prebaiting.

Fumigants

Several fumigants are registered for controlling burrowing rodents but none are registered for use against nutria. Some, such as aluminum phosphide, may have potential as nutria control agents, but their efficacy has not been scientifically demonstrated. Carbon monoxide gas pumped into dens has reportedly been used to kill nutria, but this method is neither practical nor legal because it is not registered for this purpose.

Trapping

Commercial Harvest. Damage to crops, levees, wetlands, and other resources is minimal in areas where nutria are harvested by commercial trappers. The commercial harvest of nutria on private and public lands should be encouraged as part of an overall program to manage nutria-caused damage. Landowners may be able to obtain additional information on nutria management, trapping, and a list of licensed trappers in their area from their state wildlife agency.

Leghold traps. Leghold traps are the most commonly used traps for catching nutria. Double longspring traps, No. 11 or 2, are preferred by most trappers; however, the No. 1 1/2 coilspring, No. 3 double longspring, or the soft-catch fox trap can also be used effectively. Legholds are more efficient and versatile than body-grip traps and are highly recommended for nutria control work. Leghold traps should be used with care to prevent injury to children and pets.

Several ways of setting leghold traps are effective. Set traps just under the water where a trail enters a ditch, canal, or other body of water. Make trail sets by placing a trap offset from the trail's center line so that nutria are caught by the foot. Traps can be lightly covered with leaves or other debris to hide them, but nutria are easily captured in unconcealed traps.

Bait can be used to lure nutria to leghold sets. Nutria use their teeth to pick up large pieces of food; therefore, bait should be placed beside, rather than inside, the trap jaws. Leghold traps are also effective when set on floating rafts that have been prebaited for a short period of time.

Use drowning sets when deep water is available. Otherwise, stake leghold traps to the ground, or anchor them to solid objects in the water or on land (such as floating logs, stumps, or trees and shrubs). Nutria caught in non-drowning leghold sets should be humanely dispatched with a shot or hard blow to the head. Nontarget animals should be released.

Live Traps. Nutria are easily captured in single- or double-door live traps that measure 9 x 9 x 32 inches (22.8 x 22.8 x 81.3 cm) or larger. Use

Fig. 6. Hand-caught nutria must be handled carefully to avoid being bitten or clawed.

these when leghold and body-grip traps cannot be set or when animals are to be translocated. Bait live traps with sweet potatoes and carrots and place them along active trails or wherever nutria or their sign are seen. A short line of baits leading to the entrance of a live trap will increase capture success. Live traps placed on floating rafts will effectively catch nutria but prebaiting is necessary. A large raft can hold up to 8 traps. Unwanted nutria should be destroyed with a shot or blow to the head. Nontarget animals should be released.

Floating, drop-door live traps catch nutria but are bulky and cumbersome to use. The same is true for expensive suitcase-type beaver traps. Unwary nutria can be captured using a long-handled dip net. This method should only be used by trained damage control professionals who should take special precautions to prevent being bitten or clawed (Fig. 6). Live nutria can be immobilized with an injection of ketamine hydrochloride. Funnel traps are not effective for controlling nutria.

Body-gripping Traps. The Conibear® trap, No. 220-2, is the most commonly used body-gripping trap for controlling nutria. Nos. 160-2 and 330-2 Conibear® traps can also be used. Place sets in trails, at den entrances, in culverts, and in narrow waterways. Large body-grip traps can be dangerous and should be handled with extreme caution. These traps should not be set in areas frequented by children, pets, or desirable wildlife species.

Other Traps. Use locking snares to catch nutria when other traps cannot be set. Snares are relatively easy to set, safer than leghold and body-grip traps, and almost invisible to the casual observer. Snares constructed with 3/32-inch (0.2-cm) diameter, flexible (7 x 7-winding) stainless steel or galvanized aircraft cable are suitable for catching nutria. Ready-made snares and components (for example, cable, one-way cable locks, swivels, and cable stops) for making homemade snares can be purchased from trapping suppliers.

Place set snares in trails and other travel routes, feeding lanes, trails, and bank slides. Snares do not kill the animals they catch, so anchor the snare securely. Check snares frequently because they are often knocked down by nutria and other animals. Snared nutria should be dispatched with a shot or blow to the head. Release any nontarget animals that are captured.

Shooting

Shooting can be used as the primary method of nutria control or to supplement other control techniques. Shooting is most effective when done at night with a spotlight, however, night shooting is illegal in many states and should not be done until proper permits have been obtained. Once shooting has been approved by the proper authorities, nutria can be shot from the banks of waterways and other bodies of water or from boats. In some cases, 80% of the nutria in an area can be removed by shooting with a shotgun or small caliber rifle, such as the .22 rimfire. Care should be taken when shooting over open water to prevent bullets from ricocheting.

Shooting at Bait Stations. Baits can attract large numbers of nutria to floating rafts, baiting boards, and other areas where they can be shot. Shooting from dusk to about 10:00 p.m. for 3 consecutive nights is effective once a regular feeding pattern has been established. Feeding sites should be lit continuously by a spotlight and easily visible to the shooter from a vehicle or other stationary blind. At night, nutria can be located by their red-shining eyes and the V-shaped wake left by swimming animals. As many as 4 to 5 nutria per hour may be taken by this method. Shooters should wait 2 to 3 weeks before shooting nutria at the same site again.

Boat Shooting. Shooting can also be done in the late afternoon or early evening from a small boat paddled slowly along waterways and large ditches or along the shores of small lakes and ponds. Nutria are especially vulnerable to this method when water levels are extremely high or vegetative

cover is scarce. At times, animals can be stimulated to vocalize or decoyed to a boat or blind by making a "maw" call, which imitates the nutria's nocturnal feeding and assembly call. This call can be learned from someone who knows it or by listening to nutria vocalizations at night. Nutria become wary quickly, so limit shooting to no more than 3 nights, followed by 2 to 3 weeks of no activity.

Bank Shooting. Nutria can be shot by slowly stalking along the banks of ditches and levees; this can be an effective control method where nutria have not been previously harassed. Unlike night shooting from a boat or blind, bank shooting is most effective at twilight, both in the evening and morning. Several nutria can usually be shot the first night, however, success decreases with each successive night of shooting. Daytime shooting from the bank of a waterway is effective in some situations.

Economics of Damage and Control

Nutria can have either positive or negative values. They are economically important furbearers when their pelts provide income to commercial trappers. Conversely, they are considered pests when they damage property.

From 1977 to 1984, an average of 1.3 million nutria pelts were harvested annually in the United States. Based on prices paid to Louisiana trappers during this period, these pelts were worth about $7.3 million.

The estimated value of sugarcane and rice damaged by nutria each year has ranged from several thousand dollars to over a million dollars. If losses of other resources are added to this amount, the estimated average loss would probably exceed $1 million annually.

Management plans developed for nutria should be comprehensive and should consider the needs of all stakeholders. Regulated commercial trapping should be an integral part of any management scheme because it can provide continuous, long-term income to trappers; maintain acceptable nutria densities; and reduce damage to tolerable levels.

The value of the protected resource must be compared with the cost of control when determining whether nutria control is economically feasible. Most people will not control nutria if costs exceed the value of the resource being protected or if control will adversely impact income derived from trapping. Of course, there are exceptions, especially when the resource has a high sentimental or aesthetic value to the owner or user.

Acknowledgments

This chapter is a revision of an earlier chapter written by Evans (1983). Kinler et al. (1987) and Willner (1982) were the primary sources consulted for biological information on nutria.

Figures 1 and 3 by Peggy A. Duhon of Lafayette, Louisiana.

Figure 2 from Willner (1982) and reprinted with permission of The Johns Hopkins University Press, Baltimore, Maryland.

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For Additional Information

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Enclosure 8. Navy Integrated Pest Management Plan

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INTEGRATED PEST MANAGEMENT PLAN DECEMBER 2013

NAVAL SUPPORT ACTIVITY HAMPTON ROADS, PORTSMOUTH ANNEX PORTSMOUTH, VIRGINIA

Prepared by
Naval Facilities Engineering Command Atlantic,
Norfolk, VA

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Naval Support Activity Hampton Roads, Portsmouth Annex
Integrated Pest Management Plan
Approval and Implementation

Prepared by:
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Technical and Administrative Approval:
Approved and signed in accordance with DODINST 4150.07

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Mr. Sean Sweeney Natural Resources Program Manager	Date
LCDR Jared Jasinski Public Works Officer	Date
LT Brian Jung Department Head, Preventive Medicine	Date

Approved for Implementation:

CAPT Michael Johansson Commanding Officer	Date

Naval Support Activity Hampton Roads, Portsmouth Annex
Integrated Pest Management Plan
Technical Review

The Integrated Pest Management Plan has been reviewed in accordance with OPNAVINST 6250.4C.

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CAPT Eric Hoffman
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OIC, NECE
Naval Air Station Jacksonville
Jacksonville, FL

Date: _____

Integrated Pest Management Plan Annual Review

Year	Completion Date	Integrated Pest Management Coordinator	Copies of changes to the Pest Management Consultant (Annual) Date Completed
14			
15			
16			
17			
18	Rewrite		

Scheduled On-Site Pest Management Technical Review

Scheduled Date	Integrated Pest Management Coordinator	Pest Management Consultant Date Review Completed

Note: Technical Reviews should be scheduled approximately 18 months apart and in conjunction with an EMS or NECE review if possible.

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Executive Summary

This Integrated Pest Management Plan (IPMP) provides a comprehensive, long-range document that captures all the pest management operations and pesticide-related activities conducted at the Naval Support Activity (NSA) Hampton Roads (HR), Portsmouth Annex, located in Portsmouth, Virginia. It incorporates pest management practices and the local, State, Federal and Department of Defense regulations conforming to the requirements of DOD Instruction 4150.07 and OPNAVINST 6250.4C while providing comprehensive information to installation staff and internal and external compliance auditors.

This IPMP was prepared by Naval Facilities Engineering Command Atlantic (NAVFAC LANT) Applied Biology (AB), from data collected through pest management data collection, on-site observations, and interviews with installation personnel, and document reviews.

The main goal of the various pest control functions is to support the mission of NSA HR Portsmouth Annex. DOD Civilian pest control operators provide general pest control services. Grounds maintenance is performed by NAVFAC DOD civilian personnel. Grounds maintenance does not conduct any pesticide applications; if there is a need for pesticides, they will coordinate with the on-site DOD Civilian pest control operator. Most of the MWR and NEX facilities at NSA HR Portsmouth Annex receive pest control services through contract with Ecolab. Pest control services are needed at NSA HR Portsmouth Annex to:

(1) Provide services that will prolong the life of the structures through subterranean termite and nuisance pest control;

(2) Maintain the safety and security of industrial and storage areas through weed control;

(3) Provide nuisance pest control to all buildings (except PPV housing) and outdoor areas to ensure a good working and living environment;

(4) Control weed and insect pests in all recreational and lawn areas to maintain aesthetics and provide recreational facilities to personnel;

(5) Provide control of mosquitoes, flies and other potential disease vectors to ensure the comfort and well-being of all personnel; and

(6) Provide vertebrate pest control, including rodent control, to all areas of NSA HR Portsmouth Annex.

For the current level of work to be accomplished, a sufficient staff of qualified applicators must be maintained. Contract personnel must meet state certification requirements specified by contract. Performance Assessment Representatives (PARs) must successfully take an initial Pest Management PAR Course. To maintain their certification, the PARs and DOD pesticide applicators must successfully pass a DOD pest management training and recertification course every three years. Pest control facilities must comply with current safety standards to provide a safe workplace and to minimize pesticide hazards.

The focus of this IPMP is on safe, environmentally sound, and cost-effective control of pests through Integrated Pest Management (IPM). IPM depends on education, proper surveying and identification of pests; non-chemical and chemical control methods, and individual responsibility for pest prevention.

1. Introduction

1.1. The Integrated Pest Management Plan

1.1.1. Scope

The Naval Support Activity (NSA) Hampton Roads (HR), Portsmouth Annex Integrated Pest Management Plan (IPMP) is a long-range, comprehensive planning and operational document that establishes the strategy and methods for conducting a safe, effective, and environmentally sound Integrated Pest Management (IPM) program. The IPMP covers all pest management and pesticide-related activities conducted by civilian and military DOD personnel and commercial contractors within all functional areas of NSA HR Portsmouth Annex. A glossary of acronyms used in this document is found in Appendix B.

1.1.2. Authority

OPNAVINST 6250.4C and OPNAVINST 5090.1C, Chapter 17 require all Navy activities that conduct pest management operations to have an IPMP. Pest management programs at Navy activities shall be conducted under an IPMP in accordance with DODINST 4150.07 and OPNAVINST 6250.4C.

1.1.3. Purpose and Structure

The IPMP provides a comprehensive overview of pest management and pesticide-related operations on NSA HR Portsmouth Annex and can be used as a reference by all installation personnel. The IPMP is structured as follows:

- Section 1 addresses the purpose of the IPMP and its maintenance and implementation. It also provides background on the installation and an overview of the current pest management program and requirements.
- Section 2 describes the organization and responsibilities of the functional area of the program and the administrative requirements and documentation.
- Section 3 describes the field operation of pest management including Integrated Pest Management (IPM), pesticide management, contracting, and current practices.
- Section 4 provides lists and descriptions of hazards and hazard abatement practices associated with pest management.
- Section 5 addresses the environmental considerations of the program including regulatory compliance, and the application of environmental management systems to pest management.
- Section 6 describes emergencies that are the result of infestations.
- Section 7 provides a list of resources available to the installation.
- The Appendices provide references and supporting documents. The NAVFAC Pest Management Resource CD is included in Appendix L, which includes downloadable forms and templates, pest management technical guides and handbooks, DOD directives, and pest management website links.

1.1.4. IPMP Implementation

The IPMP must be reviewed and approved by installation stakeholders and Professional Pest Management Consultants (PPMCs) from Naval Facilities Engineering Command Atlantic (NAVFAC LANT) and Navy Bureau of Medicine and Surgery (BUMED). The IPMP is implemented upon signature of the Installation Commanding Officer. The Integrated Pest Management Coordinator (IPMC) has the task of implementing, coordinating and executing the IPMP among each of the functional areas of the installation.

1.1.5. IPMP Maintenance

Once the IPMP has been developed and implemented, it must be reviewed annually and updated as necessary. The annual IPMP update form is located in Appendix D. The installation IPMC is responsible for maintaining the IPMP.

1.1.5.1. Internal Review

An internal review is conducted annually by the IPMC in coordination with the Pest Management Service Providers (PMSPs) and other functional area Points of Contact (POC). The review should include updating contract information, applicator certifications, pesticides and pest management operations to be used on the installation, and ensuring all pesticide use is reported. An Internal Assessment Plan (IAP) for the pesticide program should be used by the IPMC as a tool to review compliance issues during the internal review. A sample IAP can be found in Appendix I and other compliance self-assessments can be found in Appendix D.

1.1.5.2. Off-site Review

The IPMC may request a review by a NAVFAC LANT Applied Biology Professional Pest Management Consultant (PPMC) for review of regulatory requirements, reporting and pesticide approval procedures.

1.1.5.3. On-site Review

An on-site review of the entire pest management program shall be performed by the NAVFAC LANT Applied Biology PPMC every 3 years to ensure compliance with the IPMP. The review may be performed more frequently if extensive program problems exist.

1.1.5.4. IPMP Rewrite

The IPMP should be rewritten every 5 years to reflect new contracts, personnel, pest management practices, and regulatory changes.

1.2. Installation Background

1.2.1. Mission

Provide 4-Star Installation Management to the region's second largest Naval Facility including Security, Facilities Management, Safety, Medical Facility Improvement, Environmental Protection and Reclamation, and DOD Personnel Services.

1.2.2. Location and Facilities

Naval Support Activity Hampton Roads, Portsmouth Annex, home of Naval Medical Center Portsmouth, has proudly served the military and their families since 1830, making it the Navy's oldest continuously operating hospital. Nationally acclaimed, this state of the art medical center offers premier research and teaching programs designed to prepare new doctors, nurses and hospital corpsmen for the future.

Located on historic Hospital Point, NSA HR Portsmouth Annex is home to 5,000 men and women who live and work by the Navy's core values of honor, courage and commitment. NSA HR Portsmouth Annex is geographically located in the Southeastern corner of the Commonwealth of Virginia. The area is collectively known as "Hampton Roads" and is commonly referred to as such by residents. Hampton Roads generally includes the cities of Newport News, Hampton, Norfolk, Portsmouth, Virginia Beach, Chesapeake, and Suffolk, and is populated by over 1.5 million people. The region is homeport to the majority of the 186 ships, 1,300 aircraft and 118,000 Sailors and Marines assigned to the Atlantic Fleet. NSA HR Portsmouth Annex is one of many regional installations that constitute the largest military concentration in the world.

1.3. Pest Management Program Overview

1.3.1. Overview

The pest management program is summarized below.

- The currently designated Integrated Pest Management Coordinator (IPMC) for NSA HR Portsmouth Annex is an employee in the NAVFAC MIDLANT Environmental Core (EV12) whose office is located at Naval Station Norfolk.
- General pest control services are provided in-house by the regional NAVFAC Environmental Services pest control shop, which is located on-site at NSA HR Portsmouth Annex. This includes larval and adult mosquito control, when necessary.
- Grounds maintenance is done by NAVFAC DOD civilian personnel. Grounds maintenance does not conduct any pesticide applications; if there is a need for pesticides, they will coordinate with the on-site DOD Civilian pest control operator.
- Most of the MWR and NEX food facilities (i.e. Dancing Goat 1 and 2, NEX Food Court, and Olde Glory Coffee Company) contract with Ecolab for pest control services.
- Lincoln PPV Housing is responsible for obtaining their own pest management services and contracts with Orkin for pest control services for the only home on NSA HR Portsmouth Annex. Valleycrest is the grounds maintenance contractor for Lincoln.
- Preventive Medicine performs food service sanitation and facilities habitability inspections and oversees programs to prevent vector-borne and other infectious diseases.

In addition to the PMSPs, individual personnel including employees and housing tenants have a responsibility for preventing and reducing pest infestations in their workplace and/or berthing/residence areas. This IPMP encompasses all of the activities of the PMSPs and individuals.

1.3.2. Pest Management Objectives

The objectives of the NSA HR Portsmouth Annex pest management program are:

1. **The prevention of pest-related health and safety problems that affect the mission.** Examples of health related pests that may affect the mission include, but are not limited to mosquitoes, fire ants, and bed bugs. Any pest may impact the mission when its numbers become excessive. Prevention of pest-borne disease and injury is a component of Force Health Protection (FHP). FHP seeks to maintain a healthy and fit military and civilian force in order to maintain the highest levels of readiness. Pest management is a "Force Multiplier" for construction battalions, maintenance commands, and other deployable units. Additionally, the military and civilian infrastructure on the installation must be protected in order to provide the necessary support to these units as well. Readiness also means ensuring that all installation personnel, including dependents, are provided with healthy work and living conditions that will contribute to a high quality of life.
2. **The prevention of pest damage to equipment and subsistence used to support the operational mission of the activities and tenant commands.** Equipment and materials are susceptible to physical damage by pests. Rodents, for example, can cause considerable damage to electronic equipment through gnawing on electrical components. Examples of pests that may damage equipment and subsistence include, but are not limited to rodents, wood destroying pests and stored product pests.
3. **Vegetation management to protect the local environment.** The introduction of non-native/invasive species of plants can increase the risk of fire and degrade the surrounding native environment that is home to a number of endangered and threatened animal and plant species.
4. **The protection of government real property, materiel and aesthetics.** Buildings and roads that form the infrastructure of the installation are susceptible to pests. Termites can cause extensive damage to wood structures if not adequately prevented and controlled. Weeds can cause damage to roadways and increase the risk of fire.
5. **The reduction of the use and dependence on pesticides.**

1.3.3. Program Requirements

1.3.3.1. Administration

Proper administration of the pest management program ensures accountability and documentation through planning, record keeping, reporting, training, pesticide and contract approval and regulatory compliance. Table 1-1 outlines the pest management administrative program requirements.

1.3.3.2. Operations

Operations are the day-to-day management of pests through pesticides and non-chemical means. Pest management on NSA HR Portsmouth Annex includes the following categories of operations:

- **Ornamental and turf -** Control and management of pests of landscape plants and turf, including arthropods, fungi, and weeds.
- **Right-of-way -** Control and management of vegetation along roadways. It also includes vegetation control near fuel farms to reduce fire risk and along fence lines to enhance security.
- **Aquatic Weed Control -** Control of vegetation in ponds and ditches.
- **Industrial, Institutional, Structural, and Health-Related -** Control and management of pests in and around buildings. Pests may include cockroaches, termites, bees, venomous animals, stored product insects, rodents, and feral animals.
- **Public Health -** Control and management of human and animal disease vectors such as rodents, mosquitoes, flies, and fleas.
- **Nuisance Pest Control** - Control of insect pests that are a nuisance or annoyance to base personnel but do not present a health risk.
- **Invasive weeds -** Removal of non-native species of plants that are detrimental to native plant and animal habitats.
- **Vertebrate Control -** Control of animal predators that prey upon endangered or threatened animals and their habitats, or infest food and material storage.

Each of these operations must meet various requirements that are listed and described in Table 1-2.

Table 1-1: PEST MANAGEMENT ADMINISTRATIVE PROGRAM REQUIREMENTS

Requirement	Description	Reference	Responsibility
PLANNING	Review and revise the Integrated Pest Management Plan annually.	OPNAVINST 6250.4C; DODINST 4150.07	IPMC
RECORDING	Record all pest management operations conducted on the Base after each operation.	OPNAVINST 6250.4C; DODINST 4150.07; 7 CFR 110* (applies to restricted-use pesticides only)	All pesticide applicators
MAINTAINING	Maintain records of all pest management operations conducted on Base on-site indefinitely	OPNAVINST 6250.4C; DODINST 4150.07; 7 CFR 110* (applies to restricted-use pesticides only)	IPMC in coordination with PMPARs
REPORTING	Compile and report all pest management operations to NAVFAC Atlantic Applied Biology monthly.	OPNAVINST 6250.4C; DODINST 4150.07; 7 CFR 110* (applies to restricted-use pesticides only)	IPMC in coordination with PMPARs
PESTICIDE APPLICATOR CERTIFICATION	Ensure that all personnel applying pesticides on installations have current DOD pesticide applicator certification if in-house or state commercial applicator certification if contracted.	OPNAVINST 6250.4C; DODINST 4150.07; 40 CFR 171* (applies to restricted-use pesticides only)	IPMC in coordination with PMPARs
COMPLIANCE	Ensure that all program elements are in compliance with all Federal regulations. The Base is also encouraged to comply with County and State regulations.	OPNAVINST 6250.4C; DODINST 4150.07	IPMC in coordination with PMPARs
PESTICIDE APPROVAL	Compile and submit list of new pesticides to NAVFAC Atlantic Applied Biology for approval for use on the Base.	OPNAVINST 6250.4C; DODINST 4150.07	IPMC in coordination with PMPARs
CONTRACT REVIEW	Review pest management contract specifications for compliance with the Integrated Pest Management Plan and submit to NAVFAC Atlantic Applied Biology for final review and approval prior to advertising.	OPNAVINST 6250.4C; DODINST 4150.07	Facilities Support Contracts, PMPARs

Table 1-2: PEST MANAGEMENT OPERATIONS PROGRAMS REQUIREMENTS

Requirement	Description	Reference	Responsibility
INTEGRATED PEST MANAGEMENT	"Federal agencies shall use Integrated Pest Management techniques in carrying out pest management activities and shall promote Integrated Pest Management through procurement and regulatory policies, and other activities."	USC Title 7, Chapter 6, Subchapter II, Sec. 136r-1	IPMC/pesticide applicators
STORAGE	Pesticides kept on installations must be procured and stored in accordance with installation Base and Federal regulations. The Base is also encouraged to comply with County and State regulations.	OPNAVINST 6250.4C; AFPMB TG 17-Military Handbook; 40 CFR 165	Pest control shop supervisor
CONTAINERS	All containers used to store or transport a pesticide must have the original or copy of the original label attached. Service containers must have attached label identifying person responsible for the container, name of chemical and signal word.	OPNAVINST 6250.4C; DODINST 4150.07; 40 CFR 156	Pesticide applicators
VEHICLES	Must carry pesticide spill kits and properly secure pesticides and pesticide application equipment when not in use.	OPNAVINST 6250.4C	Pesticide applicators / vehicle operators
APPLICATION	Only registered pesticides will be used. Applications of pesticides must be performed to ensure safety and protection of the environment. A copy of the pesticide label shall be available at the application site.	OPNAVINST 6250.4C; DODINST 4150.07; 40 CFR 166	Pesticide applicators
APPLICATOR SAFETY	Procedures, medical support, equipment and supplies to ensure the safety of DOD pesticide applicators during pest control operations must be provided by the installation.	OPNAVINST 6250.4C; 29 CFR 1910	Naval Medical Clinic, Safety Department
OCCUPATIONAL HAZARDS MONITORING	Workplace monitoring shall be conducted by the medical department to ensure a safe and healthful environment for pest management personnel.	OPNAVINST 6250.4C; OPNAVINST 5100.23G	Naval Medical Clinic
CLEANING AND DISPOSAL	Equipment shall be cleaned to prevent health and environmental hazards due to chemical residues. Rinse water from container and equipment rinsing should be prevented from entering storm drains and water bodies. Dispose of empty containers properly.	OPNAVINST 6250.4C; 40 CFR 165	Pesticide applicators
SPILL PREVENTION	Spill kits should be maintained in pest control shops and on pest control vehicles. Pest management personnel should be familiar with the installation spill contingency plan.	OPNAVINST 6250.4C	Pesticide applicators

2. Program Administration

2.1. Roles and Responsibilities

The success of the pest management program depends largely on a clear understanding of the roles and responsibilities for the organizations and personnel involved. The following is a listing of the key organizations and personnel and their duties as presented in DOD guidance documents for the implementation of the IPMP.

2.1.1. Installation Commanding Officer (ICO)

- Designate an Integrated Pest Management Coordinator in writing;
- Implement and support the IPMP;
- Ensure appropriate funding of pest management programs to provide for effective and safe control of pests based on pest management objectives for the installation;
- Ensure that installation personnel performing pest control receive adequate training, and achieve pest management certification as required;
- Ensure that all pest management operations are conducted safely and have minimal impact on the environment;
- Ensure that contract specifications that include the use of pesticides are approved by a NAVFAC pest management consultant prior to advertisement for bid;
- Ensure that an IPM program, minimizing the use of pesticides, is implemented; and
- Ensure that the installation IPM plan and program are in compliance with all applicable environmental protection statutes.

2.1.2. Integrated Pest Management Coordinator (IPMC)

The IPMC is designated by the ICO in writing to coordinate all installation pest management activities. The IPMC works in the NAVFAC MIDLANT Environmental Core (EV12) located at Naval Station Norfolk. The IPMC designation letter is located in Appendix K.

- Coordinate NSA HR Portsmouth Annex's pest management program including implementation, maintenance, and annual update of the IPMP;
- Coordinate rewrite of the IPMP every 5 years;
- Promote Integrated Pest Management (IPM) in the pest management program to cost-effectively and safely manage pests and to prevent adverse environmental impact;
- Coordinate reporting of pest management and pesticide use on the installation to NAVFAC Atlantic Applied Biology;
- Ensure current certification and continuing pest management training of pesticide applicators and PMPARs;
- Receive and compile lists of new pesticides and uses from all Pest Management Service Providers (PMSPs) on NSA HR Portsmouth Annex and submit to NAVFAC Atlantic Applied Biology for review and approval;
- Maintain current list of approved pesticides;
- Act as liaison between NSA HR Portsmouth Annex and NAVFAC Atlantic Applied Biology and local, State of Virginia, and Federal agencies for pest management and pesticide regulatory issues;
- Ensure that the NSA HR Portsmouth Annex Contracting Officers submit pest management contract specifications to the NAVFAC Atlantic Applied Biology PPMC for review prior to advertising; and
- Act as the Installation Commanding Officer's advisor for pest management issues.

2.1.3. NAVFAC MIDLANT Environmental Services Pest Control

The NAVFAC MIDLANT Environmental Services pest control shop performs routine pest management and responds to service requests from tenants.

- Control of nuisance, public health, and structural pests;
- Pest control inside buildings and facilities; and
- Pest control on improved grounds, when requested.

2.1.4. NAVFAC MIDLANT Environmental Core, EV12

Regional oversight on environmental protection and compliance regarding pest management operations falls within the NAVFAC MIDLANT Environmental Core, EV12, Pesticide Program Manager, who is also designated as the IPMC.

- Review and approve new pesticides and pest management operations that may adversely impact the environment;
- Conduct internal compliance assessments of the pesticide and pest management program; and
- Provide technical review of the IPMP.

2.1.5. Public Works Department (PWD) Naval Support Activity (NSA) Hampton Roads (HR) and PWD Portsmouth, Environmental Departments

PWD NSA HR and PWD Portsmouth Environmental Departments are able to provide support to the NAVFAC MIDLANT Environmental Core (EV12) with oversight on environmental protection and compliance regarding pest management operations on NSA HR Portsmouth Annex.

- Provide assistance with the review and approval of new pesticides and pest management operations that may adversely impact the environment;
- Provide assistance with internal compliance assessments of the pesticide and pest management program; and
- Provide assistance with the technical review of the IPMP.

2.1.6. PWD Portsmouth, Facilities Engineering and Acquisition Division (FEAD)

The FEAD prepares, manages, and assesses pest control and grounds maintenance contracts. The Performance Assessment Representative (PAR) monitors and evaluates the performance of contracted PMSPs to ensure that pest control measures are properly applied.

- Prepare contracts ensuring that all requirements of the IPMP are included in the contract specifications;
- Coordinate pest management contract specifications prior to bidding with the IPMC for review prior to submittal to the NAVFAC Atlantic Applied Biology PPMC for review and final approval;
- Maintain copy of each contract on file;
- Monitor pest management contractors ensuring effective and safe application of pest management practices and identify and document discrepancies and seek corrective action with contractor in accordance with the contract; and
- Ensure that the contractors record all pest management activities and submit reports including actual pesticide use through the NAVFAC Online Pesticide Reporting System or to the IPMC on a monthly basis.

2.1.7. Preventive Medicine

NSA HR Portsmouth Annex Preventive Medicine provides public health support in accordance with NAVMED P-5010.

- Act as advisor and liaison to ICO for public health pest prevention and management;
- Conduct surveys for pests of medical importance, such as cockroaches, mosquitoes, bedbugs, etc., through habitability and food service sanitation inspections;
- Establish and maintain liaison with local health agencies as they pertain to vector management and vector-borne and zoonotic disease prevention;
- Maintain current certification as DOD Category 8 (public health) pesticide applicator;

- Develop and maintain an emergency plan for vector and pest control during a vector-borne disease outbreak or disaster; and
- Provide technical review of the IPMP.

2.1.8. Contract Pest Management Service Providers (PMSP)

Commercial contractors (Ecolab) provide pest control services to most of the MWR and NEX food facilities on NSA HR Portsmouth Annex. Contract PMSPs at NSA HR Portsmouth Annex are required to be certified as pesticide applicators by the State of Virginia. These responsibilities also apply to all other contractors on the installation.

- Conduct pest management operations in accordance with the contract specifications or lease agreements, the IPMP and in compliance with Federal and State of Virginia laws and regulations;
- Submit a list of pesticides proposed for use on the installation to their Government representative;
- Communicate all pest management issues and requirements via the Government representative; and
- Submit daily management operation records to the Government representative.

2.1.9. Navy Exchange (NEX) Manager

Oversee retail sales of pesticides and NEX pest control contractors.

- Ensure that pesticides are displayed in accordance with the pesticide label and other Federal, State and local regulations.
- Provide access to the IPMC to all pesticide application records; and
- Ensure that only current State licensed pesticide applicators apply pesticides.

2.1.10. PPV Housing Manager

Provides pest control and landscape maintenance for the one PPV home on NSA HR Portsmouth Annex.

- Provide the IPMC or NAVFAC LANT PPMC with access to all outdoor pesticide application records; and
- Ensure that only current State licensed pesticide applicators apply pesticides.

2.1.11. Building Occupants and Barracks / Housing Residents

- Apply good sanitary and pest exclusionary practices to prevent pest infestations;
- If permitted for personal use, use pesticides in accordance with the pesticide label; and
- Coordinate and cooperate fully with PMSPs in scheduling pest management and preparing the areas for pesticide treatment if necessary.

2.2. Pesticide Approval

Only pesticides approved by both the EPA and the State shall be used. Additionally, DOD and DON directives require installations to submit a list of all pesticides that will be used during control operations to the cognizant NAVFAC LANT PPMC for review and approval (OPNAVINST 6250.4C). The purpose of this approval process is to ensure that only registered pesticides which are safe, effective and appropriate for the site will be used on the installation. Requests for pesticide approval will be submitted to the NAVFAC LANT PPMC via the installation IPMC using the NAVFAC Online Pesticide Reporting System (NOPRS) (see section 2.3.3.1) or the Pesticide Approval Spreadsheet (PAS). Once a pesticide is approved, it may be used on-site as per the label directions. New pesticides may also be added to the list and submitted for approval as needed. The list should be reviewed and updated annually by the IPMC as part of the IPMP maintenance. Pesticides currently approved for use on the installation are listed in Appendix E. The electronic PAS is included in the NAVFAC Pest Management Resource CD that accompanies this IPMP in Appendix L.

2.2.1. Pesticide Labels and MSDSs

A copy of the manufacturer's label and an MSDS for each pesticide on the approved pesticide list can be maintained by the IPMC, PMPAR, and PMSP. Labels may be maintained by hard copy, electronically, or online. Pesticide labels and their registration status can be found on the EPA's National Pesticide Information Retrieval System, http://iaspub.epa.gov/apex/pesticides/f?p=PPLS:1.

2.3. Records and Reporting

"All shore installations, ships, and units performing pest management operations shall maintain records of pesticide applications and report pesticide use" (OPNAVINST 6250.4C pg 31 and OPNAVINST 5090.1C Ch. 17, Section 17-4.2, pg 17-6).

2.3.1. Pest Management Record Keeping

All PMSPs shall record pest management operations daily. Records shall include all pest management operations including surveys and non-chemical control operations performed on the installation by commercial contractors as well as work performed by DOD pest management personnel. The records will include the following information: date of application, location and site, type of operation, target pest, amount of area treated, name of applicator, pesticide information (trade name, active ingredient, and formulation), amount of pesticide applied, final concentration, and calculated pounds of active ingredient applied. The following operations are excluded from the record keeping requirement:

- Personal use of insect repellent.
- Application of repellent by deployable units during mass treatment of clothing and tentage.
- Application of pesticides for personal relief by residents of military housing.
- Application of pesticides for flea and tick control to pets by pet owners and veterinary services.

Records shall be submitted to the IPMC monthly by either the NAVFAC Online Pesticide Reporting System (section 2.3.3.1) or the electronic Pest Management Record System (section 2.3.3.2).

2.3.2. Maintaining Pest Management Operations Records

NSA HR Portsmouth Annex must archive on-site indefinitely, complete daily pest management operation records. Pesticide applications for each building, structure, or outdoor site must be accounted for. Past hardcopy records must be archived so as to prevent them from being destroyed. Electronic records shall be stored to prevent destruction or loss; back-up copies are recommended. All records reported to NAVFAC LANT will be stored and may be used as a back-up. Downloading of records from NOPRS and maintaining them on-site is highly recommended.

2.3.3. PMSP Reporting Procedures

Two methods of reporting are available. Reports will be reviewed by the IPMC and NAVFAC LANT PPMC to provide program oversight to the installation and to generate data for tracking overall DON pesticide usage.

2.3.3.1. NAVFAC Online Pesticide Reporting System (NOPRS)

All NSA HR Portsmouth Annex PMSPs that have internet access must use the NAVFAC Online Pesticide Reporting System (https://clients.emainc.com/dcs/pestmanagement/pesticidelogon.asp) to record, report and manage pesticide and pest management records. This system is preferred to other methods because it eliminates the need to send hardcopy or electronic records to the IPMC and then to the PPMC. The records are entered directly into a central database that can be accessed by the PPMC and the IPMC and downloaded into a spreadsheet. The only

computer requirement is reliable internet access. IPMCs that wish to use this on their installation must contact the NAVFAC LANT PPMC to establish a "Supervisor" account. PMSP applicators can then contact the IPMC to request an "Applicator" account.

2.3.3.2. Pest Management Record System (PMRS)

An alternate method for record keeping and reporting, for those without internet access, is the PMRS. The PMRS template is a Microsoft® Excel ™ file. The template and instructions are available on the NAVFAC Pest Management Resource CD. Using the PMRS requires the following minimum computer hardware and software:

- Computer capable of running Microsoft® Office software
- CD drive, or e-mail capability in order to transfer files

The PMRS does not require Navy and Marine Corps Intranet (NMCI) approval since it runs on an NMCI-approved program. The user should have basic knowledge of MS Excel®, e-mail, and computer file management. The completed PMRS should be sent to the IPMC, Ronnie Stephens (ronnie.s.stephens@navy.mil). The IPMC shall submit the PMRS's monthly to the NAVFAC LANT PPMC at sabra.scheffel@navy.mil, NAVFAC LANT Applied Biology, Code EV51, 6506 Hampton Blvd, Norfolk, VA 23508.

2.4. Training, Certification and Licensing

2.4.1. General Requirements

IPM requires personnel who are properly trained to investigate and diagnose pest problems, select the appropriate pest management method, apply the appropriate pesticide, perform these operations so that they are safe to humans and the environment, and educate and advise their customers on pest prevention methods. All DON personnel who select or apply pesticides shall be trained and certified within two years of employment in accordance with the DOD Plan for the Certification of Pesticide Applicators (OPNAVINST 6250.4C pg 22).

2.4.2. Verification of Qualifications

Copies of contractor or lessee State licenses shall be obtained from all PMSP personnel applying pesticides on NSA HR Portsmouth Annex. Verification of DOD pesticide applicator license / IPMC and PMPAR accreditation can be obtained from the NAVFAC Atlantic PPMC at (757) 322-4320 or sabra.scheffel@navy.mil. A list of applicators and their certification / license numbers as well as a list of business licenses is found in Appendix K. Virginia pesticide applicator certificates are also searchable on the Virginia Department of Agriculture and Consumer Services website: http://www.vdacs.virginia.gov/pesticides/pdffiles/reports-applicators.pdf.

2.4.3. Requirements for DOD Pesticide Applicators

DOD applicators may be certified in the following categories:

- Category 2: Forestry
- Category 3: Ornamental and Turf (landscape arthropod and vertebrate pests)
- Category 5: Aquatic (aquatic weeds in lakes, ponds, rivers, streams, irrigation canals)
- Category 6: Right-of-Way (weeds on sidewalks, along fence lines, parking lots, road ways, storage tank grounds)
- Category 7: Industrial, Institutional, Structural, and Health-Related (termites and other wood-destroying insects, cockroaches, crickets and other invading organisms)
- Category 8: Public Health (mosquitoes, ticks, fleas, rodents)
- Category 11: Aerial Application (application of pesticides for any pest by fixed or rotary-wing aircraft)

Preventive Medicine Technicians (PMTs) are required to be certified only in Category 8 and receive certification during PMT School. Golf course applicators are only required to be certified in categories 3, 5, and 6.

Initial certification in Categories 2, 3, 5, 6, 7, and 8 for civilian employees is a three and a half week course conducted by a designated DOD training agency. Currently, the Navy course is conducted by the Navy Entomology Center of Excellence (NECE) in Jacksonville, Florida. Initial certification and recertification in Category 11 is a one week course conducted by the Air Force Reserve in Vienna, Ohio. Certification for all categories is valid for three years. With proper justification, certifications can be extended for an additional six months by the applicator's certifying authority. Recertification courses for civilians in all categories except Category 11 are conducted annually by NAVFAC Atlantic. Initial and recertification course schedules can be viewed at http://www.afpmb.org/pubs/courses/courses.htm.

2.4.4. Requirements for Commercial Contract Applicators

"Licensed firms shall perform all pest management services procured by contract using only trained operators who are certified in the applicable state in the required EPA pest management categories for the work planned. Copies of state or host nation business licenses and applicator certifications shall be reviewed prior to award" (OPNAVINST 6250.4C pg 27). Copies of contractor business licenses and applicator certificates can be found in Appendix K. Contractors who hold a Virginia registered technician certificate have not completed the EPA category tests and are NOT allowed to apply pesticides on DOD property. All contract pesticide applicators applying pesticides on NSA HR Portsmouth Annex must hold a Virginia Commercial Pesticide Applicator's License.

2.4.5. Requirements for Natural Resource Management Applicators

Commercial applicators applying herbicides for invasive weed control or habitat restoration must hold a state license. Maintenance wildlife managers that use pesticides for control must also hold an appropriate state license.

2.4.6. Requirements for Performance Assessment Representatives

Pest Management Performance Assessment Representatives (PMPARs) assess the performance of contractors in the Performance Based Acquisition (Contracting) Program. Installations shall train personnel who provide performance assessment for commercial pest control services in pest management within one year of appointment, and send them to refresher training every three years (OPNAVINST 6250.4C pg 27 and OPNAVINST 5090.1C Ch. 17, Section 17-4.1, pg 17-5). NAVFAC Atlantic provides initial and refresher PMPAR training annually. Go to http://www.afpmb.org/pubs/courses/courses.htm#pestmgmtquaassurance for initial training schedules. PMPARs may attend the DOD pesticide applicator recertification course for refresher training. Go to http://www.afpmb.org/pubs/courses/courses.htm#pestapprecert for refresher training schedules.

2.4.7. Requirements for Integrated Pest Management Coordinators and Environmental Personnel

"The IPMC shall have the educational background, technical knowledge, and management skills to implement and oversee the pest management program" (DODINST 4150.07, Para. E4.4.1). Newly designated IPMCs are required to receive training in the administrative and operational requirements of installation pest management. Environmental personnel who have compliance oversight of pesticides on the installation should also receive training. The initial PMPAR and IPMC course provides the necessary training. NAVFAC conducts this course annually. Go to http://www.afpmb.org/pubs/courses/courses.htm#pestmgmtquaassurance for training

schedules. If the IPMC will be applying pesticides or recommending pesticide applications, then they must be certified as a DOD pesticide applicator.

2.5. Pest Management Contracting

Contracts requiring the use of pesticides must be reviewed and approved by NAVFAC Atlantic Applied Biology. This includes contracts issued by non-appropriated activities and tenant commands on the installation. Pest control contracts are required to be monitored by a trained PMPAR (OPNAVINST 6250.4C).

2.5.1. Pest Management Contracts

Contracts are prepared and managed by the Facilities Engineering and Acquisition Division (FEAD) within the Public Works Department (PWD). Most of the NEX and MWR food facilities (i.e. Dancing Goat 1 and 2, NEX Food Court, and Olde Glory Coffee Company) have their own contract with Ecolab for pest control services. Contract documents are included in Appendix G (if available).

2.5.2. Contract Specifications and Review

Pest management contract specifications must be written to ensure effectiveness, safety, and regulatory compliance. Specifications should state that the contractor:

- Shall comply with Federal, State, and local laws and regulations which also includes DOD, DON and USMC directives and this IPMP;
- Shall provide copies of pesticide applicator and business licenses to verify that they are current;
- Shall request approval of all pesticides to be used on the installation prior to their use;
- Shall use pest control vehicles that are properly marked and provide secure storage for pesticides;
- Shall report pesticide use and all pest management activities to the installation IPMC via the Government Representative; and
- Shall not store, mix, or dispose of pesticides or clean pest control equipment on the installation.

The Facilities Support Contract / Base Operation Support (FSC/BOS) performance-based contract template for pest control (Sub-annex 1503020) and grounds maintenance (Sub-annex 1503050) is available from NAVFAC Atlantic or on the NAVFAC Portal at https://portal.navfac.navy.mil/portal/page/portal/pw/fsc/template (requires login). The facilities contracting officer (KO) or contracting officer representative (COR) can provide additional information. Additional guidance on writing contracts can be found in AFPMB TG 39: *Guidelines for Preparing DOD Pest Control Contracts using Integrated Pest Management*. The online version (http://www.afpmb.org/sites/default/files/pubs/techguides/tg39.pdf) also contains links to the DOD Guide Performance Work Statement. The KO shall send the contract specifications to the NAVFAC Atlantic PPMC for review prior to procurement (OPNAVINST 6250.4C pg 26).

Termite pretreatment contract specifications shall also be reviewed by the NAVFAC Atlantic PPMC prior to procurement. The Unified Facilities Guide Specifications (UFGS) 31 31 16 Soil Treatment for Subterranean Termite Control (http://www.wbdg.org/ccb/DOD/UFGS/UFGS%2031%2031%2016.pdf) should be included in all new construction contracts for termite pretreatment. See section 3.2.4.2 for more information on termite treatment contracts.

2.5.3. Government Representatives

Contractors will communicate and submit required pest management reports via their Government representative. For the pest control and grounds maintenance (FSC/BOS) contracts, the representative is the PMPAR who is responsible for assessing the contract.

For Non-Appropriated Fund (NAF) (i.e. NEX, MWR) contracts, the representative is the local NAF organization manager. In cases where a Government representative is not available, then the installation IPMC may liaison with a contractor's representative.

2.5.4. Contract Requirements

The application of pesticides by contractors is strictly regulated by Department of Defense and Navy regulations, this IPMP and State regulations. These requirements apply to all pesticide applications including insecticides, herbicides, fungicides, molluscides, etc. to turf, ornamentals, trees, and all indoor work. These requirements apply to any size contract (small purchase or facility support contract generated) and services acquired by any other means including government purchase cards (EBUSOFFINST 4200.1, Para.7). The specific requirements for contracted pest control operators working on Navy properties are:

- Contractor Work Plan (CWP): If required by the contract, a CWP shall be submitted as part of the contractor's proposal. The CWP specifies how the contractor will meet the contract requirements. If available, the CWP will be included in this IPMP in Appendix H.
- Pesticide Applicator Certification: All contractor personnel, who apply pesticides (which include all herbicides), shall be certified / licensed in the appropriate applicator category in accordance with section 2.4.4 of this IPMP. All contractors who will apply pesticides shall, prior to the start of work, supply a copy of the certificate(s) / license(s) in accordance with contract specifications. Pesticide business licenses and pesticide applicator certificates are included in Appendix K.
- Pesticide Approval: Pesticides used by contractors must be approved and added to the installation AUL, before use, by the NAVFAC Atlantic PPMC as described in section 2.2. The list of proposed pesticides shall be included in the CWP or submitted to the designated Government representative using the format designated in the contract specifications. The AUL is in Appendix E of this IPMP.
- Pesticide Mixing, Storage, and Disposal: Contractors shall not store, mix, or dispose of pesticides or clean pest control equipment on the installation. One exception to this is soil treatment for termite prevention during building construction; the contractor must mix the termiticide on-site while the PMPAR or IPMC is there to witness.
- Pesticide Applications: Only pesticides listed on the AUL shall be used and applied in a manner consistent with the pesticide label.
- Pest Management Reporting: Contractors shall submit reports in accordance with the reporting requirements in section 2.3.3.
- Contractor Vehicles:
  - Safety equipment: Vehicles used to transport pesticides shall be equipped with a fire extinguisher and a spill and decontamination kit, capable of handling the maximum amount of pesticide transported at any given time.
  - Security: All pesticides carried on the vehicles shall be secured in locked compartments at all times. Vehicles shall not be left unattended at any time unless properly locked and secured.
  - Identification: Vehicles will be clearly identified as a pest control vehicle.
  - Appearance: All vehicles shall be maintained with a clean and orderly appearance, free from observable pesticide spills, residues, or build-up.
  - Transporting pesticides: Pesticides shall not be transported in the cab or occupied part of any vehicle. They shall always be carried in a separate compartment from the occupied cab.
- Compliance Assessment: All contractors are subject to regulatory compliance assessments by the PMPAR, IPMC, environmental compliance staff, and other authorized Government personnel. Pest control vehicles, pesticide applications, and administrative requirements are subject to inspection. Authorized Government personnel may also require the contractor to stop work if the work is not being performed in a safe manner.

2.5.5. Contract Performance Assessment

Contracts shall be assessed by a trained PMPAR to ensure environmental and contractual compliance. For FSC/BOS contracts, Functional Assessment Plans (FAP) for pest control and grounds maintenance should be developed and implemented. FAP templates are available from the KO or NAVFAC Atlantic. Assessments for pests prior to, during, and after pest control operations should be conducted to ensure efficacy of the services. Pest survey methods for contract performance assessments are found in Appendix H on each of the Integrated Pest Management Sheets. Inspection of the contractors during pesticide application should also be conducted to ensure safety measures are being taken. The contractors' vehicles and equipment must be made available for inspection when requested. In the absence of a PMPAR, the installation Preventive Medicine Technician (PMT) can provide information on the efficacy of pest control in some facilities. The PMT conducts monthly inspections that include pest surveys of food service facilities and child development centers. The PMPAR and the IPMC should liaison and coordinate performance assessment activities with the PMT.

3. Operations

3.1. Integrated Pest Management (IPM)

3.1.1. Federal Regulation and Policy

Presidential executive order (EO 13514), October 5, 2009, requires federal agencies to promote pollution prevention and eliminate waste by implementing integrated pest management and other appropriate landscape management practices. US Code states "Federal agencies shall use Integrated Pest Management techniques in carrying out pest management activities and shall promote Integrated Pest Management through procurement and regulatory policies, and other activities" (USC Title 7, Chapter 6, Subchapter II, Sec. 136r-1). It is DOD policy to "Incorporate sustainable Integrated Pest Management (IPM) philosophy, strategies, and techniques in all aspects of DOD and Component vector control and pest management planning, training, and operations, including installation Integrated Pest Management Plans and other written guidance to reduce pesticide risk and prevent pollution" (OPNAVINST 6250.4C).

3.1.2. What is IPM?

IPM is "a planned program incorporating education, continuous surveillance, record keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods including habitat modification, biological, genetic, cultural, mechanical, physical, and regulatory controls, and when necessary, the judicious use of least hazardous pesticides" (OPNAVINST 6250.4C). There are significant differences between IPM and "traditional" pest control methods. Table 3-1 lists some of the differences.

Table 3-1. Comparison of Traditional Pest Control and IPM Methods

Pest Management	Traditional Pest Control	IPM
Program Strategy	Reactive	Preventive
Customer Education	Minimal	Extensive
Potential Liability	High	Low
Emphasis	Routine pesticide application	Pesticides used when exclusion, sanitation, and other non-chemical methods are inadequate
Inspection and Monitoring	Minimal	Extensive
Pesticide Application Frequency	By schedule	By need
Pesticide Application Target	Area-wide spraying	Spot treatment of areas where pests are found
Customer Involvement in Preventing Pests	Minimal	Extensive

In IPM programs, treatments are not made according to a predetermined schedule. Rather, they are made only when and where monitoring has indicated that the pest will cause unacceptable economic, medical, or aesthetic damage. Treatments are chosen and timed to be most effective and least hazardous to non-target organisms and the general environment.

Under an IPM program, execution of individual pest management practices involves the following steps:

- **Identify** pests and possible natural enemies;
- **Develop plans/strategies**, an integration of treatment methods, that are effective against the pest, least disruptive to natural controls and least hazardous to human health and the environment;
- **Establish action thresholds** or the size of the pest population correlated with a threshold, sufficient to warrant treatment. In determining threshold levels, the amount of aesthetic or economic damage that can be tolerated must be correlated with the population size of pests, natural enemies, time in the season, and/or life stage of the pest or host;
- **Monitor pest population** for regular sampling of pest and natural enemy populations. Monitoring is an ongoing activity;
- **Control pest** (optional);
- **Document results**; and
- **Evaluate/redesign plan** to determine the outcome of treatment actions.

Controlling pests has traditionally been the responsibility of the pest control operator. **In IPM, preventing and controlling pests is the responsibility of all personnel on the installation.**

3.1.3. IPM Compliance

All pesticide applicators are trained in IPM techniques during initial and refresher licensing or certification training. Government representatives shall assess the PMSP's compliance with IPM. This may include:

- Reviewing the approved pesticide list for use of less toxic pesticides, baits with sustainable control, short-residual and pest-specific products, and products used for spot treatment rather than broadcast application.
- Contractor work plans and partner pest management plans that incorporate IPM.
- Reviewing pest management records to ensure that only approved pesticides are used, spot applications are performed, non-chemical methods are used, and routine surveys are being performed.
- Observing pest control service calls to ensure pest control operators identify conditions conducive to pest infestations, provide information to building occupants on how they can prevent pests, use only approved pesticides, perform spot treatments, properly apply baits, conduct routine surveys, and monitor baits / bait stations / traps.

3.1.4. Integrated Pest Management Sheets

The IPM sheets in Appendix H provide guidelines for the integrated control of pests at the installation. They may be used as a reference for surveillance and non-chemical and chemical control alternatives.

3.2. Current Pest Management Operations

3.2.1. General Household and Nuisance Pests

Pest control, for the purposes of this IPMP, is the control of arthropod and vertebrate pests in and around buildings. Sanitation, glue traps and exclusion are the primary means of non-chemical control in and around structures. Low toxicity insecticidal baits are used effectively for cockroaches and ants. Most pesticide applications involve the application of contact chemicals or those that have short residual efficacy.

3.2.1.1. Cockroaches

German and American cockroaches are common pests. The general adaptability of the German cockroach makes it an important pest problem in food service areas. An integrated approach of using both preventive and corrective techniques is the only practical means of controlling this pest.

3.2.1.2. Preventive Control Measures

Preventive control measures including inspection, interior and exterior facility sanitation, and exclusion methods such as closing harborage areas by caulking or other modifications, reduce the chances for pest survival by limiting needed food, water, and shelter. In buildings that are most susceptible to pest infestation, services are performed on a scheduled basis through preventive maintenance contracts. Service includes inspection, recommendations on pest proofing and sanitation and chemical control, if needed. Common use areas and food consumption areas of other buildings, i.e., areas used by people as a group, such as heads, coffee messes, lounge areas, and vending machine rooms, are serviced on either a monthly or quarterly basis, depending on the preventive maintenance contract for that building, with response to call-backs as necessary. This also includes common use areas of the barracks, warehouses, and administration buildings. Buildings where there is no food and where problems occur only occasionally such as shops and storage buildings, are handled on a service call basis. Pesticide treatments in food handling areas shall be confined to crack and crevice placement when using residual aerosol or dust formulations. Insect Growth Regulators and baits are used to complement other control measures. Self-contained light traps may also be utilized in these areas. Low odor formulations are used in offices and in other spaces where a pesticide odor would be objectionable.

3.2.2. Grounds Maintenance

Grounds maintenance is performed on improved or landscaped grounds. Pest management during grounds maintenance may involve weed control, control of pests and disease on plants, trees and turf, and control of vertebrate animals (i.e. squirrels, moles) that may destroy plants and turf. Mechanical removal of weeds and mowing are routinely performed. Grounds maintenance also includes weed control in drainage ditches that may contribute to mosquito control and bird habitat removal. Weed control is performed along roadways, fence lines, and at fuel farms where they pose fire and visibility concerns.

3.2.2.1. Weed Control

A wide variety of herbicides are available for controlling unwanted vegetation. Extreme care should be taken when using herbicides around waterways. Herbicides can be used around mowing obstacles such as signs, fire hydrants and manholes. Herbicides can also be used to control weeds along cracks in sidewalks and asphalt parking areas, along fence lines, around buildings, and along ditch banks. Selective herbicides are used to control various weeds that occur in lawns on the Base. Various cultural and chemical controls can be used to deal with these and other weed control problems. When using chemical control, both selective and non-selective herbicides may be used.

3.2.3. Aquatic Weed Control

The policy of NSA HR Portsmouth Annex is to control and limit the spread of invasive species of plants, and to protect native aquatic plant species.

3.2.4. Structural Pests

Structural pests which have an impact on activity operations include termites, powder post beetles, wood borers, and wood destroying fungi. Of these, subterranean termites and wood destroying (decay) fungi cause the most damage.

3.2.4.1. Structural Control Program

A well managed structural pest control program includes inspection, prevention and chemical treatments when needed. All susceptible structures that contain wood or wooden structural members should be inspected on an annual basis. Records should note when a building was inspected, the location of any infestation found, and the description of any treatment performed.

3.2.4.2. Administration of Termite Treatment Contracts and Warrantees

Various control techniques including: (1) the use of construction practices which protect wood from attack; (2) controlling moisture through proper drainage and ventilation; (3) the use of termiticides for barrier treatment of soil and hollow masonry units of building foundations, and (4) the use of treated wood and or metal and concrete supporting structures, are part of an integrated approach to structural pest control. Corrective chemical treatments should be performed when termites are found actively damaging wood. Control operations should be based on annual inspections of buildings and reports of termite swarming from building occupants. Top priority is given to preventive control treatments, such as preconstruction termite soil treatments and the use of treated wood to protect wood from attack.

The NAVFAC LANT PPMC should review contract specifications for termite control. Termiticides, when needed, must be applied at the highest EPA-labeled concentration and application rate. Soil treatment for termite prevention will be conducted during building construction in accordance with the Unified Facilities Guide Specifications (UFGS) 31 31 16 (DODINST 4150.07, para. E.4.7.15.1). In accordance with UFGS 31 31 16, the contractor shall provide a warranty of no less than five years. This ensures that if termite activity is discovered during the five year warranty period, the contractor will re-treat the soil and repair or replace any damage that has been caused by termite infestation. Termiticides used for termite control must be nonrepellent, such as pesticides with the active ingredient of fipronil, imidacloprid, chlorfenapyr, or chlorantraniliprole. DOD-certified pesticide applicators or PMPARs trained in pest control shall inspect applications of pesticides by contractors to control termites or other wood-destroying organisms

Once treated with termiticides, care must be taken to prevent disturbance of the soil barrier within one foot of the foundation (if moved by gardening activity or covered when raised flower beds are installed against a building). This can be a serious problem in housing areas where people are encouraged to beautify their yards. Raised beds must be four-sided (i.e. not using the foundation as one side) and soil within one foot of the foundation can't be cultivated for planting. All wood that is damaged by termites or wood rot fungi should be replaced with treated wood to prevent future damage.

3.2.5. Stored Product Pests

Stored product pests are a potential problem at NSA HR Portsmouth Annex. Receipt inspection and rejection of obviously infested materials generally prevents heavily infested material from being placed in the storage area.

3.2.5.1. Dermestid Beetle

If the dermestid beetle *Trogoderma* is found in a commodity, the whole lot of food must be condemned. The pointed hairs on the larvae will cause digestive problems if the contaminated food is eaten. An accurate identification of *Trogoderma* is required to condemn the lot. For the most part, sanitation (keeping storage areas clean) and stock rotation minimize or prevent pest infestation. If an infestation is found, the most effective way to control *Trogoderma* is through deep cleaning, vacuuming and discarding or segregating the infested product while surveying adjacent areas. ULV space treatments and residual sprays are used to stop movement of an infestation to clean stock within food storage areas.

3.2.5.2. MRE Stores

More stringent controls are required for prevention of stored products pests. Guidance on this program can be found in the AFPMB Technical Guide #38 (http://www.afpmb.org/sites/default/files/pubs/techguides/tg38.pdf).

3.2.6. Health Related Pests

Mosquitoes, biting flies and gnats (*Culicoides*), and filth flies constitute the most important insect groups from the standpoint of both disease transmission and general annoyance. Ticks are rarely a problem on base, and are identified to species and handled on a case-by-case basis when they occur. Operations directed at controlling potential disease vectors must be based on a thorough knowledge of the target pest. Survey operations are essential in determining the species present, the population level involved and the potential hazard of disease transmission. Surveys also serve as a valuable tool in evaluating control operations.

3.2.6.1. Mosquito Surveillance

Mosquito surveys are necessary to determine the species present, their abundance, the potential hazard of disease transmission, and information on which to base an efficient control program. Mosquito surveillance includes conducting both larval and adult surveys. Larval surveys are important because they determine exactly where mosquitoes are breeding, providing the information necessary to manage or eliminate mosquitoes at the source. Larval surveys involve regular dipping stations that are selected, noted on a map and inspected periodically throughout the mosquito season. In areas where mosquito control is conducted, random larval sampling should be made to check the effectiveness of the control program. Adult mosquito surveys may be conducted by either collecting mosquitoes from resting sites or using light traps. Adult collections are then counted and identified to genus or species so that the level of disease threat can be assessed. Adult surveys are focused on collecting female mosquitoes because they are the only ones that bite. Female mosquitoes require a blood-meal before they can lay viable eggs. The male mosquito feeds on plant sugars such as nectar, and does not bite. A high proportion of adult males in a trap collection usually will indicate a nearby larval habitat, and a survey of the area should be done to locate possible breeding sites. BUMED (Entomologists with the Navy Entomology Center of Excellence and also the Navy Environmental and Preventive Medicine Units) is responsible for providing professional guidance, recommendations, and on-site assistance on all technical matters relating to disease vectors and other medically important pests (OPNAVINST 6250.4C).

NSA HR Portsmouth Annex does not have a mosquito problem, and there is currently no need for adult mosquito surveillance or control to be conducted. The DOD civilian pesticide applicator at NSA HR Portsmouth Annex conducts larval mosquito surveillance and control.

3.2.6.2. Mosquito Control

Mosquito control methods are either permanent (e.g. eliminating the water source) or temporary (e.g. chemical control) in nature and may be directed against larvae or adults. Larviciding is the most effective way to control mosquitoes. Larvicides (*Bacillus thuringiensis var. israelensis* (Bti)) are applied by EV Services pest control when results of mosquito dip counts exceed two larvae per dip. Larvicides should be applied to areas where water stands for longer than 7 days. Biological control can be accomplished by the introduction of mosquito fish (*Gambusia* sp.), which are surface feeders that are predaceous on mosquito larvae. *Gambusia* species have the ability to outcompete other species, so it is important to consult with the Environmental Department prior to introducing them, as well as to only introduce them into waters that do not drain into other waterways. To decrease the amount of standing water it is important to have a drainage system allowing proper runoff of rain water from roadways. Ditches should be maintained free of weed growth. This increases water flow in the ditch allowing access of natural mosquito predators.

If adult mosquito surveillance is conducted and female mosquito counts exceed 25 per night per trap, Ultra Low Volume (ULV) insecticide treatments can be initiated by EV Services pest control. If a trap count exceeds the threshold, the area surrounding that trap should be surveyed to identify and treat the active breeding site. For most species, mosquito activity is greatest from dusk to dawn. Adult mosquito control efforts should be made during peak mosquito activity. ULV operations should be conducted in the early morning hours before the sun warms the ground, or in the evening after the ground has cooled. Regular testing of ULV aerosol droplet dispersal is required to assure maximum control, minimum insecticide use, and prevention of automobile finish spotting caused by droplets that are too large. This testing must be done at the beginning of each spray season and for every 50-100 hours of operation, or when the pesticide is changed. More information is included in the Armed Forces Pest Management Board Technical Guide #13: *Ultra Low Volume Dispersal of Insecticides by Ground Equipment* (http://www.afpmb.org/sites/default/files/pubs/techguides/tg13.pdf). Slides for aerosol droplet size testing can be obtained from and analyzed by the Testing and Evaluation Department at the Navy Entomology Center of Excellence, Jacksonville.

3.2.6.3. Filth Fly Management

Filth flies (houseflies, blow flies, flesh flies, bottle flies, etc.) can be a problem during the warm summer months if high sanitation levels are not maintained. Timely disposal of garbage and routine cleaning of garbage cans and dumpsters helps to minimize the problem. Garbage cans and dumpsters should be placed on concrete pads at least 100 feet from facilities to reduce breeding under and around the containers and to minimize access to the facilities. Continuous monitoring of sanitation conditions in and around food service areas helps assure that significant fly breeding will not occur.

The choice of fly control techniques must be based on an on-site evaluation of the problem. Pest control personnel inspect areas where garbage is handled and treat these locations with approved insecticides when flies exceed control limits. Preventive Medicine personnel also inspect these areas and report significant findings to appropriate people for corrective action. Exclusion devices such as screens and air curtains help prevent the entrance of flying insects into buildings when installed and properly maintained. Aerosol insecticide treatments are provided when adult flies become a problem in indoor spaces. Automated pesticide misting devices are not allowed by DOD instruction. Light trap devices are also helpful for filth fly control in food handling areas, but only when they are placed inside of the building. Use only non-contaminating light traps with some way of containing the dead insects. For more information on this, see AFPMB Technical Guide No. 29: *Integrated Pest Management In and Around Buildings* (http://www.afpmb.org/sites/default/files/pubs/techguides/tg29.pdf).

3.2.6.4. Bed Bug Management

Within the past decade, there has been a significant resurgence of bed bugs worldwide. Bed bugs are blood-feeding ectoparasites that are usually associated with humans, bats, or birds. These insects have a number of features that make them very effective pests and thus difficult to control: their small, flattened body design allows them to take harborage in inconspicuous places such as cracks and crevices; a female can lay several hundred eggs during her lifetime; they can survive a long time without feeding; and many insecticides have been rendered ineffective due to resistance development. The most common way bed bugs are introduced is by the movement of infested items (*i.e.,* bedding, clothing, and luggage) from one place to another. The common bed bug is not known to transmit human disease. For most people, the bite of a bed bug is painless and will usually go unnoticed, though many people can have allergenic skin reactions, ranging in severity from local inflammation and itchiness, to asthmatic symptoms and anemia. Since this is a public health issue the involvement of installation Preventive Medicine personnel is highly recommended.

Because of their cryptic lifestyle, bed bugs can be difficult pests to detect without a diligent survey strategy. Bed bugs typically feed at night when the host is asleep, and seek off-host harborage in cracks and crevices during the day. It is very important to *thoroughly* inspect areas where bed bug infestation is suspected. Typical harborage areas might include mattress seams, box springs, bed frames, night stands, picture frames, loose wallpaper, and curtains. Bed bugs typically travel 5-20 feet from their harborage area to feed. When populations are small, infestations may go unnoticed. Some tell-tale signs of a larger bed bug population include the presence of fecal spotting, shed skins, increased biting frequency, and in serious cases a distinct “obnoxiously sweet” odor produced by the bugs. Persons conducting inspections and surveys should be properly trained on what to look for and where to look for infestations.

Bed bug control may be more difficult to achieve today with increased travel and more stringent limitations on available control materials. A successful control program will require a carefully planned and integrated approach. For more information on controlling bed bugs see the AFPMB's Technical Guide 44, Bed Bugs - Importance, Biology, and Control Strategies (http://www.afpmb.org/sites/default/files/pubs/techguides/tg44.pdf).

3.2.6.5. Red Imported Fire Ant

The red imported fire ant was recently introduced into Virginia through the movement of infested nursery stock and fill soil. The fire ant’s mound building and stinging behavior interferes with recreational and grounds maintenance activities. Bait and residual insecticides are available for control of fire ants. Monthly inspections for fire ant mounds should be made in all improved and unimproved areas, with treatment as necessary. Infested areas shall be treated with bait, followed by a drench of any mounds 6 to 8 weeks later. An imported fire ant quarantine map is included in Appendix A.

3.2.6.6. Rodent Management

Rodent control work is an ongoing program to eliminate the causes of rodent infestations. Major emphasis is placed on sanitation and exclusion to limit the amount of food and harborage available to rodents. Tamper-proof bait stations should be maintained in high infestation areas. There are new EPA requirements for first generation anticoagulant products (warfarin, chlorophacinone, and diphacinone), second generation anticoagulant products (brodifacoum, bromadiolone, difenacoum, and difethialone) and non-anticoagulants (bromethalin, cholecalciferol and zinc phosphide). Bait stations are required for all outdoor, above-ground placements and are also required indoors if exposure to children, pets, or non-target animals is possible. All outdoor above ground use must be in a bait station and be applied within 100 feet of man-made structures. Mechanical traps (snap traps, glue traps, etc.) are another effective control method. Trapping is an effective way of quickly reducing a large mouse population.

3.2.6.7. Bird Management

Pigeons are the primary bird pests. Pigeons, English sparrows, and starlings can be controlled without a permit because they are not covered under the Migratory Bird Treaty Act. Other bird species require special permits before any control measures can be taken. Bird control methods vary according to the situation. Bird droppings pose a health hazard, as a possible cause of histoplasmosis and other respiratory problems when airborne. Bird ectoparasites, such as mites, can also fall on installation employees. Ultrasonic devices and plastic owls and snakes, etc. are not effective for bird control. The best alternative for bird control is "bird proofing" or the exclusion of birds by closing up all openings. Because of its permanency, bird proofing (i.e., the placing of hardware cloth and chicken wire over potential roosts) is considered the most cost effective means of control. Population reduction techniques (i.e., destruction of nests accessible by a ladder or "cherry picker") can sometimes be used effectively. Repellent chemicals which produce alarm reactions and cause a flock to leave or avoid an area are often used. Control personnel should

continually monitor bird population levels and take appropriate control actions when required.

3.2.6.8. Feral Cat Management

Cats may occasionally be found near food handling areas or dwelling in crawl spaces under buildings where they can cause flea problems inside of the buildings. The elimination of available food by keeping garbage cans and dumpsters sealed will decrease the appeal of the area to the cats. Elimination of shelter is also a good means of control. The activity should discourage people from feeding stray cats. EV Services pest control uses live traps for the capture and subsequent transport of these cats to the local animal shelter. Guidance on this control plan can be found in AFPMB Technical Guide # 37 (http://www.afpmb.org/sites/default/files/pubs/techguides/tg37.pdf).

3.2.7. Pest Management in Housing

3.2.7.1. Public Private Venture Housing

The NSA HR Portsmouth Annex PPV house is under a Public Private Venture (PPV) partnership with Lincoln Military Housing. Lincoln Military Housing is responsible for providing pest management services and responsible for upholding the agreements set forth in the Partner's Plan for Pest Control included in Appendix G. General pest control services are currently being provided by contract with Orkin and grounds maintenance services are being provided by Valleycrest (certificates located in Appendix K). Contractors providing services in the PPV areas must follow all state and local laws.

3.2.7.2. Pet Management

Pet dogs and cats released or lost by owners on base can become a pest problem. Feral cats and dogs are susceptible to and can carry disease, damage natural habitats, harm protected wild animals, become a vehicle strike hazard, and attack and injure personnel. Pet owners are encouraged to microchip their pets. Microchipping is a permanent pet identification system using a computer chip implant in the skin of the animal. This allows a lost pet to be identified even if the collar tag is missing.

3.2.8. Prohibited Operations and Devices

3.2.8.1. Occupied spaces

"Installations shall not permit the application of liquid, dust, or aerosol pesticide formulations in any space occupied by unprotected personnel. However, pesticides contained in gel or paste bait formulation may be applied in occupied spaces in accordance with pesticide label directions." (OPNAVINST 6250.4C pg 25 and OPNAVINST 5090.1C Para. 17-4.13)

3.2.8.2. Preventive or Scheduled Pesticide Treatments

"Regularly scheduled, periodic pesticide applications are not approved for DOD property except in situations where the IPM plan clearly documents that no other technology or approach is available to protect personnel or property of high value. Installations shall not use preventive pesticide treatments, to include automated misting devices, unless the appropriate pest management consultant has given approval based upon current surveillance information or records documenting past disease vector or pest problems that require this approach." (DODINST 4150.07, Para. E4.10.3)

3.2.8.3. Paints and Coatings Containing Pesticides and Other Biocides

"Paints containing insecticides are not approved for use on DoD property. This guidance applies to interior and exterior pesticide-containing paints intended for application to structural surfaces, such as walls, ceilings, and siding. It also applies to insecticides formulated and labeled for use as paint additives. Paints containing fungicides as mildew inhibitors may be used when application directions specify no special restrictions due to the

fungicide. Approved marine anti-fouling compounds or coatings may be applied to protect surfaces of watercraft" (DoDINST 4150.07, Para. E4.10.2).

3.2.8.4. Electrically Operated Devices

"Electromagnetic exclusion or control devices, ultrasonic repellent or control devices, and **outdoor** devices for electrocuting flying insects are not approved for use on DOD installations (DODINST 4150.07, Para. E4.10.1); this does not apply to **indoor** use of selected devices, carefully placed, for electrocuting flying insects. Pest surveillance traps and monitoring equipment, such as non-electrocuting mosquito light traps, may also be used by trained personnel.

3.3. Regulatory Compliance

3.3.1. Policy

Department of Defense policy is to ensure that DOD pest management programs achieve, maintain, and monitor compliance with all applicable Executive Orders and applicable Federal, State, and local statutory and regulatory requirements. When there is a conflict between Federal and local regulations, the installation will comply with the more stringent of the two. This may occur with pesticides limited for use by the State of Virginia, which are not necessarily restricted by the EPA. In this case, the installation must comply with Virginia regulations.

3.3.2. Pesticide Regulation and Enforcement

3.3.2.1. Pesticide Regulation

The U.S. Environmental Protection Agency (EPA) has the primary authority to regulate pesticides in the U.S. The EPA delegates pesticide enforcement authority to states through cooperative agreements. OPNAVINST 6250.4C requires Navy installations to comply with state and local pesticide use regulations.

3.3.2.2. Enforcement

The responsibility for compliance and enforcement lies with the installation CO. As the CO's pest management advisor, the IPMC shall be familiar with Federal, State and local pesticide use regulations and ensure that all applicators conduct operations in compliance with these regulations. Regulatory enforcement for each of the PMSPs is provided.

- **Commercial contractor applicators:** PMPARs shall provide assistance by monitoring contract PMSPs for compliance with all applicable regulations as specified in the contract and will recommend appropriate actions to the contracting officer if the contractor does not comply. PMTs conducting inspections of food service facility pest management programs can also ensure compliance for safe pesticide use and applicator licensing / certification (Inspection guidelines are found in NAVMED P-5010 Chapters 1 and 8).
- **DOD applicators:** The pesticide applicator's immediate supervisor, with the assistance of the IPMC, shall also ensure that pesticide use is in compliance. Under the authority of DOD Instruction (DODINST) 4150.07 and DOD Directive 5134.01 and per DOD 4150.07, Volume 1, the DOD may deny, suspend, or revoke the certificate of any DOD employee who violates any provision of FIFRA or falsifies records. In accordance with DOD 4150.07, Volume 1, the installation CO may initiate a formal review if FIFRA violations are suspected. Violations shall be reported through appropriate command channels to the NAVFAC Atlantic certifying authority for review. The certifying authority shall determine if further action is required. That action may include suspension of the applicator's certification. See DOD 4150.07, Volume 1 for more information http://www.afpmb.org/sites/default/files/pubs/directives_mous/415007m_vol1.pdf..

NAVFAC Atlantic Applied Biology shall provide assistance to the installation IPMC with compliance and enforcement issues and clarification of regulations. The senior pest management consultant is the certifying official for DOD certified pesticide applicators on the installation.

3.3.3. Laws and Regulations

3.3.3.1. Primary Pesticide Regulations

- **Federal:** U.S. Code of Federal Regulations (CFR) at 40 CFR Section E, 152-180: Pesticide Programs (http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfrv21_03.html).
- **DOD and Navy:** DODINST 4150.07, DOD Pest Management Program; OPNAVINST 6250.4C, Navy Pest Management Programs; OPNAVINST 5090.1C, Environmental Readiness Program Manual.
- **Virginia:** The Virginia Department of Agriculture and Consumer Services, Office of Pesticide Services regulates the Pest Control Industry (http://www.vdacs.virginia.gov/pesticides).

3.3.3.2. The Pesticide Label

The primary source of pesticide regulations for the pesticide applicator is found on the pesticide label in accordance with 40 CFR 156. Virginia may add supplementary labels which are regulations that must be complied with in the State. **It is a violation of Federal and/or State law to use a pesticide in a manner inconsistent with the label.** Note, however, that the pesticide label does not provide specific information for each site where the pesticide may be applied. For example, the pesticide label may allow application of an herbicide to unimproved grounds, but if those grounds are within a ringed map turtle habitat, then pesticide use may be restricted under the Endangered Species Act. Pesticide applicators should be aware of environmentally sensitive areas before beginning any new pesticide application and should consult the installation's Environmental Department. For more on the pesticide label, see http://www.epa.gov/pesticides/label/.

Endangered Species Protection Bulletins set forth geographically specific pesticide use limitations for the protection of endangered or threatened species and their designated critical habitat. If your pesticide label directs you to the EPA Bulletins Live! Website (http://epa.gov/espp/bulletins.htm), you are required to follow the pesticide use limitations found in the Bulletin for your county, pesticide active ingredient and application month.

3.3.3.3. Other Regulations

Other applicable directives, laws, and regulations concerning pesticide applicators and pest management operations are listed and described in Appendix C.

3.4. Pesticide Management

Chemical control of pests using pesticides can be an integral part of an IPM program. Proper management of pesticides will ensure a safe and cost-effective pest management program. Management of pesticides includes the proper selection of pesticides, pesticide approval, procurement, storage, mixing, use of pesticide application equipment, and clean-up. The pesticide label provides most of the information needed to manage pesticide use and must be affixed to the container at all times.

3.4.1. Pesticide Selection

The following criteria should be used when selecting a pesticide:

- **Determine the need for a pesticide.** Is a chemical pesticide really needed? In some situations non-chemical control methods may be more effective or less costly and time-consuming in the long term. Will exclusion or habitat elimination take care of the problem?

- **Choose a pesticide with a low toxicity.** Can the pest be sufficiently controlled with a pesticide that has a low toxicity to humans?
- **Choose pesticides and pesticide formulations with minimal environmental impact.** Avoid using "Restricted Use" pesticides if possible. The environmental impact of pesticide spills is reduced when using a granular pesticide formulation rather than a liquid. Can attractant bait stations be used instead of broadcast application of a pesticide?
- **Choose pesticides that provide a long-term or sustainable solution.** For example, contact insecticides applied to ant trails will only temporarily halt the infestation, and may cause the colony to bud and form new colonies, while baits can kill the entire colony including the queen.

3.4.2. Pesticide Procurement

Pesticides used by contractors are included in the cost of the contract and are procured through commercial sources. Pesticides used by DOD personnel may be purchased through the Federal Stock System. Contractors cannot purchase pesticides through the Federal Stock System. A list of pesticides approved by DOD and found in the Stock System can be found at http://www.afpmb.org/pubs/standardlists/DOD%20pesticides%20list.pdf (these are not the only pesticides that may be used on the installation). Only pesticides listed on the installation's Authorized Use List (AUL) in Appendix E may be purchased. All pesticide products and pest control services procured via government credit cards must also be pre-approved by the NAVFAC LANT PPMC (NAVSUPINST 4200.99). For information on requesting new pesticides to the installation AUL, see section 2.2 Pesticide Approval.

3.4.3. Pesticide Storage

3.4.3.1. Pesticide Storage

NAVFAC MIDLANT Environmental (EV) Services pest control maintains a pest control shop on NSA HR Portsmouth Annex located in Building 277, which is in good order. Pesticides used by commercial contractors are stored off-site in contractor-owned facilities. DODINST 4150.07 (Para. E4.5.1.) states that pesticide storage facilities "shall comply with all applicable regulatory standards and shall, where feasible, be modified to meet the minimum standards for new pesticide storage facilities." The DOD standards are described in *AFPMB TG 17: Military Handbook, Design of Pest Management Facilities* (http://www.afpmb.org/sites/default/files/pubs/techguides/tg17.pdf).

3.4.3.2. Retail Sale Pesticide Storage

Household pesticides displayed and sold at the NEX shall be stored in their original, sealed containers.

3.4.3.3. Vehicles

Pest control vehicles must carry pesticide spill kits in accordance with OPNAVINST 6250.4C. Pesticides shall not be transported in the vehicle's passenger compartment and pesticide containers shall be secured to vehicles to prevent spillage.

3.4.4. Mixing

EV Services pest control conducts pesticide mixing at the NSA HR Portsmouth Annex pest control shop located in Building 277. All pesticide mixing conducted by commercial contractors is done off-site. One exception to this is soil treatment for termite prevention during building construction; the contractor must mix the termiticide on-site while the PMPAR or IPMC is there to witness. Pest control operators must mix pesticides in accordance with the pesticide label in appropriate areas that minimize the risk of safety and environmental hazards. Contracted pest control operators must also mix pesticides in accordance with the contract specifications. Persons mixing pesticides with water shall protect the water supply

from back-siphoning of the pesticide mixture. They shall also ensure accurate measurement of concentrated pesticide to ensure proper application rate. Precautions must be taken to minimize the risk of a pesticide spill. See Section 5.3.4 for pesticide spill prevention measures. Spill kits must be maintained on pest control vehicles and must be available at the mixing site.

3.4.5. Application

3.4.5.1. Service containers

Containers other than the original pesticide container that are used for transporting pesticides to the job site must have a copy of the label attached. Service containers used for the application of a pesticide must have the following information on a tag attached to the container: name of party responsible for the container, the identity of the chemical in the container, and signal word of the chemical. Containers commonly used for food, drink, or household products **shall not be used** to hold pesticides.

3.4.5.2. Equipment

Only pest control equipment that is in good repair and safe to operate shall be used by PMSPs. The equipment should be in good condition, free from corrosion, clean and free from leaks. The PMPAR shall inspect equipment used by contract applicators. Applicators shall also ensure that they use equipment suitable to ensure proper application of pesticides.

3.4.5.3. Pesticide Application

All pesticides shall be applied in accordance with Federal, State and label directions. Application of pesticides should be timed to ensure contact with and maximum kill of the pest and to prevent use under adverse weather conditions that can cause drift of the chemical outside the target area. See section 4.2.2 for more information on timing and drift prevention

3.4.6. Post-application Clean Up

All pest control equipment shall be properly cleaned. Contract PMSPs are not allowed to dispose of excess pesticide, used containers, or residues on the installation per contract specifications; they must conduct all cleaning off-site. Spray tanks and pesticide containers must be triple-rinsed prior to storage or disposal. Disposal of pesticide spray tank rinse water should be performed by applying to a site listed on the pesticide label, used for future mixing of the same pesticide, or disposed of as hazardous waste. Rinse water shall not be allowed to enter storm drains.

3.5. Minimum Risk Pesticides

Minimum risk pesticides, such as those marketed under the EcoEXEMPT® brand, may be used by pest management service providers (PMSP) as part of their IPM program. According to the EPA, “Minimum risk pesticides are a special class of pesticides that are not subject to federal registration requirements because their ingredients, both active and inert, are *demonstrably* safe for the intended use.” These pesticides are exempt from federal registration under section 25(b) of the FIFRA and are not labeled with an EPA registration number. Since there is no federal review of these pesticides or their pesticide label, there is no federal review of the instructions for effective use of these products. Although these pesticides are exempt from federal registration, they still need to be approved prior to use on DOD property, primarily for efficacy and safety reasons.

3.6. Cancelled Pesticides

In recent years several common organophosphate pesticide registrations have been cancelled or restricted. Chlorpyrifos (i.e. Dursban®, Lorsban®) and diazinon were widely used pesticides by private

and commercial pesticide users that have been cancelled. The following actions are allowed with these pesticides:

- End users (e.g. PMSPs and private, residential users) are allowed to use the pesticides until depleted.
- PMPARs should monitor the use of the pesticides by contractors to ensure that they are not using an increased amount of the pesticides as a means of using up their stock.

The EPA is also cancelling most organic arsenical pesticide registrations, which consist of monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA), calcium acid methanearsonate (CAMA), and cacodylic acid and its sodium salt. Organic arsenical pesticides are used or have been used as herbicides on cotton and other agricultural crops, in forestry, on residential and other lawns and turf, and in non-crop areas such as rights of way, drainage ditch banks, fence rows, and storage yards. All uses of DSMA, CAMA, and cacodylic acid and its sodium salt were canceled as of September 30, 2009.

All uses of MSMA **except** cotton, sod farms, golf courses, and highway rights-of-way, were canceled as of September 30, 2009. Use of MSMA on sod farms, golf courses, and highway rights-of-way **was** to have been prohibited after December 31, 2013, but because the EPA is considering newly-submitted information, these uses remain registered. These uses, in addition to the cotton use, will be considered in the pending registration review process for MSMA. **Users can continue to apply MSMA on sod farms, golf courses, and highway rights-of-way until further notice, but thoughtful use and consideration of depleting stocks is highly encouraged.**

4. Health and Safety

4.1. Pesticide Applicator Safety

To ensure the safe use of pesticides, pesticide applicators shall handle and apply pesticides in accordance with the product's label directions.

4.1.1. Potential Occupational Hazards

The following hazards may be encountered by pesticide applicators or Government representatives that may be exposed while inspecting pest management operations. Occupational Safety and Health guidance is found in the OPNAVINST 5100.23G: *The Navy Occupational Safety and Health Program Manual*.

4.1.1.1. Direct Contact Toxic Chemical Exposure

Many chemicals used as pesticides are also harmful to humans. The three routes of exposure to applicators are dermal, inhalation and ingestion. For applicators the most common route of exposure is dermal; frequently due to not wearing the appropriate personal protective equipment. Severity of the harmful effects is determined by duration of exposure and toxicity of the chemical. The effects can be acute (rapid onset due to high dosage, high toxicity) or chronic (slow or delayed onset; due to long term exposure to low dosage, low toxicity chemicals). The highest risk for severe acute chemical exposure occurs during pouring and mixing of concentrated pesticide resulting in high dose, rapid onset chemical poisoning. Chronic exposure can occur when the applicator fails to use appropriate PPE during frequent pesticide applications and the chemical accumulates in the body of the individual over a period of time leading to delayed or gradual onset of illness or injury. Direct chemical exposure can result not only in pesticide poisoning, but in skin burns due to corrosive chemicals.

4.1.1.2. Heat

The use of protective equipment such as respirator, goggles, gloves and coveralls increases the risk of heat injury especially in warm climates. Heat injury can occur during long periods of work outdoors during warm weather or in enclosed spaces where machinery or equipment may generate heat.

4.1.1.3. Noise

Some pesticide application equipment use gas-powered air compressors or pumps that produce noise hazards. Gas-powered backpack sprayers are particularly hazardous due to the proximity of the noise source to the ears.

4.1.1.4. Eye Hazards

Eye hazards may result from chemical splashed into the eyes causing corrosive, toxic, or impact injury. Some pesticides are labeled "Restricted Use" due to their corrosive nature. Highest risk occurs during pesticide pouring, mixing and application. During pesticide applications, chemicals may enter the eyes through "splashback" when applying the chemical under pressure into a crack or crevice or when applying pesticides overhead. Injury may also occur during equipment cleaning.

4.1.1.5. Infectious Zoonotic Disease

Care should be taken when trapping and handling live or dead animals. Hantavirus may be transmitted from rodents to humans through body fluid exposure or when breathing aerosolized rodent excreta. Pest management providers may be exposed when handling rodent carcasses after trapping or handling traps contaminated with rodent urine and feces. Feral dogs, cats, skunks, raccoons, and bats may carry and transmit rabies through a bite.

4.1.1.6. Inhalation Hazards

Many pesticides release hazardous vapors and are particularly hazardous in enclosed spaces. Some pesticides are labeled "Restricted Use" due to the high risk of inhalation injury. Personnel may be exposed during mixing, application, and cleaning.

4.1.1.7. Electrical and Fire Hazards

Spot and crack and crevice applications may require application of a pesticide to areas near motors of refrigerators, compressors and other machinery where it can become an electrical shock hazard. They may also be applied to areas near pilot lights resulting in an explosion and/or fire hazard.

4.1.1.8. Head Impact and Sharp Hazards

Surveys and pest control procedures may be done in attics, crawl spaces, basements, and other areas with low overheads where head impact hazards exist. Some devices used for bird roosting exclusion and rodent control have sharp edges and can cause cuts, puncture wounds, and abrasions.

4.1.1.9. Trip and Fall Hazards

Trip hazards may occur when applicators are spraying without close attention to where they are stepping. Spraying around buildings where there are various obstacles (i.e. plants, utility boxes, plumbing) in the path of the applicator can be particularly hazardous. Pest control may also need to be performed from ladders, on roofs, in ceilings, and in trees. Wet surfaces on the ground or on elevated surfaces can increase the risk of trips and falls.

4.1.1.10. Exposure to Harmful Animals

Venomous animals such as bees, wasps, rattlesnakes, and spiders are potential hazards when attempting to control them. Some of these are very dangerous due to envenomation and allergic reactions. Feral dogs, cats, coyotes, raccoons, and other large pest animals can inflict serious bites or clawing wounds.

4.1.2. Hazard Abatement

4.1.2.1. Operational Risk Management

Operational Risk Management (ORM) is a decision making tool to reduce the risk of mishaps, whether in military contingency or support operations. Pest management operations pose risks to human health and the environment that affect the installation's mission that can be reduced and minimized by ORM. Pest management ORM uses the following process to minimize hazards:

- **Identify hazards** – the hazards may involve the pesticide or the application equipment (see list of hazards above)
- **Assess hazards** – determine the degree of risk based on the probability and severity of these hazards. For example, the risk may be high if a highly toxic pesticide is used daily.
- **Make risk decisions** – Develop risk control options. Decide whether benefits of control outweigh the risks involved.
- **Implement controls**
  - Engineering controls – Example: use a less toxic pesticide for controlling the pest
  - Administrative controls – Example: place warning placards around pesticide vehicles and pesticide storage areas
  - Personal protective equipment – Example: wear a respirator when an inhalation hazard exists
- **Supervise** – Follow-up to determine effectiveness of controls and monitor changes to hazards.

For more information on ORM go to the Navy Safety website at http://www.safetycenter.navy.mil/.

4.1.2.2. Training and education

Pesticide safety is a core requirement for DOD and civilian pesticide applicator certification and licensing programs. Topics included in the DOD training are listed in DOD Manual 4150.07, Volume 1, DOD Pest Management Training and Certification Program: The DOD Plan for Pesticide Applicators. Safety topics are also given during recertification courses. See section 2.4 for specific training information.

4.1.2.3. Read the Pesticide Label

Pesticide labels are found on all pesticide containers used by installation PMSPs. The pesticide label provides directions for mixing, applying, and disposing of pesticides safely. It also includes a list of hazards to humans and first aid treatment. It may also include a list of personal protective equipment that must be worn and user safety recommendations. The label should always be read completely and thoroughly by the applicator before purchasing and using a pesticide. The label is a legal document mandated by Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

4.1.2.4. Personal Protective Equipment

Personal Protective Equipment (PPE) should always be used when applying pesticides. The type and level of protection needed will be determined by the toxicity, formulation and method of application of the pesticide. The pesticide label provides guidance on what PPE to use.

- Respirator
- Chemical-proof gloves
- Coveralls or long-sleeve shirt and long pants
- Chemical-proof boots
- Hard hat
- Goggles
- Apron
- Faceshield
- Self-contained breathing apparatus (for fumigation)

PPE must be appropriate for the type and application of the pesticide being used. It is the applicator's responsibility to maintain the PPE. Contractors must provide appropriate PPE to their applicators.

4.1.2.5. Pest Control Vehicle Safety Devices

Pest control vehicles should be equipped with safety devices and information. This may include:

- Emergency medical information including nearest emergency treatment center
- Fire extinguisher
- Spill kit
- First aid kit
- Cell phone or radio
- Drinking water supply
- Rinse water supply for washing pesticide off skin.

4.1.2.6. Pesticides and Equipment

The risk of pesticide exposure can be reduced by selecting the appropriate pesticide and equipment for the job. Applying small amounts of low toxicity pesticide using appropriate and properly maintained equipment greatly reduces the risk of harm. Using pesticides that are formulated (i.e. contain emetics) or packaged (i.e. water-soluble packets) to minimize chemical exposure and increase safety should be considered when purchasing pesticides.

Pesticide selection is addressed in section 3.4.1. Equipment should be tested with water prior to application to ensure proper application and that it is not leaking. Situational awareness, such as monitoring meteorological conditions and location, also prevents harmful exposure to pesticides.

4.1.2.7. Protection from Infectious Zoonotic Diseases

Pest control personnel who handle trapped animals or dead animal carcasses should wear gloves to prevent exposure to potentially infectious body fluids. A respirator fitted with a high efficiency particulate air filter should be worn when entering enclosed spaces with large amounts of rodent feces that might be disturbed and become airborne. Additional protection from Hantavirus can be provided by spraying dead rodents and rodent feces with a commercial disinfectant. This will kill Hantavirus as well as wet the feces to prevent it from becoming airborne. Detailed guidance on rodent handling is found in AFPMB TG 41: *Protection from Rodent-borne Diseases with Special Emphasis on Occupational Exposure to Hantavirus* (http://www.afpmb.org/sites/default/files/pubs/techguides/tg41.pdf).

4.1.2.8. Hazard Communication

All pesticide applicators must receive OSHA Hazard Communication training (29 CFR 1910.1200). Contractors must carry material safety data sheets (MSDSs) in their vehicles or, as appropriate, at their on-base administration office. Applicators must understand all of the hazards associated with the chemicals they will use and be able to communicate those to the customer if necessary.

4.1.2.9. Medical Surveillance Program

DOD pesticide applicators are required to be in a medical surveillance program depending on their hazard exposure. Medical surveillance is conducted by the occupational health clinic at the Naval Medical Clinic in accordance with Navy Environmental Health Center Technical Manual (NEHC-TM-OEM) 6260.1: Occupational and Environmental Medicine Field Operations Manual and Medical Matrix.

4.2. Public Safety

4.2.1. Potential hazards to public

4.2.1.1. Direct Contact with Pesticides

Pesticide exposure can occur through dermal contact with a pesticide on a surface, inhalation of vapors, or ingestion of pesticide contaminated food or eating utensils. This type of exposure can occur if a pesticide application is done while unprotected building occupants are present, occupants are allowed entry into buildings before the pesticide has dried, or food and food preparation and serving equipment were not properly protected or cleaned after an application.

4.2.1.2. Pesticide Drift

Pesticide drift occurs when a pesticide leaves the target area and affects unprotected persons outside the area. This commonly occurs outdoors when winds can carry the pesticide off-site. Drift can occur indoors if there is air movement or pesticides are drawn up through ventilation ducts. Pesticide applications that involve small pesticide droplets, such as fogging or ultra-low volume (ULV) application, or dusts are most susceptible to drift.

4.2.1.3. Contact with Contaminated Water

Some pesticides can move through soil and contaminate groundwater used for drinking. Others, if applied in or close to surface water, can cause contamination of recreational waterways.

4.2.1.4. Injury Due to Animals

The use of an inappropriate pesticide may cause collateral injury due to an insufficient "knockdown" of the target pest. This can occur with bees and wasps. Some insecticides do not knockdown the insects rapidly and may actually excite them causing them to become more aggressively defensive in behavior. Unprotected persons blocks away from the pesticide application may become the target of their aggression. Injury can also occur when persons get too close to or try to release a trapped animal or try to capture feral animals by themselves.

4.2.1.5. Fumigation Exposure

Fumigants are highly toxic and can cause immediate death upon exposure. Fumigations can be performed in the housing area where it poses a potential hazard to neighbors and pets. During fumigation the chemical is injected into a tarped structure and allowed to remain for 24 hours. The highest risk of injury or death occurs if a person or animal were to enter the tarp during this period or after the tarp is removed and the before the building is completely ventilated. The fumigant, when exposed to air, dissipates rapidly and readily.

4.2.2. Hazard Abatement

4.2.2.1. Proper Timing of Pest Control Operations

Most indoor application of pesticides should be conducted when building occupants are not present. An exception to this is the application of pesticide baits that are enclosed in a tamper-proof bait station that does not allow exposure to occupants or pets. The building occupants must remain out of the building to allow the liquid pesticide to dry. Some pesticide labels are specific about re-entry times (time after application that occupants are allowed back into the treated building). Some pesticides such as fumigants provide specific directions on aeration of spaces to remove pesticide prior to re-entry. Certain operations, such as bee and wasp control or removal are best conducted after the area has been cleared of unprotected persons. Refer to the product label for specific information.

4.2.2.2. Preventing Pesticide Drift

Pesticide drift from target areas to areas where humans, animals and plants can be affected can be reduced through the following means (adapted from University of Nebraska publication G1773: Spray Drift of Pesticides at http://www.ianrpubs.unl.edu/epublic/live/g1773/build/g1773.pdf).

- Select low or nonvolatile pesticides.
- Read and follow the pesticide label. Apply a pesticide only if an application is warranted.
- Use spray additives that decrease drift within label guidelines. This will increase the droplet sizes and pesticide effectiveness.
- Use larger spray nozzle orifice sizes. This will give larger droplets and will increase the number of tank refills, but will improve coverage and effectiveness.
- Avoid high pressure. High pressure creates finer droplets; 45 PSI should be considered maximum for conventional broadcast spraying.
- Use drift-reduction nozzles. They will produce larger droplets when operated at low pressures.
- Use wide angle nozzles, low boom heights, and keep the boom stable.
- Drift is minimal when wind velocity is less than 10 mph. Do not spray when wind is greater or blowing towards sensitive crops, gardens, dwellings, livestock, or water sources.
- Use shielded spray booms. When banding, use shroud covers to keep chemical from drifting.
- For indoor applications, turn off ventilation and close doors to prevent air currents.

4.2.2.3. Prevent Tampering with Animal Traps

Caged animals can be very aggressive. Traps should be placed in areas where they will not be tampered with by humans or pets. Warning signs can be placed on the traps and area occupants can be warned of the risk of injury. Live and dead rodents in traps can also be a hazard for Hantavirus. Traps should be placed in areas where humans or domestic animals will not be exposed to the rodents.

4.2.2.4. Protection of Fumigation Sites

Warning signs should be posted at the fumigation site warning of the hazards. Some installation contracts require the contractor to provide a 24-hour roving watchperson to patrol the fumigation site to prevent entry by unauthorized personnel.

4.2.3. Special Safety Considerations

4.2.3.1. Medical Treatment Facilities

Persons undergoing medical or dental treatment may be sensitive to pesticides and pesticide odors in the environment. Additionally, medical equipment and supplies may be contaminated during pesticide applications. Alternative IPM methods must be considered prior to using pesticides in medical treatment areas. If pesticides must be used, the preferred method is to use baits, then crack and crevice treatments with low toxicity pesticides. Application of any liquid or dust formulation must only be done when the area is unoccupied. Guidelines for pest management in medical treatment facilities are found in AFPMB TG 20: *Pest Management Operations in Medical Treatment Facilities* (http://afpmb.org/sites/default/files/pubs/techguides/tg20.pdf).

4.2.3.2. Child Development Center

Children can be sensitive to pesticides and other chemicals. Parents are also concerned about potential hazards that their children may be exposed to and have a right to know about these hazards. Best practice is to minimize pesticide use in and around child development centers and schools, use only enclosed baits and low toxicity pesticides, do not apply pesticides when people are present, and inform staff and parents of any pesticides to be used on the property. IPM should be used to reduce the health risks of pesticides to children.

4.2.3.3. Food Service Areas

Food contaminated with pesticides can lead to pesticide poisoning. Sanitation and exclusion should be the primary means of preventing and reducing pest infestations. Pesticide use in food service areas should be limited to low-toxicity pesticides applied to cracks and crevices and baits. The area should be properly prepared for treatment by putting away utensils and equipment and covering food preparation services. After treatment the area should be thoroughly cleaned to prevent contamination.

4.2.4. Emergency Planning and Community Right-to-know Act (EPCRA)

Executive Order 12856 requires all Federal agencies, including the DOD, to comply with the provisions of EPCRA. EPCRA is intended to 1) encourage and support emergency planning between the installation and the surrounding community, 2) provide the community with information about potential chemical hazards stored and used on the installation, and 3) establish a framework for local and state emergency planning. Chemical lists and applicable EPCRA sections and threshold quantities are found in the EPA List of Lists, which can be searched at: http://yosemite.epa.gov/oswer/lol.nsf/homepage.

4.2.4.1. Section 302: Emergency Planning Notification

Some pesticide active ingredients are Extremely Hazardous Substances (EHSs), and storage of them over a threshold planning quantity requires the installation to submit a facilities profile form to the State's Emergency Response Commission (SERC) and/or a

Local Emergency Planning Committee (LEPC). However, typical pesticide storage does not incur an additional regulatory burden, because the installation stores other extremely hazardous substances that would require notification under this section.

4.2.4.2. Section 304: Emergency Release Notification

EHSs or CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) listed hazardous substances that are accidentally released at or above their reportable quantity **must be reported** to local, state and federal authorities. Pesticides applied in accordance with the pesticide label are exempt from this requirement. Pesticide spills are not exempt. The amount of pesticides stored, used and transported on the installation should be minimized to prevent accidental spills.

4.2.4.3. Section 311 and 312: Hazardous Chemical Inventory Reporting

This applies to OSHA hazardous chemicals which are any chemicals with an MSDS. Nearly all the pesticides used on the installation have MSDSs. This applies to pesticide storage and pesticides in spray tanks. Although it is unlikely that pesticide amounts in storage will exceed the threshold quantity at any given time, stored pesticides must be reported to the IPMC because reporting is cumulative.

4.2.4.4. Section 313: Toxic Chemical Release Reporting

40 CFR 372.38 (c)(2) exempts the use of toxic chemicals contained in products for routine janitorial and installations grounds maintenance. The routine maintenance exemption is intended to cover janitorial or other custodial maintenance and all other installation grounds maintenance activities using substances such as cleaning supplies, fertilizers, pesticides, fungicides, herbicides, rodenticides, and insecticides similar in type and concentrations to consumer products.

4.2.5. Specific State Laws:

Information specific to Virginia can be found at http://www.vdacs.virginia.gov/pesticides/index.shtml.

4.3. Pest Control Accidents

4.3.1. First Aid

First aid for pesticide accidents is included on the pesticide label. The applicator should be familiar with first aid procedures required for the pesticide they are using. A copy of the label must be available at the application site. For some pesticides, immediate first aid and medical treatment may be required.

4.3.2. Medical Emergencies

All pesticide applicators or persons responding to an injured applicator should call the installation's emergency number in the event of a medical emergency. The name, address, and telephone number of an emergency medical care facility should be posted in the commercial applicator's vehicle. For pesticide poisonings, a copy of the pesticide label should be given to the medical first responders or taken to the emergency medical facility. If cholinesterase-inhibiting pesticides (i.e. malathion) are used then the emergency room shall maintain the proper antidotes, atropine, and 2-pam chloride.

5. Environmental Considerations

5.1. Environmental Management System (EMS) for Pesticides

This IPMP puts pesticide management within the framework of the DOD and Navy EMS. This Plan provides the tools and products to include pesticide management in the installation's overall EMS program.

5.1.1. Department of Defense Policy

DOD policy states that "The Department of Defense shall integrate EMS into missions, activities, functions, contracts, and installation support agreements as a business practice for improving overall performance. EMS is a vital supporting component of the DOD mission and is therefore the responsibility of all DOD personnel. It is not just an environmental function responsibility, but requires active participation from all functions and organizations." The remainder of this policy and details on the EMS program are found in DODINST 4715.17 of 15 Apr 2009.

5.1.2. What is an EMS?

"Environmental Management System means a set of processes and practices that enable an organization to increase its operating efficiency, continually improve overall environmental performance and better manage and reduce its environmental impacts, including those environmental aspects related to energy and transportation functions. EMS implementation reflects accepted quality management principles based on the "Plan, Do, Check, Act," model found in the ISO 14001:2004(E) International Standard and using a standard process to identify and prioritize current activities, establish goals, implement plans to meet the goals, evaluate progress, and make improvements to ensure continual improvement." Council on Environmental Quality, "Instructions for Implementing Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management," March 29, 2007.

5.1.3. Conformance of the Pest Management Program to EMS

An EMS is comprised of five basic components. The components and how the pest management program conforms to these components are listed:

5.1.3.1. Policy

The installation has established an environmental policy to support "mission readiness through environmental stewardship". Pest management environmental objectives to meet this policy are:

- Reduce pesticide pollution that affects the installation's neighbors through the use of IPM to prevent adverse impact on air, water, and land resources.
- Use IPM to preserve aspects of the natural environment by managing and controlling invasive and nuisance pests and preventing pesticide pollution.
- Ensure and maintain the competence of pest management personnel through certification and training to ensure that effective operations and technologies are used to control pests that minimize waste, prevent air and water pollution, minimize health and safety risks, and dispose of waste safely and responsibly.
- Enable the IPMC to maintain effective oversight and coordination of the program and liaison with local agencies in order to ensure regulatory compliance.

5.1.3.2. Planning

This IPMP is the installations primary planning document. Specific planning items included in the IPMP are:

- Legal and other requirements are identified in Section 3.3, Appendix C, and listed throughout the plan.
- General objectives and targets are included in Section 1.3.2 and specific pest management objectives are included in the IPM project sheets in Appendix H.
- Environmental aspects of pesticide use and the pest management program are included in the Environmental Impact Log in Appendix I. Also included are personnel responsible for the practice, specific aspects of each pest management practice and the impacts on installation vulnerable assets are also identified for each practice.

5.1.3.3. Implementation

Implementation of the EMS is addressed in the following sections of the plan:

- Roles and responsibilities – Section 2.1
- Pest management personnel training and awareness – Section 2.4
- Program documentation includes record keeping, reporting and IPMP updates. These are addressed in Sections 2.3 and 1.1.5.
- Operational control is the responsibility of the pest management service providers. This is maintained through their contract or lease agreement. Operational requirements are found in Section 2.5. IPM is the operation used for reducing environmental impacts and supporting mission priorities. Safety considerations are in Chapter 4.

5.1.3.4. Checking and Corrective Action

The success of an EMS depends on the ability for an installation to assess and correct itself. The Internal Assessment Plan (IAP) provides the basis for a self-assessing and self-correcting system. The IAP inventory lists the practices and practice owners identified in the environmental impact log and creates a "checklist" for assessment. The IAP inventory for pest management is found in Appendix I. Additionally, a self-assessment checklist is included in Appendix D. Compliance is addressed in Section 3.3.2.

5.1.3.5. Management Review

The major claimant, Navy Installations Command (NIC), conducts periodic EMS reviews that will include the pest management program.

5.2. Environmental Considerations on the Pesticide Label

If the pesticide is potentially harmful to the environment, information will be provided in the following sections:

- Directions for Use: If pesticide drift is a potential environmental hazard, then the directions may require certain application equipment and/or the addition of an anti-drift agent to the tank mix.
- Environmental Hazards: This section may indicate the pesticide is particularly hazardous to specific animals (i.e. bees, fish). It will also provide information on how to avoid environmental damage.

5.3. Managing Environmental Impact

Many procedures to reduce the impact of pest management practices on vulnerable assets are already in place. Many of these are contained within existing NSA HR Portsmouth Annex environmental management plans.

5.3.1. Pesticide Pollution

5.3.1.1. Synthetic Pyrethroids

Pyrethroids are insecticides that are widely used for household, garden and agricultural pest control. Most were replacements for the more toxic and environmentally-hazardous organophosphate and carbamate insecticides. Recent State—wide surveys have indicated that some pyrethroids are being found in urban stream sediment and at least one chemical

has been shown to be toxic to sediment dwelling organisms. The specific pyrethroids of concern are:

- Bifenthrin (i.e. Talstar®)
- Cyfluthrin (i.e. Cykick®, Tempo®)
- Beta-Cyfluthrin (i.e. Tempo Ultra®)
- Cypermethrin (i.e. Demon®, Cynoff®)
- Deltamethrin (i.e. Deltadust®)
- Lambda-Cyhalothrin (i.e. Demand®)
- Permethrin (i.e. Permanone®)
- Tralomethrin

Outdoor operations pose the greatest risk for pyrethroid contamination of surface water and stormwater runoff. Increased risk operations that may use pyrethroids include landscape plant insect control, agricultural insect control, and uniform repellent treatment.

5.3.1.2. Bee Protection from Pesticides

Bees are an important resource as they provide crop and natural plant pollination. Certain classes of insecticides are highly toxic to bees. These are organophosphates, carbamates, and neonicotinoids (i.e. imidacloprid). The greatest risk for bee poisoning is application of these insecticides for ornamental plants and agricultural crops. Insecticide labels include specific precautions to protect bees. These include timing applications when plants aren't blooming, bees aren't foraging, and at night when bees aren't active. The label will also include a residual toxicity (RT) time that is the time after application until there is minimal toxic effect on bees.

5.3.1.3. Pollution Prevention

A pesticide is unique as a potential environmental pollutant. When it is applied properly for the correct target pest and to the target location, it is not considered a pollutant. When a pesticide is applied or it drifts outside of the target area, then it becomes a pollutant. Pollution can occur during most pest management practices as the result of accidental spills, air and water emissions, and container disposal. Pollutants can be in the form of pesticide residues from equipment and container cleaning or as waste containers. The following pollution prevention best practices should be used on the installation:

- Conduct surveillance first to determine the need for pesticide use.
- Apply pesticides and clean equipment away from storm drains to prevent storm water contamination.
- Do not pour pesticide container rinsate into drains. Apply rinsate to a site listed on the pesticide label, store rinsate to use for future pesticide mixing, or dispose of according to local regulations.
- Use less-toxic and target-specific pesticides.
- When applying Permethrin repellent to uniforms outdoors: Do not mix or apply near storm drains or where water run-off will result in storm water contamination; Avoid overspray of pesticide onto the ground; and apply spray tank rinsate to uniforms.
- Minimize outdoor applications of pyrethroids.
- Use spot spraying and crack and crevice applications rather than broadcast or baseboard spraying.
- Minimize pesticide storage on the installation through proper inventory management and not allowing contractors to store pesticides on the installation.
- Use rodent traps rather than rodenticides.

5.3.2. Natural Resource Protection

Natural resources on NSA HR Portsmouth Annex have the potential to be impacted by pest management operations or have an impact on these operations. These operations include, but are not limited to, surveys, trapping, weeding, biological control, and pesticide use.

5.3.2.1. Environmentally Sensitive Areas

No individuals of federally listed threatened or endangered species of plant or animal are known to be found on the installation. However, these negative results do not mean that individuals of a threatened or endangered species are not present or will not be found at some time in the future. Habitat suitable for several species is present on the installation, which leaves open the possibility of a population of one of these species being found. The current management plans call for continued surveys for threatened or endangered species on a regular basis, and to protect the habitat necessary for any threatened or endangered species that may be found during a biological survey.

5.3.2.2. Invasive Species Prevention

Invasive species can cause damage to native habitats and introduce diseases to native plants and animals. All military vehicles and materials that have been in contact with foreign soil and returning from foreign locations including Hawaii are required to be cleaned by the deployed unit and inspected by U.S. Department of Agriculture Plant Pest Quarantine Officers prior to disembarkation on U.S. soil per SECNAVINST 6210.2A, Quarantine Regulations of the Armed Forces. The purpose of these inspections is to prevent the introduction of disease causing organisms and plant pests. Although the inspections are generally thorough, the equipment of recently redeployed units should be monitored to ensure that any introduced pests are destroyed properly. Any pests found on this equipment should be reported to the Environmental Department.

5.3.3. National Pollutant Discharge Elimination System (NPDES)

Water pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The permit is available to operators who discharge to waters of the U.S. from the application of (1) biological pesticides or (2) chemical pesticides that leave a residue when application is for one of four use patterns:

- Mosquito and other flying insect control
- Aquatic weed control
- Aquatic Nuisance Animal Control
- Forest Canopy Pest Control

If pesticide applications for the above use patterns are expected to exceed thresholds, a Notice of Intent (NOI) and preparation of a Pesticide Discharge Management Plan (PDMP) (PDMP template included in Appendix I) may be required. Practicing integrated pest management, recordkeeping, and monitoring are also requirements under the NPDES permits. The Virginia General Permit to Discharge Pesticides in Water is included in Appendix I. The Hampton Roads Regional Pesticide Discharge Management Plan, which covers mosquito control and aquatic weed control use patterns for all of the Hampton Roads Navy Installations, is also included in Appendix I.

5.3.4. Spill Prevention and Management

Installation spill prevention guidelines shall be followed. The following spill prevention actions shall be taken:

- Spill kits shall be readily accessible in all pest management vehicles, mixing sites and pesticide storage facilities.
- Pesticides shall only be stored in an area with containment to hold a spill and without a floor drain.
- Portable mixing pads shall be used when appropriate.
- All pesticide applicators shall be familiar with the installation spill contingency plan (included in Appendix I, if available).

All pesticide applicators are trained on spill response procedures as part of their initial pest management certification/licensing training. Spills will be managed as described in the installation spill contingency plan. Further information on preventing and controlling pesticide spills is contained in the AFPMB TG #15: *Pesticide Spill Prevention and Management* (http://www.afpmb.org/sites/default/files/pubs/techguides/tg15.pdf).

5.3.5. Hazardous Materials and Hazardous Waste Management

Pesticides, being hazardous materials, shall be managed in accordance with the installation's Hazardous Material Management Plan. Proper inventory management and planning will prevent waste generation. The appropriate use of pesticides produces very little hazardous waste. Rinse water containing pesticide residues usually has very small quantities of chemical and is often applied to the target pest site. Not permitting contractor storage of pesticides and on-site disposal of pesticide waste eliminates hazardous material and waste management. In general, pesticides that are not applied must be disposed of as hazardous waste. Large quantities of hazardous waste may be produced when a pesticide is not used by its expiration date. It may also be produced if a pesticide is not used up before the registration for that pesticide is cancelled and the stop-use date has occurred. These pesticides may be disposed of as Universal Waste only when allowed by the Standards for Universal Waste Management found in 40 CFR Part 273 and when approved by Environmental. Any excess pesticides or absorbent material used for spill clean-up requiring disposal requires evaluation by the Hazardous Waste Coordinator in the Environmental Department to ensure proper disposition.

6. Emergency Pest Management

6.1. Public Health Emergencies

Pests become a public health emergency when the pests increase in number and/or are found to carry human disease pathogens. A public health emergency, or potential emergency, requiring pest management action, may be indicated in several ways:

6.1.1. Natural or Manmade Disaster

Usually pest problems do not develop immediately after a disaster, such as earthquakes, wildfires, floods, vehicle accidents and terrorist attacks. Public health pest problems may be the result of increased amounts of refuse, collapse of local infrastructure (i.e. lack of garbage pick-up), decaying human and animal bodies, and accumulation of standing water. The potential pest related consequences are vector-borne or zoonotic disease outbreaks and increased contact with rodents and feral animals that may cause injury.

6.1.2. Vector-borne or Zoonotic Disease

- Reports of human cases – Many human cases of vector-borne and zoonotic disease identified in local medical facilities are reportable to the local and/or State health agencies. A report of a human case of West Nile Virus (WNV) or other disease may initiate an investigation and result in alerts going out to other hospitals and clinics if it appears that the case was locally acquired. Immediate vector control may be necessary to prevent further transmission.
- Detection of infected mosquitoes or sentinel animals – Routine surveillance for mosquito-borne diseases are conducted by local and State health agencies. These agencies report testing results through the public health system. This surveillance program is an early warning system that indicates when vector control should be initiated or increased to prevent human disease.
- USGS Disease Maps, http://diseasemaps.usgs.gov/, provide mosquito-borne disease information by state.

6.1.3. Animal Attack

Africanized Honey Bees (AHB) are of specific concern due to their aggressive defensive behavior. The local fire department is usually the primary responder to bee sting incidents. Fire department personnel have been trained to protect and manage bee sting victims. A stinging incident is not considered a pest control response issue, but rather, an emergency response and any and all appropriate bee control measures can be used. If fire department response is delayed installation first responders should be trained how to protect themselves and victims from bee stings.

6.2. Agricultural Emergencies

Agricultural emergencies are the result of the introduction of insects or other animals that can cause extensive damage to agriculture or forestry in the State. Examples of introduced agricultural pests include the Mexican fruit fly and gypsy moth. Military installations can be a conduit for the introduction of these pests due to the movement of military equipment and personnel in and out of the State and the Country. The military's role in preventing introduction of these pests is described in SECNAVINST 6210.2A: Quarantine Regulations of the Armed Forces. Inspections to prevent importation of pests are normally conducted at the port of debarkation in the foreign country.

6.3. Emergency Pest Management Resources

Installation PMSPs maintain pesticides and equipment to manage most emergencies. Contract PMSPs can be used for emergencies if it is written in the contract specifications. The Naval Branch Health Clinic should develop an Emergency Disease Vector Control Plan (EDVCP) to manage public health emergencies (included in Appendix J, if available). It includes additional Navy and local government contingency vector surveillance and control resources.

7. Program Resources

NSA HR Portsmouth Annex has access to the following support agencies and organizations for pest management assistance. Contact information is located in Appendix L.

7.1. NAVFAC Atlantic Applied Biology, Code EV51, Norfolk, VA

NAVFAC Atlantic Applied Biology is currently staffed by six full time civilian DOD Professional Pest Management Consultants certified in DOD pesticide applicator categories 3,5,6,7,8 and 11. These personnel are assigned the following responsibilities:

- Review and approve the IPMP in accordance with DOD and Navy policy;
- Provide technical assistance to the installation IPMC, environmental manager, safety officer, medical officer and other regional and installation personnel regarding pest management and pesticide regulatory compliance;
- Review and approve or reject pesticides and equipment to be used on the installation;
- Conduct on-site program reviews and environmental compliance program external assessments (EA) to ensure compliance with the regulations and the IPMP;
- Compile and report actual pesticide use and pest management operations to appropriate DOD agencies;
- Provide IPM recommendations and pest identification;
- Assist installations with writing or re-writing IPMPs; and
- Provide recertification training for DOD certified applicators as well as initial and recertification training for PMPARs/IPMCs.

Website: https://portal.navfac.navy.mil/portal/page/portal/ev/applied_biology (This is on the NAVFAC intranet and is only available to NAVFAC, CNIC and USMC personnel who have an account. Personnel may individually request an account.)

7.2. Navy Environmental and Preventive Medicine Unit TWO (NEPMU-2), Norfolk, VA

NEPMU-2 is staffed by three full-time active duty Navy entomologists. The entomologists are certified in DOD pesticide applicator categories 3,5,6,7,8 and 11 and are assigned the following responsibilities:

- Act as Navy Medicine (BUMED) Professional Pest Management Consultants to provide BUMED review of IPMP and Emergency Disease Vector Control Plan;
- Provide initial and recertification training in categories 7&8 for Preventive Medicine Technicians;
- Provide technical assistance on the surveillance and control of vectors on the installation;
- Provide vector-borne disease risk assessments and disease prevention recommendations when requested;
- Provide disease vector management consultation and identification services; and
- Provide contingency pest management in the event of a disaster or disease outbreak.

Website: (http://www.med.navy.mil/sites/nepmu2/Pages/default.aspx).

7.3. Navy Entomology Center of Excellence (NECE), Jacksonville, FL

NECE is staffed by full-time active duty Navy entomologists. The entomologists are certified in DOD pesticide applicator categories 3,5,6,7,8 and 11 and are assigned the following responsibilities:

- Act as Navy Medicine (BUMED) Professional Pest Management Consultants to provide BUMED review and approval of IPMP;
- Provide initial training for DOD certified pesticide applicators;
- Provide technical assistance on the surveillance and control of vectors on the installation;
- Provide vector-borne disease risk assessments and disease prevention recommendations when requested;
- Provide disease vector management consultation and identification services; and
- Provide contingency pest management in the event of a disaster or disease outbreak.

Website: (http://www.nmcphc.med.navy.mil/field_activities/nece_overview.aspx).

7.4. Virginia Department of Agriculture and Consumer Services

Personnel from the Office of Pesticide Services in this department are the pesticide regulatory officials for the State of Virginia. Pesticide enforcement personnel can provide information regarding State and local pesticide regulations. Website: http://www.vdacs.virginia.gov/pesticides.

7.5. Virginia Cooperative Extension Service

Virginia Cooperative Extension responds to the needs of individuals and organizations in the State of Virginia by providing information and guidance in the areas of agriculture, natural resources, and consumer sciences. Website: http://www.ext.vt.edu/.

INTEGRATED PEST MANAGEMENT PLAN

NAVAL SUPPORT ACTVITY HAMPTON ROADS

VIRGINIA

JULY 2017

PREPARED BY

NAVFAC
Naval Facilities Engineering Command
NAVFAC ATLANTIC

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NSA Hampton Roads Integrated Pest Management Plan
Approval and Implementation

Prepared by:

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Technical and Administrative Approval:
Approved and signed in accordance with DODI 4150.07

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Public Works Officer

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Preventive Medicine Department
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Approved for Implementation:

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CAPT Jack Freeman Date
Commanding Officer

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NSA Hampton Roads Integrated Pest Management Plan
Technical Review

The Integrated Pest Management Plan has been reviewed in accordance with DODI 4150.07.

_____ Date: _____

Ms. Sabra Scheffel
Applied Biology Branch Manager
Naval Facilities Engineering Command, Atlantic
Norfolk, VA

_____ Date: _____

LT Matthew Yans
Entomologist
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Norfolk, VA

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Integrated Pest Management Plan Annual Review

Year	Completion Date	Integrated Pest Management Coordinator	Copies of changes to the Pest Management Consultant (Annual) Date Completed
18			
19			
20			
21			
22	Rewrite		

Scheduled On-Site Pest Management Technical Review

Scheduled Date	Integrated Pest Management Coordinator	Pest Management Consultant Date Review Completed

Note: Technical Reviews should be scheduled approximately 3 years apart and in conjunction with an EMS review if possible.

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Additional Source Documents

(included on CD provided with this plan)

Integrated Natural Resources Management Plan, Naval Support Activity Hampton Roads Northwest Annex, June 2016.

Emergency Disease Vector Control Plan for the Hampton Roads Region, November 2013.

Online Pesticide Reporting Tutorial.

Multiple information sheets, California Environmental Protection Agency, Department of Pesticide Regulation.

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National Pesticide Applicator Certification Core Manual, Environmental Protection Agency.

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Field Guide to Venomous and Medically Important Vertebrates Affecting Military Operations: Identification, Biology, Symptoms, Treatment. United States Air Force Institute for Operational Health, July 2006.

DD 1070 Termite and Wood Decay Inspection Form.

Prevention and Control of Wildlife Damage, University of Nebraska Cooperative Extension, 1994.

AVMA Guidelines on Euthanasia, American Veterinary Medical Association, June 2007.

National Park Service Rodent-Exclusion Manual, National Park Service Public Health Program, March 2005.

Turfgrass Pest Management Manual: a Guide to Major Turfgrass Pests & Turfgrasses. North Carolina State University, North Carolina Cooperative Extension Service.

Under Siege: Invasive Species on Military Bases, National Wildlife Federation, October 2005.

National Invasive Species Management Plan, 2008-2012. The National Invasive Species Council, August 2008.

Weed Control Methods Handbook: Tools & Techniques for Use in Natural Areas. The Nature Conservancy, April 2001.

United States Air Force Guide to Operational Surveillance of Medically Important Vectors and Pests, August 2006.

Recognition and Management of Pesticide Poisonings, U.S. Environmental Protection Agency, 1999.

Public Health Pest Control Manual, University of Florida and the American Mosquito Control Association.

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EXECUTIVE SUMMARY

This Integrated Pest Management Plan is a comprehensive, long-range document that captures all of the pest management operations and pesticide-related activities conducted on the installation. It incorporates pest management practices and the local, State, federal, and Department of Defense regulations, and conforms to the requirements of Department of Defense Instruction 4150.07, DOD Pest Management Program, and Chief of Naval Operations Instruction 6250.4C, Navy Pest Management Programs. It supplies comprehensive information about the pest management program to installation staff and internal and external compliance auditors.

The Naval Facilities Engineering Command, Atlantic's Applied Biology Center prepared this plan using information obtained through pest management data collection, on-site observations, installation personnel interviews, and document reviews.

The main goal of the various pest control functions is to support the mission of NSA Hampton Roads. Commercial contract pest control operators currently provide the majority of the pest control services at the Northwest Annex, and in-house pest control operators provide pest control to other areas of the installation and at Sewell's Point golf course. Pest control services are needed on the installation in order to:

1. Provide services that will prolong the life of the structures through subterranean termite and nuisance pest control

2. Maintain the safety and security of industrial and storage areas through weed control

3. Provide nuisance pest control to all buildings (except public-private venture housing) and outdoor areas to ensure a good working and living environment

4. Control weed and insect pests in all recreational and lawn areas to maintain aesthetics and provide recreational facilities to personnel

5. Provide control of mosquitoes, flies, and other potential disease vectors to ensure the comfort and well-being of all personnel

6. Provide vertebrate pest control, including rodent control, to all areas of the installation.

For the current level of work to be accomplished, a sufficient staff of qualified applicators must be maintained. Contract personnel must meet Virginia certification requirements as specified by the contract. Pest management performance assessment representatives must successfully take an initial pest management performance assessment representatives course. To maintain their certification, the pest management performance assessment representatives and Department of Defense pesticide applicators must successfully pass a Department of Defense pest management training and recertification course every three years. Pest control facilities must comply with current safety standards to provide a safe workplace and to minimize pesticide hazards.

This plan focuses on safe, environmentally-sound, and cost-effective control of pests through integrated pest management. Integrated pest management depends on education, proper surveillance, and identification of pests, non-chemical and chemical control methods, and individual responsibility for pest prevention.

CHAPTER 1

Introduction

1.1 INTEGRATED PEST MANAGEMENT PLAN

The Integrated Pest Management Plan (IPMP) is a long-range, comprehensive planning and operational document that establishes the strategy and methods for conducting a safe, effective, and environmentally-sound Integrated Pest Management (IPM) program. The IPMP covers all pest management and pesticide-related activities conducted by civilian and military Department of Defense (DOD) personnel and commercial contractors within all functional areas of the installation.

1.1.1 Authority

Department of Defense Instruction (DODI) 4150.07, DOD Pest Management Program; Chief of Naval Operations Instruction (OPNAVINST) 6250.4C, Navy Pest Management Programs; and Chief of Naval Operations Manual (OPNAV M) 5090.1, Environmental Readiness Program Manual, Chapter 24—Pesticide Compliance Ashore, require that all Navy installations develop and implement an IPMP in accordance to the guidelines. The IPMP will detail all aspects of pesticide management including administration, procurement, contract services, storage, disposal, safety, reporting, vehicles, integrated pest management, and applicable laws and regulations.

1.1.2 Department of Defense Measures of Merit

This plan provides the framework for the installation to meet the DOD's annual goals or measures of merit (MoMs). As established in DODI 4150.07, and updated by the Armed Forces Pest Management Board, the MoMs are:

1. Measure of Merit 1: All DOD installations will maintain installation Pest Management Plans that have been reviewed and approved by a DOD-certified Pest Management Consultant and annually updated by the installation pest management coordinator.

   NSA Hampton Roads helps meet this goal by implementing (via the commanding officer's signature) this plan.

2. Measure of Merit 2: All DOD installations will adhere to the principals of integrated pest management and the DOD will maintain the goal of minimizing annual pesticide use by both government and contractor pesticide applicators on its installations. This goal is set at 425,000 lbs of active ingredient, the DOD's average annual usage for Fiscal Years 2007–2009 and an overall 52 percent reduction from the original fiscal year 1993 baseline.

   NSA Hampton Roads provides data for this MoM through the reporting requirement (section 2.3).

3. Measure of Merit 3: All DOD pesticide applicators will be certified. All contracted employees shall have appropriate State or host-nation pesticide applicator certification in the appropriate categories at the time the contract is let.

   NSA Hampton Roads ensures proper certification of all applicators through regular verifications and maintains a list of certifications in appendix E of this plan. See section 2.4 for training and certification requirements.

1.1.3 Integrated Pest Management Plan Implementation

The IPMP must be reviewed and approved by installation stakeholders and professional pest management consultants (PPMCs) from Naval Facilities Engineering Command (NAVFAC), Atlantic and the Bureau of Medicine and Surgery (BUMED). The IPMP is implemented upon signature of the installation's commanding officer. The integrated pest management coordinator (IPMC) has the task of implementing, coordinating, and executing the IPMP among each of the functional areas of the installation.

1.1.4 Integrated Pest Management Plan Maintenance

Once the IPMP has been developed and implemented, it must be reviewed annually and updated as necessary. The installation IPMC is responsible for maintaining the IPMP.

1.1.4.1 Internal Review

The IPMC shall conduct an internal review annually in coordination with the pest management service providers (PMSPs) and other functional area points of contact (POCs). The review should include updating contract information, applicator certifications, pesticides, and pest management operations to be used on the installation, as well as, updating pesticide use records. The pest management program self-assessment checklist (appendix C) is available as a tool to review compliance issues during the internal review.

1.1.4.2 Off-Site Review

The IPMC may request that a NAVFAC Atlantic Applied Biology PPMC perform a review of regulatory requirements, reporting, and pesticide approval procedures.

1.1.4.3 On-Site Review

The NAVFAC Atlantic Applied Biology PPMC shall perform an on-site review of the entire pest management program every three years to ensure compliance with the IPMP. The review may be performed more frequently if extensive program problems exist.

1.1.4.4 Integrated Pest Management Plan Rewrite

The IPMP should be rewritten every five years to reflect new contracts, personnel, pest management practices, and regulatory changes.

1.2 INSTALLATION BACKGROUND

NSA Hampton Roads has the largest concentration of fleet headquarters administrative and communication facilities outside of Washington, D.C. More than 6,000 personnel work at the installation, including major tenant commands.

1.2.1 Mission

NSA Hampton Roads is committed to providing effective and efficient world-class support to our customers to enable our fighters and support our families. Major tenant commands include: U.S. Fleet Forces Command, Joint Staff Hampton Roads, U.S. Marine Corps Forces Command, Naval Submarine Forces, Atlantic, Naval Reserve Forces Command, and Naval Medical Center Portsmouth.

Northwest Annex provides a wide array of support services for 11 tenant commands, comprising United States Coast Guard and Department of Homeland Security operational units, United States Navy and United States Marine Corps Anti-Terrorism/Force Protection training commands, and United States Navy, United States Coast Guard and NATO strategic communication activities. Northwest Annex maintains and operates the largest small-arms range facilities in Commander, Navy Region Mid-Atlantic.

1.2.2 Location and Facilities

NSA Hampton Roads is primarily located in three separate areas. The headquarters and several tenants are located off Terminal Blvd. in Norfolk, Virginia. The Northwest Annex is located off Ballahack Road in Chesapeake, Virginia and borders North Carolina. Northwest Annex is composed of approximately 3,600 acres, of which 2,300 are forested. The Portsmouth Annex, which is covered under a separate IPMP, is located in the city of Portsmouth, Virginia on the Elizabeth River.

1.3 PEST MANAGEMENT PROGRAM OVERVIEW

The pest management program is summarized below.

1) NAVFAC Mid-Atlantic Environmental Services provides general pest control services at the Norfolk locations of NSA Hampton Roads, including larval and adult mosquito control.

2) Didlake, Inc. performs grounds maintenance at the Norfolk locations of NSA Hampton Roads.

3) Hampton Roads Termite & Pest Control, Inc., a subcontractor under Global Management Services, LLC., provides general pest control services at Northwest Annex under the Base Operating System (BOS) contract. This includes larval and adult mosquito control.

4) NAVFAC Mid-Atlantic Environmental Services provides termite and fire ant control at the Northwest Annex.

5) J & J Maintenance, Inc., a subcontractor under Global Management Services, LLC., performs grounds maintenance at Northwest Annex under the Base Operating System (BOS) contract.

6) Raytheon, Inc. provides vegetation control along the antenna array at Northwest Annex.

7) One DOD-certified in-house applicator maintains the Marine Corps Security Forces Training Company firing ranges at Northwest Annex.

8) One DOD-certified and two state certified in-house applicators maintain the MWR Sewell's Point golf course.

9) The NEX food court vendors (staff college area) contract pest control with several vendors separately from the base contract.

10) Public-private venture housing (Lincoln Military Housing) at the Northwest Annex contracts pest control services with Hampton Roads Termite & Pest Control, Inc.

11) The Marine Corps Exchange (MCX) in Norfolk sells a selection of retail pesticides.

12) Branch Health Clinic Naval Station Norfolk preventive medicine department performs food service sanitation and facilities habitability inspections, and oversees programs to prevent vector-borne and other infectious diseases at the Norfolk facilities of NSA Hampton Roads.

13) Naval Medical Center Portsmouth preventive medicine department performs food service sanitation and facilities habitability inspections, and oversees programs to prevent vector-borne and other infectious diseases at the Northwest Annex.

1.3.1 Pest Management Objectives

The objectives of the installation's pest management program are:

1. The prevention of pest-related health and safety problems that affect the mission.

   Examples of health-related pests that may affect the mission include, but are not limited to mosquitoes, fire ants, and stinging insects. Any pest may impact the mission when its numbers become excessive. Prevention of pest-borne disease and injury is a component of force health protection. Force health protection seeks to maintain a healthy and fit military and civilian force in order to maintain the highest levels of readiness. Pest management is a force multiplier for construction battalions, maintenance commands, and other deployable units. Additionally, the military and civilian infrastructure on the installation must be protected in order to provide the necessary support to these units as well.

2. The prevention of pest damage to equipment and subsistence used to support the operational mission of the activities and tenant commands.

   Equipment and materials are susceptible to physical damage by pests and the financial costs of such damage can be high. Rodents, for example, can cause considerable damage to electronic equipment through gnawing on electrical components. Examples of pests that may damage equipment and subsistence include, but are not limited to rodents, wood-destroying pests, and stored-product pests.

3. Vegetation management to protect the local environment.

   The introduction of non-native/invasive species of plants can increase the risk of fire and degrade the surrounding native environment that is home to a number of endangered and threatened animal and plant species.

4. The protection of government real property, materiel, and aesthetics.

   Buildings and roads that form the infrastructure of the installation are susceptible to pests. If not adequately prevented and controlled, termites can cause extensive damage to wood structures. Weeds can cause damage to roadways and increase the risk of fire.

5. The reduction of the use of and dependence on pesticides.

1.3.2 Program Requirements

1.3.2.1 Administration

Proper administration of the pest management program ensures accountability and documentation through planning, record keeping, reporting, training, pesticide and contract approval, and regulatory compliance. Table 1-1 outlines the pest management administrative program requirements.

Requirement	Description	Reference	Responsibility	Locator
PLANNING	Review and revise the Integrated Pest Management Plan annually.	• OPNAVINST 6250.4C • DODI 4150.07	• IPMC	Section 1.2
RECORDING	Record all pest management operations conducted on the installation after each operation.	• OPNAVINST 6250.4C • DODI 4150.07 • 7 C.F.R.§110*	• All pesticide applicators	Section 2.3.1
MAINTAINING	Maintain records of all pest management operations conducted on installation on-site indefinitely.	• OPNAVINST 6250.4C • DODI 4150.07 • 7 C.F.R.§110*	• IPMC in coordination with PMPARs	Section 2.3.2
REPORTING	Compile and report all pest management operations to NAVFAC Atlantic Applied Biology monthly.	• OPNAVINST 6250.4C • DODI 4150.07 • 7 C.F.R.§110*	• IPMC in coordination with PMPARs	Section 2.3.3
PESTICIDE APPLICATOR CERTIFICATION	Ensure that all personnel applying pesticides on installations have current DOD pesticide applicator certification if in-house or State commercial applicator certification if contracted.	• OPNAVINST 6250.4C • DODI 4150.07 • 40 C.F.R.§171*	• IPMC in coordination with PMPARs	Section 2.4
COMPLIANCE	Ensure that all program elements are in compliance with all federal regulations. Navy policy is to comply with local/State regulations.	• OPNAVINST 6250.4C • DODI 4150.07	• IPMC in coordination with PMPARs	Section 3.3
PESTICIDE APPROVAL	Compile and submit list of new pesticides to NAVFAC Atlantic Applied Biology for	• OPNAVINST 6250.4C • DODI 4150.07	• IPMC in coordination with PMPARs	Section 2.2

	approval for use on the installation.			
CONTRACT REVIEW	Review pest management contract specifications for compliance with the Integrated Pest Management Plan and submit to NAVFAC Atlantic Applied Biology for final review and approval prior to advertising.	• OPNAVINST 6250.4C • DODI 4150.07	• Facilities Support Contracting personnel • PMPARs	Section 2.5
• * (applies to restricted-use pesticides only)				

Table 1-1. Pest management administrative program requirements.

1.3.2.2 Operations

Operations are the day-to-day management of pests through pesticides and non-chemical means. Pest management on the installation includes the following categories of operations:

1. Ornamental and turf—Control and management of pests of landscape plants and turf including arthropods, fungi, and weeds.

2. Right-of-way—Control and management of vegetation along roadways as well as vegetation control near fuel farms to reduce fire risk and along fence lines to enhance security.

3. Aquatic Weed Control—Control of vegetation in ponds and ditches.

4. Industrial, Institutional, Structural, and Health-Related—Control and management of pests in and around buildings. Pests may include cockroaches, termites, bees, venomous animals, stored product insects, rodents, and feral animals.

5. Public Health—Control and management of human and animal disease vectors such as rodents, mosquitoes, flies, ticks, and fleas.

6. Nuisance Pest Control—Control of insect pests that are a nuisance or annoyance to base personnel, but do not present a health risk.

7. Invasive weeds—Removal of non-native species of plants that are detrimental to native plant and animal habitats.

8. Vertebrate Control—Control of animal predators that prey upon endangered or threatened animals and their habitats, or infest food and material storage.

Each of these operations must meet various requirements that are listed and described in table 1-2.

Requirement	Description	Reference	Responsibility	Locator
INTEGRATED PEST MANAGEMENT	"Federal agencies shall use Integrated Pest Management techniques in carrying out pest management activities and shall promote Integrated Pest Management through procurement and regulatory policies, and other activities."	• 7 U.S.C. § 136r-1	• IPMC • Pesticide applicators	Section 3.1.1
STORAGE	Pesticides kept on installations must be procured and stored in accordance with installation and federal regulations. Navy policy is to comply with local/State regulations.	• OPNAVINST 6250.4C • AFPMB TG 17 • 29 C.F.R.§1910 • 40 C.F.R.§165	• Pest control shop supervisor	Section 3.4.3
CONTAINERS	All containers used to store or transport a pesticide must have the original or copy of the original label attached. Service containers must have attached label identifying: the person responsible for the container, the name of chemical, and the signal word.	• OPNAVINST 6250.4C • DODI 4150.07 • 40 C.F.R.§156	• Pesticide applicators	Section 3.4.5.1
VEHICLES	Must carry pesticide spill kits and properly secure pesticides and pesticide application equipment when not in use.	• OPNAVINST 6250.4C	• Pesticide applicators • Vehicle operators	Section 3.4.3.3

APPLICATION	Only registered pesticides will be used. Applicators must apply pesticides in a manner that ensures safety and protects the environment. A copy of the pesticide label shall be available at the application site.	• OPNAVINST 6250.4C • DODI 4150.07 • 40 C.F.R.§166	• Pesticide applicators	Section 3.4.5
APPLICATOR SAFETY	The installation must provide procedures, medical support, equipment, and supplies to ensure the safety of DOD pesticide applicators during pest control operations.	• OPNAVINST 6250.4C • 29 C.F.R.§1910	• Naval Branch Health Clinic • Safety Department	Section 4.1
OCCUPATIONAL HAZARDS MONITORING	Workplace monitoring shall be conducted by the medical department to ensure a safe and healthful environment for pest management personnel.	• OPNAVINST 6250.4C • OPNAVINST 5100.23G	• Naval Branch Health Clinic	Section 4.1.2.9
CLEANING AND DISPOSAL	Equipment shall be cleaned to prevent health and environmental hazards due to chemical residues. Prevent water from container and equipment rinsing from entering storm drains and water bodies. Dispose of empty containers properly. Manage and dispose hazardous waste	• OPNAVINST 6250.4C • 40 C.F.R.§165 • 40 C.F.R.§260-273	• Pesticide applicators	Section 3.4.6

	and non-hazardous waste properly.			
SPILL PREVENTION	Spill kits should be maintained in pest control shops and on pest control vehicles. Pest management personnel should be familiar with the installation spill contingency plan.	• OPNAVINST 6250.4C • 40 C.F.R.§300	• Pesticide applicators	Section 5.3.4

Table 1-2. Pest management operations program requirements.

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CHAPTER 2

Program Administration

2.1 ROLES AND RESPONSIBILITIES

The success of the pest management program depends largely on a clear understanding of the roles and responsibilities for the organizations and personnel involved. The following is a listing of the key organizations and personnel and their duties as presented in DOD guidance documents for the implementation of the IPMP.

2.1.1 Commander, Navy Installations Command

The CNIC is responsible for the funding and prioritizing of the pest management program.

2.1.2 Installation Commanding Officer

The installation commanding officer (CO) is responsible for the compliance and enforcement of the pest management program. The installation commanding officer delegates compliance and enforcement of the pest management program to the IPMC via the IPMC designation letter. Responsibilities of the installation CO include:

1. Budgeting for IPMPs, training, operations, and facilities in compliance with legal and DOD requirements.

2. Designating an integrated pest management coordinator in writing

3. Implementing and supporting the IPMP

4. Ensuring all pest management operations are conducted safely and have minimal impact on the environment

5. Ensuring an IPM program, minimizing the use of pesticides, is implemented

6. Ensuring the installation's IPM plan and program are in compliance with all applicable federal, State, and local laws as well as DOD regulations.

2.1.3 Integrated Pest Management Coordinator

The IPMC is designated by the installation CO in writing as the advisor to the installation CO and coordinator of all installation pest management activities. The IPMC designation letter is in appendix E. Responsibilities of the IPMC include:

1. Coordinating the installation's pest management program including implementation, maintenance, and annual update of the IPMP

2. Coordinating the rewrite of the IPMP every 5 years

3. Promoting integrated pest management (IPM) in the pest management program to cost-effectively and safely manage pests and to prevent adverse environmental impact

4. Coordinating reporting of all pest management operations on the installation to NAVFAC Atlantic Applied Biology

5. Ensuring current certification and continuing pest management training of pesticide applicators and pest management performance assessment representatives (PMPARs)

6. Receiving and compiling lists of new pesticides and uses from all PMSPs on the installation and submitting them to NAVFAC Atlantic Applied Biology for review and approval

7. Maintaining current list of approved pesticides

8. Acting as liaison between installation and Applied Biology and local, State, and federal agencies for pest management and pesticide regulatory issues

9. Ensuring the installation contracting officers submit pest management contract specifications to the Applied Biology PPMC for review prior to advertising.

2.1.4 Environmental Division

The installation environmental division provides oversight on environmental protection and compliance regarding pest management operations. Responsibilities of the department include:

1. Reviewing and approving new pesticides and pest management operations that may adversely impact the environment

2. Conducting internal compliance assessments of the pesticide and pest management program

3. Providing technical review of the IPMP.

As part of the environmental division, the natural resources manager is responsible for managing natural resources at the installation. In this capacity, the manager may be responsible for conducting or contracting some pest management operations (e.g., invasive species management). The role of the natural resources section is further described in the Integrated Natural Resources Management Plan (INRMP) for Northwest Annex. The other areas of NSA Hampton Roads are not covered under an INRMP, however the installation instruction will be modified to address invasive species management and protection of threatened and endangered species as needed. Responsibilities of the natural resources manager include:

1. Providing information on protected species, endangered or threatened species, noxious or invasive species, and environmentally-sensitive sites

2. Providing guidance on the management of nuisance wildlife.

The cultural resources manager is responsible for managing cultural resources at the installation, including properties that are officially listed in or eligible for inclusion in the National Register of Historic Places. In this capacity, the manager may be responsible for approving pest control in and around

these areas. The cultural resources are further described in the installation's Integrated Cultural Resources Management Plan (ICRMP).

2.1.5 Facilities Engineering and Acquisition Division

The Facilities Engineering and Acquisition Division (FEAD) prepares, manages, and assesses pest control and grounds maintenance contracts. The performance assessment representative (PAR) monitors and evaluates the performance of contracted PMSPs to ensure that pest control measures are properly applied. The PAR serves as liaison between the contractor and the IPMC. Responsibilities of the FEAD include:

1. Preparing contracts ensuring that all requirements of the IPMP are included in the contract specifications

2. Coordinating with the NAVFAC Atlantic Applied Biology PPMC for a review of pest management contract specifications prior to advertisement for bid

3. Maintaining copy of each contract on file

4. Monitoring pest management contractors; ensuring effective and safe application of pest management practices, identifying and documenting discrepancies, and seeking corrective action with contractors in accordance with the contract

5. Ensuring contractors record all pest management activities and submit reports including actual pesticide use through the NAVFAC Online Pesticide Reporting System (NOPRS) or to the IPMC on a monthly basis.

All PMPARs shall be delegated the authority (in the contract and in the PMPAR appointment letter) to halt any contract pesticide applications that:

1. Endanger or present a hazard to humans, animals, or the environment

2. Violate contract specifications, or applicable federal, State, DOD, or Navy laws/regulations

3. Violate the pesticide label.

2.1.6 Naval Medical Center Portsmouth

The Naval Medical Center includes preventive medicine, industrial hygiene, and occupational health departments. The industrial hygiene and occupational health departments are located within the naval hospital at the Portsmouth Annex. This section discusses responsibilities for each department.

2.1.6.1 Preventive Medicine

The Naval Medical Center and Naval Branch Health Clinic Sewell's Point both provide public health support to the installation in accordance with Navy Medical (Command) (NAVMED) P-5010, Manual of Naval Preventive Medicine, and OPNAVINST 6250.4C. Responsibilities of the health clinic include:

1. Acting as advisor and liaison to the installation CO for public health pest prevention and management

2. Conducting surveys for pests of medical importance, such as cockroaches, mosquitoes, bed bugs, etc., through habitability and food service sanitation inspections

3. Establishing and maintaining liaison with local health agencies as they pertain to vector management and vector-borne and zoonotic disease prevention

4. Maintaining current certification as DOD category 8 (public health) pesticide applicator

5. Developing and maintaining an emergency plan for vector and pest control during a vector-borne disease outbreak or disaster

6. Providing technical review of the IPMP.

2.1.6.2 Industrial Hygiene

Industrial hygiene (IH) personnel perform surveys (i.e., for pest management employees) to characterize occupational exposures (i.e., to inherent chemical, physical, ergonomic, and biological stressors) and control measures (e.g., engineering–local exhaust and mechanical dilution ventilation systems; administrative–warning signs, standard operating procedures, training requirements, etc.; and personal protective equipment–respiratory protection and chemical resistant clothing). In addition, IH surveillance information is used to initiate, continue, or end medical surveillance.

2.1.6.3 Occupational Health

Occupational health personnel are responsible for performing all necessary medical surveillance (such as physical examinations and blood testing) for government pest management personnel, as deemed necessary.

2.1.7 Contract Pest Management Service Providers

Contract PMSPs are required to be certified as pesticide applicators by the Commonwealth of Virginia. These responsibilities apply to all contractors on the installation. Responsibilities of contract PMSPs include:

1. Conducting pest management operations in accordance with the contract specifications or lease agreements and the IPMP and in compliance with federal and State laws and regulations

2. Submitting a list of pesticides proposed for use on the installation to their government representative

3. Communicating all pest management issues and requirements via the government representative

4. Submitting daily pest management operation records to the government representative or through NOPRS.

2.1.8 Morale, Welfare, and Recreation

Morale, welfare, and recreation (MWR) provides recreational activities for military and civilian personnel on the installation. This includes maintenance of the golf course and athletic fields. Additionally, MWR oversees commercial food concessions including the Pub One Grille and Community Center, Sewell's Point Club House, the Mariner Community Center, and the Retro Bowling Center. With respect to golf course and athletic field maintenance, MWR must:

1. Ensure that all personnel who apply pesticides maintain current certifications in the appropriate categories (see section 2.4 for more information)

2. Ensure that all pesticides are approved, prior to use, by the NAVFAC PPMC

3. Provide copies of the pesticide labels to the IPMC

4. Maintain and report records of all pesticide applications in accordance with the requirements outlined in this IPMP

5 Maintain the pesticide storage and mixing facility in accordance with the requirements of this IPMP and installation regulations

6. Obtain adequate supplies of pesticides, pesticide dispersal equipment, and personal protective equipment (PPE), and ensure equipment is properly maintained

7. Ensure that all pesticide applicators practice IPM

8. Ensure that landscape cultural management practices are used to maintain the health of plants and turf to prevent disease and pest infestations

9. Ensure that new plants brought onto the installation for landscaping in recreational areas are not invasive, infested with pests, or infected with disease.

With respect to MWR food establishments, MWR must:

1. Ensure that proper sanitation is maintained in all food handling facilities

2. Submit any contract specifications (outside of the installation pest management contract) for pest management to the IPMC for technical review prior to submitting the contract for bid

3. Ensure that only current, state-licensed pesticide applicators apply pesticides

4. Ensure that all pest management activities are reported in accordance with the requirements outlined in this IPMP (for pest management that is conducted separately from the installation contract).

2.1.9 Marine Corps Exchange and Navy Exchange

The Marine Corps Exchange (MCX) in Norfolk and the Navy Exchange (NEX) at Northwest Annex display and sell household and garden pesticides for retail sale. Additionally, the NEX runs commercial food concessions at their staff college location, including Panda Express, Subway, and White Lotus Sushi. With respect to pesticide sales, the MCX and NEX must:

1. Ensure that pesticides are displayed in accordance with the pesticide label and other federal, State, and local regulations.

2. Ensure that store employees are properly trained on emergency procedures in the event of a pesticide spill.

With respect to food concessions, the NEX must:

1. Ensure proper sanitation is maintained in all food handling facilities

2. Submit any contract specifications (outside of the installation pest management contract) for pest management to the IPMC for technical review prior to submitting the contract for bid

3. Ensure only current, State-licensed pesticide applicators apply pesticides

4. Ensure all pest management activities are reported in accordance with the requirements outlined in this IPMP (for pest management that is conducted separately from the installation contract).

2.1.10 United States Army Veterinary Services

The veterinary services department provides clinical support for military working dogs and services for privately-owned pets and animals. Veterinary technicians also provide food inspection for the commissary and for other food items delivered to the installation. Responsibilities of the veterinary services include:

1. Conducting surveillance for pests which damage, destroy, and contaminate food stored in the commissary and installation facilities

2. Ensuring stored field rations (e.g., meals, ready to eat (MREs), etc.) are free from pests

3. Advising preventive medicine and the IPMC of any zoonotic diseases that may require pest management

4. Providing advice and education to pet owners on preventing pest infestations.

2.1.11 Public Private Venture Housing

The public-private venture (PPV) housing manager provides pest control and landscape maintenance for military family housing residents. Responsibilities of the PPV housing manager include:

1. Ensure that pesticide usage reports for outdoor pesticide applications (including herbicides) are forwarded to the IPMC or the NAVFAC Atlantic PPMC, or reported using NOPRS

2. Ensure that only current, State-licensed pesticide applicators apply pesticides.

2.1.12 Building Occupants and Barracks/Housing Residents

All installation personnel have the responsibility for:

1. Applying good sanitary and pest exclusionary practices to prevent pest infestations

2. If permitted for personal use, use pesticides in accordance with the pesticide label

3. Coordinate and cooperate fully with PMSPs in scheduling pest management and preparing the areas for pesticide treatment if necessary.

2.1.13 Agricultural Outleases

1. Ensure that all pesticides are approved prior to use and that all pesticide usage reports are forwarded to the IPMC or the NAVFAC Atlantic PPMC, or reported using NOPRS

2. Ensure that only current, state-licensed pesticide applicators apply pesticides.

2.1.14. In-House Pest Control Shop

The in-house pest control shop is located on Naval Station Norfolk (NAVSTA Norfolk) performs routine pest management on the installation and responds to service requests from tenants. At the Northwest Annex, they provide fire ant and termite control only. Responsibilities of the shop include:

1. Controlling nuisance, public-health, and structural pests
2. Conducting pest control inside buildings and facilities
3. Conducting pest control on improved grounds.

2.2 PESTICIDE APPROVAL

Only pesticides approved by both the Environmental Protection Agency (EPA) and the State shall be used. Additionally, DOD and Department of the Navy (DON) directives require installations to submit a list of all pesticides that will be used during control operations to the cognizant NAVFAC Atlantic PPMC for review and approval (OPNAVINST 6250.4C, paragraph 4). The purpose of this approval process is to ensure that only registered pesticides which are safe, effective, and appropriate for the site will be used on the installation. Requests for pesticide approval will be submitted to the NAVFAC Atlantic PPMC via the installation IPMC using NOPRS (see section 2.3.3). Once a pesticide is approved, it may be used on-site as per the label directions. New pesticides may also be added to the list and submitted for approval as needed. The list should be reviewed and updated annually by the IPMC as part of the IPMP maintenance. Pesticides currently approved for use on the installation are listed in appendix D.

The IPMC shall maintain a hard copy or electronic version of the manufacturer's label and safety data sheet (SDS) for each pesticide on the pesticide authorized use list (AUL); these should be made easily accessible to installation personnel upon request. The PMPARs or the PMSPs should also maintain copies. Pesticide labels and their registration status can be found on the EPA's National Pesticide Information Retrieval System at http://ppis.ceris.purdue.edu/.

2.3 RECORDS AND REPORTING

All shore installations and units performing pest control operations shall maintain daily records of pesticide applications and submit reports of pest management operations at least monthly to the cognizant PPMC. (OPNAVINST 6250.4C, paragraph 23 and OPNAV M-5090.1, paragraph 24-3.4)

2.3.1 Pest Management Record Keeping

All PMSPs shall record pest management operations daily. Records shall include all pest management operations including surveys and non-chemical control operations performed on the installation by commercial contractors as well as work performed by DOD pest management personnel. The records will include the following information: date of application, location and site, type of operation, target pest, area treated, name of applicator, pesticide information (trade name, active ingredient, and formulation), amount of pesticide applied, and calculated pounds of active ingredient applied. The following operations are excluded from the record keeping requirement:

1. Personal use of insect repellent
2. Application of repellent by deployable units during mass treatment of clothing and tentage

3. Application of pesticides for personal relief by residents of military housing

4. Application of pesticides for flea and tick control to pets by pet owners and veterinary services.

Records shall be submitted to the IPMC monthly via the NAVFAC Online Pesticide Reporting System (section 2.3.3)

2.3.2 Maintaining Pest Management Operations Records

The installation must archive complete daily pest management operation records on-site indefinitely. Pesticide applications for each building, structure, or outdoor site must be accounted for. Past hardcopy records must be archived so as to prevent them from being destroyed. Electronic records shall be stored to prevent destruction or loss; back-up copies are recommended. All records reported to NAVFAC Atlantic will be stored and may be used as a back-up. Downloading records from NOPRS at least annually and maintaining them on-site is highly recommended.

2.3.3 Pest Management Service Provider Reporting Procedures

Reports will be reviewed by the IPMC and the NAVFAC Atlantic PPMC to provide program oversight to the installation and to generate data for tracking overall DON pesticide usage.

All PMSPs that have Internet access must use the NAVFAC Online Pesticide Reporting System to record, report, and manage pesticide and pest management records. This system is preferred to other methods because it eliminates the need to send hardcopy or electronic records to the IPMC and then to the PPMC. The records are entered directly into a central database that can be accessed by the PPMC and the IPMC and downloaded into a spreadsheet. The only computer requirement is reliable Internet access. Integrated pest management coordinators must contact the NAVFAC Atlantic PPMC to establish a supervisor account. Pest management service provider's applicators can then contact the IPMC to request an applicator account. The NOPRS Web site is at: https://noprs.pestlogics.com/. The NOPRS PowerPoint tutorial is included on the CD of supporting documents provided with this plan.

2.4 TRAINING, CERTIFICATION, AND LICENSING

Integrated pest management requires personnel who are properly trained to investigate and diagnose pest problems, select the appropriate pest management method, apply the appropriate pesticide, perform these operations so that they are safe to humans and the environment, and educate and advise their customers on pest prevention methods. All DOD personnel who apply or supervise the application of pesticides shall be trained and certified within two years of employment in accordance with the DOD Plan for the Certification of Pesticide Applicators, or EPA-approved State certification plan (OPNAVINST 6250.4C, paragraph 11). Additionally, professional pest management personnel shall be certified if their duties include:

1. Making recommendations for the use of pesticides, applying pesticides, or directly supervising the application of pesticides

2. Conducting demonstrations on the proper use and techniques of pesticide application or the supervision of pesticides

3. Conducting field research that includes using or supervising the use of pesticides.

An exception to the standard training and certification requirements are those individuals approved by the IPMC to apply ready-to-use pesticides as part of the self-help program.

2.4.1 Verification of Qualifications

Copies of contractor or lessee State licenses shall be obtained from all PMSP personnel applying pesticides on the installation. Verification of DOD pesticide applicator certifications, as well as IPMC and PMPAR accreditation, can be obtained from the NAVFAC Atlantic PPMC. A list of applicator certifications as well as a list of pest control business licenses is found in appendix E.

2.4.2 Requirements for Department of Defense Pesticide Applicators

DOD applicators may be certified in the following categories:

1. Category 2—Forestry
2. Category 3—Ornamental and Turf (e.g., landscape arthropod and vertebrate pests)
3. Category 5—Aquatic (e.g., aquatic weeds in lakes, ponds, rivers, streams, irrigation canals)
4. Category 6—Right-of-Way (e.g., weeds on sidewalks, along fence lines, parking lots, road ways, storage tank grounds)
5. Category 7—Industrial, Institutional, Structural, and Health-Related (e.g., termites and other wood-destroying insects, cockroaches, crickets and other invading organisms)
6. Category 8—Public Health (e.g., mosquitoes, ticks, fleas, rodents)
7. Category 11—Aerial Application (e.g., application of pesticides for any pest by fixed or rotary-wing aircraft).

Preventive medicine technicians (PMTs) are required to be certified only in Category 8 and receive certification during PMT school. Golf course applicators are only required to be certified in categories 3, 5, and 6.

Initial certification in categories 2, 3, 5, 6, 7, and 8 for civilian employees is a three and a half week course conducted by a designated DOD training agency. The Navy course is conducted by the Navy Entomology Center of Excellence (NECE) in Jacksonville, Florida and also the Navy Environmental Preventive Medicine Units (NEPMUs). Initial certification and recertification in category 11 is a one week course conducted by the Air Force Reserve. Certification for all categories is valid for three years. With proper justification, certifications can be extended by the applicator's certifying authority for an additional six months for civilian personnel or an additional 12 months for military personnel. Recertification courses for civilians in all categories except category 11 are conducted annually by NAVFAC Atlantic. Initial and recertification course schedules can be viewed at http://www.acq.osd.mil/eie/afpmb/training_Certification.html.

2.4.3 Requirements for Commercial Contract Applicators

"Licensed firms shall perform all pest management services procured by contract using only trained operators who are certified in the applicable State in the required EPA pest management categories for the work planned. Copies of State or host nation business licenses and applicator certifications shall be

reviewed prior to award" (OPNAVINST 6250.4C, paragraph 15b). Copies of contractor business licenses and applicator certificates can be found in appendix E. All contract pesticide applicators applying pesticides on the installation must hold a Virginia commercial or government pesticide applicator's license. Virginia pesticide applicator categories equivalent to DOD categories are found in table 2-1.

In order to apply pesticides or herbicides on the installation for grounds maintenance, apply pesticides inside and outside buildings to control household or structural pests, or conduct mosquito control, the contracted pesticide applicator must hold a pesticide applicator license in the appropriate categories issued by the Virginia Department of Agriculture and Consumer Services, Office of Pesticide Services. More information can be found at: http://www.vdacs.virginia.gov/pesticides.shtml.

DOD		VIRGINIA	
2	Forest	2	Forest Pest Control
3	Ornamental and Turf	3A, 3B	Ornamental Pest Control, Turf
5	Aquatic	5A	Aquatic Pest Control
6	Right-of-Way	6	Right-of-Way Pest Control
7	Industrial, Institutional, Structural, and Health-Related	7A	General Pest Control
		7B	Wood-Destroying Pest Control
		7C	Fumigation (Non-Agricultural)
		7D	Vertebrate Pest Control
		7E	Sewer Root Control
8	Public Health	8	Public Health Pest Control
11	Aerial Application	11	Aerial Pesticide Application
No DOD equivalent		1A, 1B	Agricultural Pest Control
		1C, 1D	Fumigation of Soil and Agricultural Products, Chemigation
		4	Seed Treatment
		5B	Marine Anti-Foulant Paints
		9	Regulatory Pest Control
		12	Wood Preservation and Wood Products Treatment

Table 2-1. Category equivalents between DOD and Virginia pesticide certifications.

2.4.4 Requirements for Natural Resource Management Applicators

Commercial contract applicators applying herbicides for invasive weed control or habitat restoration must hold a State license. Personnel using pesticides for wildlife control must also hold an appropriate State license. Department of defense employees applying pesticides for invasive weed control or habitat restoration should be DOD-certified as a pesticide applicator.

2.4.5 Requirements for Performance Assessment Representatives

Pest management performance assessment representatives assess the performance of contractors in the Performance-Based Acquisition (contracting) Program. The installation is required to train personnel to provide performance assessment for commercial pest control or grounds maintenance services in pest management within one year of appointment and send them to refresher training every three years

(OPNAV M-5090.1, paragraph 24-3.19). Naval Facilities Engineering Command provides initial and refresher PMPAR training annually. The training schedule is available at the Armed Forces Pest Management (AFPMB) Web site at: http://www.acq.osd.mil/eie/afpmb/training_Certification.html.

2.4.6 Requirements for Integrated Pest Management Coordinators and Environmental Personnel

"The IPMC shall have the educational background, technical knowledge, and management skills to implement and oversee the pest management program" (DODI 4150.07, section E.4.4.1). Newly designated IPMCs are required to receive training in the administrative and operational requirements of installation pest management. Environmental personnel who have compliance oversight of pesticides on the installation should also receive training. The initial PMPAR and IPMC course provides the necessary training. Naval Facilities Engineering Command, Atlantic conducts these courses annually. If applying pesticides or recommending pesticide applications, the IPMC must be certified as a DOD pesticide applicator. Training schedules are available at: http://www.acq.osd.mil/eie/afpmb/training_Certification.html.

2.5 PEST MANAGEMENT CONTRACTING

Contracts requiring the use of pesticides must be reviewed and approved by the NAVFAC Atlantic Applied Biology PPMC. This includes contracts issued by non-appropriated activities and tenant commands on the installation. Pest control contracts are required to be monitored by a trained PMPAR (OPNAVINST 6250.4C, paragraph 1).

2.5.1 Pest Management Contracts

The installation's pest management contracts are listed below.

2.5.1.1 Naval Facilities Engineering Command Mid-Atlantic Pest Management Contract

The installation has a pest management contract in place under the BOS contract for the Northwest Annex. This contract covers general indoor and outdoor pest management for invertebrate and vertebrate pests. Additionally, the contract requires the contractor to pick up dead vertebrates and dispose of them appropriately. To put in a call for pest management services, personnel must contact the public works call center at 757-341-0475 (Norfolk locations) or the BOS contractor trouble desk at 757-421-4121 (Northwest Annex). The names of the current contract companies are listed in appendix E.

2.5.1.2 Grounds Maintenance Contract

The installation has a grounds maintenance contract in place under the BOS contract. Grounds maintenance work includes the use of pesticides (herbicides) to control weeds in semi-improved and improved grounds including substations, fence lines, railroads, thermal lines, parking lots, ditches, and ponds. The contractor also uses non-chemical methods of weed control such as line trimming. To put in a call for grounds maintenance services, personnel must contact the public works call center at 757-341-0475 (Norfolk locations) or the BOS contractor trouble desk at 757-421-4121 (Northwest Annex). The names of the current contract companies are listed in appendix E.

2.5.1.3 Miscellaneous Pest Management Contracts

The Navy Exchange food court franchises perform their own pest management independently of the installation pest management service provider. The restaurants include Panda Express, Subway, and White Lotus Sushi.

2.5.2 Contract Specifications and Review

Pest management contract specifications must be written to ensure effectiveness, safety, and regulatory compliance. The facilities support contract/base operation support (FSC/BOS) performance-based contract template for pest control (sub-annex 1503020) and grounds maintenance (sub-annex 1503050) is available from NAVFAC Atlantic or on the NAVFAC Portal (requires login) at: https://hub.navfac.navy.mil/webcenter/portal/pw/FSC+Mgmt+and+Facility+Services++/FSC/BOS+Templates. The facilities contracting officer (KO) or contracting officer representative (COR) can provide additional information. The KO shall send the contract specifications to the NAVFAC Atlantic PPMC for review prior to sending the contract out for bidding (OPNAVINST 6250.4C, paragraph 4).

Termite pretreatment contract specifications for new construction shall also be reviewed by the NAVFAC Atlantic PPMC prior to procurement. The Unified Facilities Guide Specifications (UFGS) 31 31 16 Soil Treatment for Subterranean Termite Control should be included in all new construction contracts for termite pretreatment. See section 3.2.4.3 for more information on termite treatment contracts.

2.5.3 Government Representatives

Contractors will communicate and submit required pest management reports via their government representative. For the pest control and grounds maintenance (FSC/BOS) contracts, the representative is the PMPAR who is responsible for assessing the contract. For Non-Appropriated Fund Instrumentality programs (NAFI) (i.e., NEX, MWR) contracts, the representative is the local NAFI organization manager. In cases where a government representative is not available, the installation IPMC may liaison with a contractor's representative.

2.5.4 Contract Requirements

The application of pesticides on Navy properties by contractors is strictly regulated by Department of Defense and Navy regulations, this IPMP, and state regulations. These requirements apply to all pesticide applications including insecticides, herbicides, fungicides, molluscides, etc. to any area in or outdoors. These requirements apply to any size contract (small purchase or facility support contract generated) and services acquired by any other means including government purchase cards (EBUSOFFINST 4200.1, chapter 6, paragraph 7). The specific requirements for contracted pest control operators working on Navy properties are:

1. Contractor Work Plan (CWP): If required by the contract, a CWP shall be submitted as part of the contractor's proposal. The CWP specifies how the contractor will meet the contract requirements.

2. Pesticide Applicator Certification: All contractor personnel, who apply pesticides (which include all herbicides), shall be certified/licensed in the appropriate applicator category in accordance with section 2.4.4 of this IPMP. All contractors who will apply pesticides shall, prior to the start of work, supply a copy of the certificate(s)/license(s) in accordance with contract specifications. Pesticide business licenses and pesticide applicator certificates are included in appendix E of this IPMP.

3. Pesticide Approval: Pesticides used by contractors must be approved and added to the installation pesticide AUL, before use, by the NAVFAC Atlantic PPMC as described in section 2.2. The list of proposed pesticides shall be included in the CWP or submitted to the designated Government representative using the format designated in the contract specifications. The pesticide AUL is in appendix D of this IPMP.

4. Pesticide Mixing, Storage, and Disposal: Contractors shall not store, mix, or dispose of pesticides or clean pest control equipment on the installation unless an approved pesticide storage and mixing area is specified in the contract and authorized by the KO. One exception to this is soil treatment for termite prevention during building construction; the contractor must mix the termiticide on-site while the PMPAR or IPMC is there to witness.

5. Pesticide Applications: Only pesticides listed on the pesticide AUL shall be used and applied in a manner consistent with the pesticide label.

6. Pest Management Reporting: Contractors shall submit reports in accordance with the reporting requirements in section 2.3.3.

7. Contractor Vehicles:

    a. Safety equipment: Vehicles used to transport pesticides shall be equipped with a fire extinguisher and a spill and decontamination kit, and be capable of cleaning up the maximum amount of pesticide transported at any given time. Clean water shall be carried for use in emergency personal decontamination.

    b. Security: All pesticides carried on the vehicles shall be secured in locked compartments at all times. Vehicles shall not be left unattended at any time unless properly locked and secured.

    c. Identification: Vehicles will be clearly marked as pest control vehicles.

    d. Appearance: All vehicles shall be maintained with a clean and orderly appearance, free from observable pesticide spills, residues, or build-up.

    e. Transporting pesticides: Pesticides shall not be transported in the cab or occupied part of any vehicle. They shall always be carried in a separate compartment from the occupied cab.

8. Compliance Assessment: All contractors are subject to regulatory compliance assessments by the PMPAR, IPMC, environmental compliance staff, and other authorized government personnel. Pest control vehicles, pesticide applications, and administrative requirements are subject to inspection. Authorized government personnel may also require the contractor to stop work if the work is not being performed in a safe manner.

2.5.5 Contract Performance Assessment

Contracts shall be assessed by a trained PMPAR to ensure environmental and contractual compliance. For FSC/BOS contracts, Functional Assessment Plans (FAPs) for pest control and grounds maintenance should be developed and implemented. Functional Assessment Plan templates are available from the KO or NAVFAC Atlantic Applied Biology. Periodic assessments for pests prior to, during, or after pest control operations should be conducted to ensure efficacy of the services. Pest survey methods for contract performance assessments are found in chapter 8 on each of the Integrated Pest Management Sheets. Periodic assessment of the contractors during pesticide application should also be conducted to

ensure appropriate safety measures are being taken. The contractors' vehicles and equipment must be made available for inspection when requested. In the absence of a PMPAR, a preventive medicine technician can provide information on the efficacy of pest control in some facilities. The PMT conducts monthly inspections that include pest surveys of food service facilities and child development centers. The PMPAR and the IPMC should liaison and coordinate performance assessment activities with the PMT.

CHAPTER 3

Operations

3.1 INTEGRATED PEST MANAGEMENT

Presidential Executive Order (EO) 13514, Federal Leadership in Environmental, Energy, and Economic Performance, October 5, 2009, requires federal agencies to promote pollution prevention and eliminate waste by implementing integrated pest management and other appropriate landscape management practices. United states Code (7 U.S.C. § 136r-1) states, "Federal agencies shall use Integrated Pest Management techniques in carrying out pest management activities and shall promote Integrated Pest Management through procurement and regulatory policies, and other activities." Department of Defense policy is to, "Incorporate sustainable Integrated Pest Management (IPM) philosophy, strategies, and techniques in all aspects of DOD and Component vector control and pest management planning, training, and operations, including installation Integrated Pest Management Plans and other written guidance to reduce pesticide risk and prevent pollution" (OPNAVINST 6250.4C).

3.1.1 Integrated Pest Management Defined

Integrated pest management is, "a planned program incorporating education, continuous surveillance, record keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods including habitat modification, biological, genetic, cultural, mechanical, physical, and regulatory controls, and when necessary, the judicious use of least hazardous pesticides" (OPNAVINST 6250.4C, paragraph 2). There are significant differences between IPM and traditional pest control methods. Table 3-1 lists some of the differences.

In IPM programs, treatments are not made according to a predetermined schedule. Rather, treatments are made only when and where monitoring has indicated that the pest will cause unacceptable economic, medical, or aesthetic damage. Treatments are chosen and timed to be most effective and least hazardous to non-target organisms and the general environment.

Pest Management	Traditional Pest Control	IPM
Program Strategy	Reactive	Preventive
Customer Education	Minimal	Extensive
Potential Liability	High	Low
Emphasis	Routine pesticide application	Pesticides used when exclusion, sanitation, and other non-chemical methods are inadequate
Inspection and Monitoring	Minimal	Extensive
Pesticide Application Frequency	By schedule	By need

Pest Management	Traditional Pest Control	IPM
Pesticide Application Target	Area-wide spraying	Spot treatment of areas where pests are found
Customer Involvement in Preventing Pests	Minimal	Extensive

Table 3-1. Comparison of traditional pest control and integrated pest management methods.

Under an IPM program, execution of individual pest management practices involves the following steps:

1. Identify pests.

2. Establish action thresholds that are sufficient to warrant treatment. In determining threshold levels, the amount of public health, aesthetic, or economic threat that can be tolerated must be correlated with the population size of pests, natural enemies, time in the season, and/or life stage of the pest or host.

3. Develop plans/strategies through an integration of treatment methods that are effective against the pest, least disruptive to natural controls, and least hazardous to human health and the environment.

4. Monitor pest population before and after treatment. Monitoring is an ongoing activity.

5. Implement pest control measures if economic damage or public health threat are above the established action threshold.

6. Document results.

7. Evaluate/redesign plan to determine the outcome of treatment actions.

Controlling pests has traditionally been the responsibility of the pest control operator. Using IPM, preventing and controlling pests is the responsibility of all personnel on the installation.

3.1.2 Integrated Pest Management Compliance

All pesticide applicators are trained in IPM techniques during initial and refresher licensing or certification training. Government representatives shall assess the PMSP's compliance with IPM. This may include:

1. Reviewing the approved pesticide list for use of less toxic pesticides, baits with sustainable control, short-residual and pest-specific products, and products used for spot treatment rather than broadcast application

2. Ensuring contractor work plans and partner pest management plans incorporate IPM

3. Reviewing pest management records to ensure that only approved pesticides are used, spot applications are performed, non-chemical methods are used, and routine surveys are being performed

4. Observing pest control service calls to ensure pest control operators identify conditions conducive to pest infestations, provide information to building occupants on how they can prevent pests, use only approved pesticides, perform spot treatments, properly apply baits, conduct routine surveys, and monitor baits/bait stations/traps.

3.1.3 Integrated Pest Management Sheets

The IPM sheets in chapter 8 provide general guidelines for the integrated control of pests. They may be used as a reference for surveillance and non-chemical and chemical control alternatives.

3.2 CURRENT PEST MANAGEMENT OPERATIONS

Nuisance and health-related pests and vegetation are managed on the installation.

3.2.1 Inspections

Routine inspections provide early detection of pests. Pest inspections should be conducted routinely at all food service, sales, and storage facilities. Preventive medicine technicians conduct food safety inspections including surveys for pests and pest signs at the galleys and food facilities each month. They also inspect the child development center, exchanges, and barber shops. The preventive medicine department provides monthly and quarterly sanitation inspection reports and, if necessary, immediate recommendations to facility managers when contractor-administered pest control operations are needed to control pests. United States (U.S.) Army Veterinarian food inspectors conduct food quality inspections that include examining food items for pests at the commissary and at food service and sales locations.

3.2.2 General Household and Nuisance Pests

Sanitation, glue traps, and pest exclusion are the primary sustainable means of non-chemical control. Low-toxicity insecticidal baits are used effectively against cockroaches and ants. Most pesticide applications can be effective in immediate reduction of pest populations, but have short residual efficacy and are not sustainable in the long term.

3.2.2.1 Cockroaches

German and American cockroaches are common pests. The general adaptability of the cockroach makes it both an important pest problem and the most common pest problem in food service areas. An integrated approach of using both preventive and corrective techniques is the only practical means of controlling this pest.

3.2.2.2 Control Measures

Non-chemical preventive control measures—including inspection, interior and exterior facility sanitation, and exclusion methods such as closing harborage areas by caulking or other modifications—reduce pest populations by limiting food, water, and shelter. In buildings that are most susceptible to pest infestation, these measures are performed on a scheduled basis through preventive maintenance contracts. Common use areas and food consumption areas of other buildings, such as restrooms, coffee messes, lounge areas, and vending machine rooms, are serviced on either a monthly or quarterly basis, depending on the preventive maintenance contract for that building, with response to call-backs as necessary. This also includes common use areas of the barracks, warehouses, and administration buildings. Buildings where there is no food and where problems occur only occasionally such as shops and storage buildings, are handled on a service call basis. Pesticide treatments in food handling areas shall be confined to crack and

crevice placement when using residual aerosol or dust formulations. Insect growth regulators and baits are used to complement other control measures. Self-contained light traps may also be utilized in these areas. Low-odor formulations are used in offices and in other spaces where a pesticide odor would be objectionable.

3.2.3 Grounds Maintenance

Grounds maintenance is performed on improved or landscaped grounds. Pest management during grounds maintenance may involve weed control; control of pests and disease on plants, trees, and turf; and control of vertebrate animals (e.g., squirrels, moles) that may destroy plants and turf. Mechanical removal of weeds and mowing are routinely performed. Grounds maintenance also includes weed control in drainage ditches that may contribute to mosquito control and bird habitat removal. Weed control is performed along roadways, fence lines, and at fuel farms where they pose fire and visibility concerns.

3.2.3.1 Turf and Ornamental Pests

Turf and ornamental pests include insects and diseases. White grubs and ants infest the soil and roots of plants. Japanese beetles, bagworms, tent caterpillars, sod webworms, and armyworms feed on the leaves of plants. Leafhoppers, scale insects, and aphids are referred to as plant sucking insects and feed on the fluids inside of plants. Oak borers and bark beetles are insects that bore into plants or trees and disrupt the plants' ability to transport nutrition and water. Various plant diseases including brown patch and dollar spot are also possible turf diseases that may be encountered. Ornamental diseases can cause leaf spots, blights, mildews, and wilts from fungi, bacteria, and viruses.

3.2.3.2 Weed Control

A wide variety of herbicides are available for controlling unwanted vegetation. Extreme care should be taken when using herbicides around waterways. Herbicides can be used around mowing obstacles such as signs, fire hydrants, and manholes. Herbicides are used to control weeds along cracks in sidewalks and asphalt parking areas, along fence lines, around buildings, and along ditch banks. Selective herbicides are used to control various weeds that occur in lawns on the installation. Various cultural and chemical controls can be used to deal with these and other weed control problems. When using chemical controls, both selective and non-selective herbicides may be used.

3.2.3.3 Aquatic Weed Control

Aquatic weed control work should be conducted in accordance with the Integrated Natural Resource Management Plan. The policy is to control and limit the spread of invasive species of plants, and to protect aquatic plant species. Each pesticide must be approved prior to use to prevent harm to the natural resources that feed in the ponds.

3.2.4 Golf Course and Athletic Fields

Pest management operations include the following:

1. Weed, fungus, and insect control on golf course grounds
2. Weed control on ball fields
3. Weed control in miscellaneous MWR facilities.

The golf course includes 138 acres of greens, fairways, and rough. The golf course contains Bermuda grass on the greens and fairways, and mixed grasses on the rough. Undesirable vegetation in the turf grass, including sedges and crabgrass, are controlled by using pre- and post-emergent selective herbicides.

3.2.4.1 Mole Cricket Control

Mole crickets are an infrequent problem on the lawns and golf course areas. Because the nymphal stage feeds on the roots of the grass, it is a very destructive pest. Mole crickets are best controlled by using insecticidal baits and residual insecticides on the nymphal (feeding) stage. Control of the adult stage is done only when damage levels present are excessive. Effective treatment requires proper timing through the consideration of weather conditions and the stage of the insect. An area-wide treatment of all continuous lawn areas is much more effective than scattered spot treatments. Subsurface insecticide applications are more effective since they direct the application where the insect lives. This treatment should be performed once a year when mole crickets are in the nymphal stage and repeated if the population builds back up.

3.2.4.2 Nematode Control

Sting and lance nematodes have historically not been known to be pests on the golf course. Nematodes are difficult to control and are often responsible for large amounts of turf damage. The best management practices for golf courses with nematode problems are:

1. Avoid other stresses on the grass as much as possible
2. Monitor nematode populations by sampling frequently
3. Apply nematicides when needed.

Historically, most nematicides have been toxic at low levels and water soluble in order to move into the soil profile and get to the nematodes. Many of the effective nematicides used in the past have been withdrawn from the market during the last 25 years for environmental and health reasons until only a handful remain. When using any nematicide, the product label must be strictly adhered to in order to minimize human and environmental health impacts and to avoid liability. It is a NAVFAC Atlantic Applied Biology policy that the presence of nematodes must be verified by a soil test before a nematicide can be used. The soil samples should be taken and the results forwarded to the NAVFAC Atlantic PPMC before approval can be given for the purchase of nematicides.

3.2.4.3 Other Golf Course Pests

Other insect pests include sod webworm, armyworm, and chinch bugs. The major turf diseases are brown spot, dollar spot, and pythium. Significant damage to the turf can often be avoided by inspecting the turf daily during the periods when pest and disease problems are likely to occur. Disease occurrence is often decreased or avoided through cultural control, such as proper fertilization and watering. Natural controls are maximized when chemical control operations are based on need instead of a schedule. This careful use of chemical control can help avoid environmental and pest resistance caused by overuse of pesticides. The only exemptions to need-based control are the preventive treatments for pythium and dollar spot.

3.2.5 Structural Pests

Structural pests which have an impact on activity operations include termites, powder post beetles, wood borers, and wood destroying fungi. Of these, subterranean termites and wood destroying (decay) fungi cause the most damage.

3.2.5.1 Structural Control Program

A well-managed structural pest control program includes inspection, prevention, and chemical treatments when needed. All susceptible structures that contain wood or wooden structural members should be inspected on an annual basis. The records should note when a building was inspected, the location of any infestation found, and the description of any treatment performed.

3.2.5.2 Termite Control

Various control techniques as part of an integrated approach to structural pest control include:

1. The use of construction practices which protect wood from attack
2. The control of moisture through proper drainage and ventilation
3. The use of termiticides for barrier treatment of soil and hollow masonry units of building foundations
4. The use of treated wood and or metal and concrete supporting structures
5. The fumigation for extensive drywood termite infestations.

Corrective chemical treatments should be performed when termites are found actively damaging wood. Control operations should be based on annual inspections of buildings and reports of termite swarming from building occupants. All wood that is damaged by termites or wood rot fungi should be replaced with treated wood to prevent future damage.

Top priority is given to preventive control treatments, such as preconstruction termite soil treatments and the use of treated wood to protect wood from attack. Once treated with termiticides, care must be taken to prevent disturbance of the soil barrier within one foot of the foundation (if moved by gardening activity or covered when raised flower beds are installed against a building). This can be a serious problem in housing areas where people are encouraged to beautify their yards. Raised beds must be four-sided (i.e., not using the foundation as one side) and soil within one foot of the foundation can't be cultivated for planting.

3.2.5.3 Administration of Termite Treatment Contracts and Warrantees

Termite treatment contracts shall follow all of the requirements found in section 2.5.4. The NAVFAC Atlantic PPMC should review contract specifications for termite control. Termiticides, when needed, must be applied at the highest EPA-labeled concentration and application rate. Soil treatment for termite prevention will be conducted during building construction in accordance with the Unified Facilities Guide Specifications (UFGS) 31 31 16 (DODI 4150.07, section E.4.7.15.1). In accordance with UFGS 31 31 16, the contractor shall provide a warranty of no less than five years. This ensures that if termite activity is discovered during the five year warranty period, the contractor will re-treat the soil and repair or replace any damage that has been caused by termite infestation. Termiticides used for termite control must be

nonrepellent, such as pesticides with the active ingredient of fipronil, imidacloprid, chlorfenapyr, or chlorantraniliprole. DOD-certified pesticide applicators or PMPARs trained in pest control shall inspect applications of pesticides by contractors to control termites or other wood-destroying organisms.

3.2.6 Invasive and Non-Indigenous Species Management

Executive order (EO) 13112 is implemented at DOD installations through DODI 4150.07 (section E4.7.6) which requires that installations prevent, detect, and monitor invasive species. Guidance on the use of available control techniques may be obtained from the installation's NAVFAC Atlantic PPMC. More information on invasive species can be found in the installation INRMP. Primary invasive species of concern at Northwest Annex include the red imported fire ant, phragmites (common reed), kudzu, and bamboo. The nutria (*Myocastor coypus*), a large semiaquatic rodent introduced from South America, has become increasingly common in the Tidewater area of Virginia and may present a threat to wetlands and waterways on the installation.

3.2.7 Stored Product Pests

Stored product pests are a potential problem at any installation. Inspection upon receipt of products and rejection of obviously infested materials generally prevents heavily infested material from being placed in the storage area.

3.2.7.1 Dermestid Beetle

If the dermestid beetle (*Trogoderma*) is found in a commodity, the whole lot of food must be condemned. The pointed hairs on the larvae will cause digestive problems if the contaminated food is eaten. An accurate identification of *Trogoderma* is required to condemn the lot. For the most part, sanitation (keeping storage areas clean) and stock rotation minimize or prevent pest infestation. If an infestation is found, the most effective way to control *Trogoderma* is through deep cleaning, vacuuming, and discarding or segregating the infested product while surveying adjacent areas.

3.2.7.2 Storing Meal, Ready-to-Eat Rations

More stringent controls are required for prevention of stored products pests when storing meal, ready-to-eat (MRE) rations. Guidance on this program can be found in AFPMB Technical Guide No. 38, Protecting Meals, Ready-to-Eat Rations (MREs) and Other Subsistence during Storage.

3.2.8 Health-Related Pests

In accordance with OPNAVINST 6250.4C (paragraph 4c), the Naval Branch Health Clinic Preventive Medicine Department is responsible for conducting inspections and surveys aboard the installation to determine the species, source, location, and density of medically-important arthropods and provide the results to the public works and facilities departments for use in planning pest control operations. Mosquitoes, biting flies, and filth flies constitute the most important insect pests for both disease transmission and general annoyance. Controlling these insect pests should be based on a thorough knowledge of the target pest, actionable surveillance data, and compelling evidence of an infestation that poses an emergent public health risk.

3.2.8.1 Mosquito Biology and Medical Importance

There are over 3,000 mosquito species worldwide and about 150 species in the U.S. All mosquitoes have the same life cycle and are similar in their biology and habits. However, differences in breeding habitats

and host preference occur between the species and these subtle differences affect how we survey and control them. Mosquitoes can be separated into two groups, depending on where they lay their eggs. The flood-water mosquitoes lay their eggs in temporary bodies of water such as artificial containers, tree holes, tidal marches, etc. Eggs of flood-water mosquitoes are laid on moist substrate just above the surface of the water; this group includes *Aedes* and *Psorophora* species. Permanent-water mosquitoes lay their eggs in permanent or semi-permanent water such as ponds, lakes, marshes, ditches, etc. Eggs of permanent water mosquitoes are laid on the water's surface; this group includes *Anopheles* and *Culex* species. It is only the female mosquito that bites; female mosquitoes require a blood-meal before they can lay viable eggs. The male mosquito feeds on plant sugars such as nectar, and does not bite. The Navy Bureau of Medicine and Surgery entomologists, centered at the Navy Entomology Center of Excellence (NECE) and the Navy Environmental and Preventive Medicine Units (NEPMUs), are responsible for providing professional guidance, recommendations, and on-site assistance on all technical matters relating to disease vectors and other medically important pests (OPNAVINST 6250.4C, paragraph 4c).

Mosquitoes are both a major nuisance and a medically important pest. Protozoan pathogens (e.g., Malaria), nematode worms (e.g., dog heartworm), and a number of different viruses (e.g., West Nile Virus, Zika Virus), can all be transmitted by mosquitoes. The NECE West Nile Virus Surveillance and Control Guide for U.S. Navy and Marine Corps Installations can be found at: http://www.med.navy.mil/sites/nmcphc/Documents/nece/WNV-Surveillance-and-Control-Guide-2014.pdf

Dengue, Chikungunya virus (CHIKV), and Zika virus are all known to be transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes, which are common in tropical and subtropical areas throughout the world. *Aedes aegypti* can also transmit Yellow Fever. *Aedes* mosquitoes breed in containers and generally bite during the day. Humans are the reservoir for Dengue, CHIKV, and Zika virus. These diseases can be introduced into an area by persons infected during travel in areas where these diseases are found. Local transmission can occur if the vector mosquito species is present in the area, and the vector mosquito becomes infected after biting an infected person. Transmission of Zika virus through blood and sexual contact has also been reported. *Aedes* mosquitoes are an invasive species whose eggs, which remain viable when dried, are easily transported throughout the world in shipping containers, equipment, and vehicles. Because *Aedes* mosquitoes are active during the day, surveillance and control operations should be targeted during the daytime hours. Additional information on *Aedes* vector surveillance, control, and the viruses they transmit can be found on the web site for the Navy and Marine Corps Public Health Center (http://www.med.navy.mil/sites/nmcphc/program-and-policy-support/Pages/Chikungunya.aspx), and the Armed Forces Pest Management Board (http://www.acq.osd.mil/eie/afpmb/).

3.2.8.2 Mosquito Surveillance and Control

Routine mosquito surveys are the responsibility of preventive medicine technicians. However, if a PMT is not available, a pest control provider can conduct mosquito surveillance. If additional assistance is needed, Navy entomologists from the Navy Entomology Center of Excellence or the Navy Environmental and Preventive Medicine Units can provide assistance in mosquito surveillance. Survey operations are essential to determine the species present, the population level involved, and the potential risk of disease transmission. Surveys also serve as a valuable tool in evaluating control operations. Mosquito surveillance includes conducting both larval and adult surveys. Larval surveys are important because they determine exactly where mosquitoes are breeding, providing the information necessary to manage or eliminate mosquitoes at the source. Larval surveys involve regular dipping stations that are selected, noted on a map, and inspected periodically throughout the mosquito season. In areas where mosquito control is conducted, random larval sampling should be made to check the effectiveness of the control program.

Adult mosquito surveys may be conducted by either collecting mosquitoes from resting sites or using traps. Traps should be placed near where the mosquitoes are expected to be found, during the periods they are active. Two adult mosquito traps that are available with National Stock Numbers (NSNs) are the CDC light trap and the Biogents (BG) Sentinel trap. Traps should be baited with CO_2 from dry ice, when available or, in the case of the BG traps, with the manufactures' recommended lure. The BG Sentinel trap is specifically designed to collect daytime-feeding mosquitoes, and has been found to collect *Ae. aegypti* and *Ae. albopictus* (Zika vectors) more effectively than the standard CDC light trap. Adult collections are then counted, identified to genus or species, and then may be submitted to a regional Army or Air Force public health laboratory for testing, so that the disease transmission risk can be assessed. Adult surveys focus on collecting female mosquitoes because they are the only ones that bite. A high proportion of adult males in a trap collection usually will indicate a nearby larval habitat, and a survey of the area should be done to locate possible breeding sites.

Preventive Medicine (Branch Health Clinic NAVSTA Norfolk) surveys adult mosquitoes at the Norfolk locations using four to five BG Sentinel traps that are rotated among several sites including the golf course, Camp Allen, and housing area. During the mosquito season, preventive medicine collects mosquitoes one to two times a week. Adult collections are counted and identified in-house. Preventive Medicine (Naval Medical Center Portsmouth) is responsible for mosquito surveillance at Northwest Annex, however they were not conducting surveillance at the time this plan was written. They should use three to four BG Sentinel traps to monitor mosquitoes in developed areas of the annex and the campground. Employee and resident mosquito complaints can be made through the call center and then forwarded to preventive medicine.

Mosquito control methods are either permanent (e.g., eliminating the water source) or temporary (e.g., chemical control) in nature and may be directed against larvae or adults. The most effective way to control mosquitoes is to target the larval stage. Larvicides, pesticides specifically labeled to control mosquito larval stages, should be applied to areas where water stands for longer than 7 days when results of mosquito dip counts exceed 1-2 larvae per dip.

Biological control can be accomplished by the introduction of mosquito fish (*Gambusia* sp.), which are surface feeders that are predaceous on mosquito larvae. *Gambusia* have the ability to outcompete other species, so it is important to consult with the environmental division prior to introducing them, as well as to only introduce them into waters that do not drain into other waterways. To decrease the amount of standing water, it is important to have a drainage system allowing proper runoff of rain water from roadways. Ditches should be maintained free of weed growth. This increases water flow in the ditch allowing access of natural mosquito predators. It is also important to educate the public on source reduction when the problem mosquitoes originate from artificial containers (e.g., bird baths, gutters, flower pots) found around homes and other buildings.

This installation performs ultra-low volume (ULV) pesticide applications to control adult mosquitoes on an as needed basis. If 5 or more *Aedes* mosquitoes are caught per trap consult the Emergency Vector-borne Disease Plan (EVDCP). When female adult mosquito counts exceed 25 per night per trap, it is recommended that chemical control be initiated upon approval from preventive medicine. These recommended thresholds may vary depending on location of the installation and preventive medicine guidance. If local transmission of a disease is confirmed, thresholds will likely decrease. If a trap count exceeds the threshold, the area surrounding that trap should be surveyed to identify and treat the active breeding site. For many species, mosquito activity is greatest from dusk to dawn. However, as mentioned in the above mosquito biology section, *Aedes* mosquitoes are important vectors that continue to bite during the day. Ultra-low volume treatments must be made during peak mosquito activity when weather conditions are optimal; therefore, for control of non-*Aedes* mosquitoes, ULV pesticide applications should be conducted in the early morning hours before the sun warms the ground or in the evening after the

ground has cooled (when temperature inversion usually occurs). Control operations for *Aedes* mosquitoes should be targeted in the early morning or late afternoon rather than daytime because weather conditions are more favorable for the treatment.

Regular testing of ULV aerosol droplet dispersal is required to assure maximum control, minimum insecticide use, and prevention of automobile finish spotting caused by droplets that are too large. This testing must be done at the beginning of each spray season and for every 50–100 hours of operation, or when the pesticide is changed. More information is included in the AFPMB TG No. 13, Ultra Low Volume Dispersal of Insecticides by Cold Aerosol and Thermal Fog Ground Equipment. Government personnel can obtain slides for aerosol droplet size testing from the Testing and Evaluation Department at the Navy Entomology Center of Excellence, Jacksonville, Florida. Additionally, application of residual insecticides labeled for mosquito control in relatively small areas near the source of the mosquitoes has been shown to be highly effective. Automated pesticide misting devices are not allowed according to DODI 4150.07 (section E4.10.3).

If mosquito populations are extremely high or infestations occur in hard to reach areas, aerial application of adulticides or larvicides by helicopter or fixed-wing aircraft may be the only effective treatment method available. Refer to section 3.2.8.9 for requirements regarding aerial spraying.

3.2.8.3 Filth Fly Management

Performing routine sanitation is the best method to manage filth flies (houseflies, blow flies, flesh flies, bottle flies, etc.). Removal of refuse and routine cleaning of garbage cans and dumpsters will minimize the problem. Garbage cans and dumpsters should be placed on concrete pads at least 100 feet from facilities to reduce breeding under and around the containers and to minimize access to the facilities. Continuous monitoring of sanitation conditions in and around food service areas helps assure that significant fly breeding will not occur.

Chemical control of filth flies is short-term and unsustainable. The choice of fly control techniques must be based on an on-site evaluation of the problem. Pest control personnel inspect areas where garbage is handled and treat these locations with approved insecticides when flies exceed control limits. Preventive medicine technicians also inspect these areas and report significant findings to facility managers for corrective action. Exclusion devices, such as screens and air curtains, help prevent the entrance of flying insects into buildings when installed and properly maintained. Aerosol insecticide treatments are provided when adult flies become a problem in indoor spaces. Automated pesticide misting devices are not allowed according to DODI 4150.07 (section E4.10.3). Light trap devices are also helpful for filth fly control in food handling areas, but only when they are placed inside of the building. Use only non-contaminating light traps with some way of containing the dead insects. For more information on filth fly management, see AFPMB TG No. 29, Integrated Pest Management In and Around Buildings.

3.2.8.4 Bed Bug Management

Bed bugs belong to a family of blood-feeding, ectoparasitic insects called *Cimicidae*. They have a number of features that make them very effective pests and difficult to control. Their small, flattened body allows them to hide in inconspicuous places such as cracks and crevices. A female can lay several hundred eggs during her lifetime. Bed bugs can survive a long time without feeding; and many insecticides have been rendered ineffective due to resistance development. The most common way bed bugs are introduced is by the movement of infested items (e.g., bedding, clothing, and luggage) from one place to another. The common bed bug is not known to transmit human disease. For most people, the bite of a bed bug is painless and will usually go unnoticed, though many people can have allergenic skin reactions, ranging in severity from local inflammation and itchiness, to asthmatic symptoms and anemia. Although the

common bed bug seems to prefer human hosts, they are also capable of feeding on birds, rodents, or other mammals. While other cimicid species, like bat bugs and swallow bugs, mainly feed on bats or birds, but may incidentally bite people when their usual host abandons the nest or is eliminated from the building.

Bed bugs can be difficult pests to detect without a diligent survey strategy. Bed bugs typically feed at night when the host is asleep, and hide in cracks and crevices during the day. It is very important to thoroughly inspect areas where bed bug infestation is suspected. Typical harborage areas might include mattress seams, box springs, bed frames, night stands, picture frames, loose wallpaper, and curtains. Bed bugs typically travel 5–20 feet from their harborage area to feed. When populations are small, infestations may go unnoticed. Some tell-tale signs of a larger bed bug population include the presence of fecal spotting, shed skins, increased biting frequency, and in serious cases a distinct, obnoxiously sweet, odor produced by the bugs. Persons conducting inspections and surveys should be properly trained on what to look for and where to look for infestations. The NECE and EPMU personnel are available to provide training on bed bug inspections.

Bed bugs are a public health issue; installation preventive medicine department should be contacted immediately. Bed bug control may be more difficult to achieve today with increased travel and more stringent limitations on available control materials. A successful control program will require a carefully planned and integrated approach. For more information on controlling bed bugs see AFPMB Technical Guide No. 44, Bed Bugs—Importance, Biology, and Control Strategies.

3.2.8.5 Rodent Management

Rodent control work is an ongoing program to eliminate the causes of rodent infestations. Major emphasis is placed on sanitation and exclusion to limit the amount of food and harborage available to rodents. Tamper-resistant bait stations should be maintained in high infestation areas. There are specific EPA requirements for first generation anticoagulant products (warfarin, chlorophacinone, and diphacinone), second generation anticoagulant products (brodifacoum, bromadiolone, difenacoum, and difethialone), and non-anticoagulants (bromethalin, cholecalciferol, and zinc phosphide). Bait stations are required for all outdoor, above-ground placements and must be placed within 100 feet of man-made structures. Bait stations are also required indoors if exposure to children, pets, or non-target animals is possible. Mechanical traps (snap traps, glue traps, etc.) are another effective control method. Trapping is an effective way of quickly reducing a large mouse population.

3.2.8.6 Bird Management

Pigeons are the primary bird pests on most installations. Pigeons, English sparrows, and starlings can be controlled without a permit because they are not covered under the Migratory Bird Treaty Act. Other bird species require special permits before any control measures can be taken. Bird control methods vary according to the situation. Bird droppings pose a health hazard, as a possible cause of histoplasmosis and other respiratory problems when airborne. Bird ectoparasites, such as mites, can also fall on installation employees. Ultrasonic devices and plastic owls and snakes, etc. are not effective for bird control. The best alternative for bird control is bird-proofing or the exclusion of birds by closing up all openings. Because of its permanency, bird-proofing (i.e., the placing of hardware cloth and chicken wire over potential roosts) is considered the most cost effective means of control. Population reduction techniques (e.g., destruction of nests accessible by a ladder or cherry picker) can sometimes be used effectively. Repellent chemicals which produce alarm reactions and cause a flock to leave or avoid an area are often used. Control personnel should continually monitor bird population levels and take appropriate control actions when required.

3.2.8.7 Feral Animal Management

Feral or free-ranging domestic cats and dogs are considered by the professional wildlife management community to be one of the most widespread and serious threats to the integrity of native wildlife populations (e.g., birds, bats) and natural ecosystems in North America. Navy commands must prevent feral cat and dog populations, and ensure their humane removal from Navy lands through close coordination and cooperation between natural resources, pest management, security, veterinary, and housing personnel. In accordance with the Chief of Naval Operations Policy Letter Preventing Feral Cat and Dog Populations on Navy Property (10 Jan 2002) and OPNAV M-5090.1, chapter 12, Navy commands shall not allow trap-neuter-release or the release of unwanted house pets on their lands due to the potential of feral or free-ranging cat populations to act as disease reservoirs, threatening human health, native wildlife populations, and natural ecosystems.

Cats may occasionally be found near food handling areas or dwelling in crawl spaces under buildings where they can cause flea problems inside of the buildings. The elimination of available food by keeping garbage cans and dumpsters sealed will decrease the appeal of the area to the cats. Elimination of shelter is also a good means of control. The installation should discourage people from feeding stray cats. Guidance on feral cat management can be found in AFPMB Technical Guide No. 37, Integrated Management of Stray Animals on Military Installations.

3.2.8.8 Wildlife Management

Native and feral animals can adapt to and thrive within human habitations. The animals may become a nuisance, damage buildings or property, or be a source of human disease transmission. They can also kill native animals and plants or disrupt their habitats. Animals that may be pests at NSA Hampton Roads include Canada geese, raccoons, fox, and opossums. Animal damage control efforts will emphasize the use of integrated pest management techniques which exclude pests and mitigate damage rather than control populations whenever practical. The field use of chemical toxicants which cause secondary poisoning effects is generally prohibited for bird and mammal control by E.O. 11870. Public works environmental division will be called for wildlife or carcass removal. In cases where they cannot be reached and personnel or equipment may be at risk, the certified pesticide applicator may remove the animal.

3.2.8.9 Aerial Spraying

Aerial spraying can be conducted to effectively control disease-carrying insects, pest insects, and undesirable vegetation over a large area. No aerial spray operations are currently conducted or validated for NSA Hampton Roads. Validation for aerial spraying must be obtained from a category 11-certified pest management consultant with BUMED or NAVFAC Atlantic and clearance for aerial spray operations must be obtained from the Federal Aviation Administration. The validation Statement and the execution of a requirements type contract should be done before they are required to minimize delays in initiation of control operations.

The DoD tasks the 910th Airlift Wing at Youngstown Air Reserve Station, Ohio to maintain the DoD's only large area fixed-wing aerial spray capability to control disease-carrying insects, pest insects, undesirable vegetation and to disperse oil spills in large bodies of water. Missions may be executed in combat areas, on DoD installations or in response to disasters/emergencies as declared by the President of the United States.

3.2.8.10 Red Imported Fire Ant

Fire ants are a significant health concern due to their aggressive nature when disturbed and the allergic reaction that occurs in some people. The fire ant's mound building and stinging behavior interferes with recreational and grounds maintenance activities. Bait and residual insecticides are available for control of fire ants. Monthly inspections for fire ant mounds should be made in all improved and unimproved areas, with treatment as necessary. Infested areas should be treated with bait, followed by a drench of any mounds 6–8 weeks later. Any active mounds found in the interim should be retreated. Bait and residual insecticides are available for control of fire ants. Fire ants are a fairly recent invader in the area, and have only become a problem on the installation in the last decade.

3.2.9 Pest Management in Housing

Housing areas on the installation are under a PPV partnership with Lincoln Military Housing. The PPV partner is responsible for providing pest management services and for upholding the agreements set forth in the Partner's Plan for Pest Control. General pest control and grounds maintenance services are provided by contract. Certificates for the PPV contract pesticide applicators are located in appendix E. Contractors providing services in the PPV areas must follow all state and local laws.

Pet dogs and cats released or lost by owners on base can become a pest problem. Feral cats and dogs are susceptible to and can carry disease, damage natural habitats, harm protected wild animals, become a vehicle strike hazard, and attack and injure personnel. Pet owners are encouraged to microchip their pets. Microchipping is a permanent pet identification system using a computer chip implant in the skin of the animal. This allows a lost pet to be identified even if the collar tag is missing.

3.2.10 Self-Help Pest Management

Self-help pest control programs on DOD installations are authorized by DODI 4150.07 (section E4.7.7.3) when they are cost-effective and when IPM monitoring indicates the need for control. Self-help pest control allows uncertified personnel to use low-toxicity, ready-to-use (RTU) pesticides for small-scale pest control operations. Examples of self-help programs available are: stinging insect pest control for maintenance personnel, venomous spider control, fire ant control, vegetation control using glyphosate, and barracks/office pest control. Any personnel or departments conducting unauthorized pesticide applications should be directed to immediately cease applications. Requirements for self-help are:

1. The program shall be reviewed and approved by the IPM coordinator and then by the NAVFAC Atlantic PPMC

2. A program manager, who will be responsible for the program and be the primary point of contact, shall be designated

3. All personnel that will be applying pesticide must be trained and their training documented

4. Only RTU pesticides approved for use by the NAVFAC Atlantic PPMC shall be used

5. The area(s) to be treated should be small enough to be practically treated with RTU pesticides

6. All pesticides will be stored in a storage site as described on the pesticide label

7. All pesticide use will be reported.

To request review of a proposed program and submit a Statement of need, the IPMC must contact the NAVFAC Atlantic PPMC.

3.2.11 Prohibited Operations and Devices

Several operations and devices are prohibited by DOD and DON regulations.

Prohibited operations and devices include:

1. Occupied spaces—Installations shall not permit liquid spray and dust pesticide formulations in any space occupied by unprotected personnel. However, pesticides contained in gel or paste bait formulation may be applied in occupied spaces (OPNAV M-5090.1, paragraph 24-3.2).

2. Preventive or Scheduled Pesticide Treatments—DOD policy prohibits the use of regularly scheduled, periodic pesticide applications except in situations where the installation pest management plan clearly documents that no other technology or approach is available to protect personnel or property of high value (DODI 4150.07, section E4.10.3).

3. Electrically-Operated Devices—"Electromagnetic exclusion or control devices, ultrasonic repellent or control devices, and outdoor devices for electrocuting flying insects are not approved for use on DOD installations" (DODI 4150.07, section E4.10.1). This does not apply to indoor use of selected devices, carefully placed, for electrocuting flying insects. Pest surveillance traps and monitoring equipment, such as non-electrocuting mosquito light traps, may also be used by trained personnel.

4. Paints and Coatings Containing Pesticides and Other Biocides—DOD policy prohibits the use of paint containing insecticides on DOD property. This includes interior and exterior paints. Paints containing fungicides as mildew inhibitors and approved marine antifouling compounds or coatings may be applied to protect surfaces of watercraft (DODI 4150.07, section E4.10.2).

3.3 REGULATORY COMPLIANCE

The Department of Defense's policy is to ensure that DOD pest management programs achieve, maintain, and monitor compliance with all applicable executive orders and applicable federal, state, and local statutory and regulatory requirements. When there is a conflict between federal and local regulations, the installation will comply with the more stringent of the two. This may occur with pesticides limited for use by the state, which are not necessarily restricted by the EPA. In this case, the installation must comply with state regulations.

3.3.1 Pesticide Regulation and Enforcement

The U.S. Environmental Protection Agency has the primary authority to regulate pesticides in the United States. The EPA delegates pesticide enforcement authority to states through cooperative agreements. Per OPNAVINST 6250.4C, Navy installations must comply with state and local pesticide use regulations.

The responsibility for compliance and enforcement lies with the installation's commanding officer. As the installation CO's pest management advisor, the IPMC shall be familiar with federal, state, and local pesticide use regulations and ensure that all applicators conduct operations in compliance with these regulations. The environmental division should be familiar with these regulations as well due to the environmental hazards of pesticides. Regulatory enforcement for each of the PMSPs is provided.

1. Commercial contractor applicators: PMPARs shall provide assistance by monitoring contract PMSPs for compliance with all applicable regulations as specified in the contract and will recommend appropriate actions to the contracting officer if the contractor does not comply. Preventive medicine technicians conducting sanitation inspections of food service facility pest management programs can also ensure compliance for safe pesticide use and applicator licensing/certification. Inspection guidelines are found in NAVMED P-5010, chapters 1 and 8. The preventive medicine technicians will notify the IPMC of any potential pesticide application violations observed during the course of routine sanitation inspections.

2. DOD applicators: The pesticide applicator's immediate supervisor, with the assistance of the IPMC, shall also ensure that pesticide use is in compliance. Under the authority of DODI 4150.07 and DOD Directive 5134.01, and per Department of Defense Manual (DODM) 4150.07, Volume 1, DOD Pest Management Training and Certification Program, the DOD may deny, suspend, or revoke the certificate of any DOD employee who violates any provision of Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) or falsifies records under DODM 4150.07, Volume 1. In accordance with DODM 4150.07, Volume 1, the installation CO may initiate a formal review if FIFRA violations are suspected. Violations shall be reported through appropriate command channels to the NAVFAC Atlantic certifying authority for review. The certifying authority shall determine if further action is required. That action may include suspension of the applicator's certification.

Naval Facilities Engineering Command, Atlantic Applied Biology shall provide assistance to the installation IPMC with compliance and enforcement issues and clarification of regulations. The senior pest management consultant is the certifying official for DOD-certified pesticide applicators on the installation.

3.3.2 Pesticide Laws and Regulations

Primary pesticide regulations include:

1. Federal: U.S. Code of Federal Regulations (CFR) at 40 CFR Section E, 152-180: Pesticide Programs (http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfrv21_03.html).

2. DOD and Navy: DODI 4150.07, DOD Pest Management Program; OPNAVINST 6250.4C, Navy Pest Management Programs; OPNAV M-5090.1, Environmental Readiness Program.

3. Virginia: The Virginia Department of Agriculture and Consumer Services, Office of Pesticide Services regulates the pest control industry (http://www.vdacs.virginia.gov/pesticides).

3.3.2.1 The Pesticide Label

The primary source of pesticide regulations for the pesticide applicator is found on the pesticide label in accordance with 40 CFR § 156. Virginia may add supplementary labels which are regulations that must be complied with in the state. It is a violation of federal and/or Virginia law to use a pesticide in a manner inconsistent with the label. Note, however, that the pesticide label does not provide specific information for each site where the pesticide may be applied. For example, the pesticide label may allow application of an herbicide to unimproved grounds, but if those grounds are within a ringed map turtle habitat, then pesticide use may be restricted under the Endangered Species Act. Pesticide applicators should be aware of environmentally sensitive areas before beginning any new pesticide application and should consult the installation's environmental division. For more on pesticide labels, see http://www.epa.gov/pesticides/label/.

Endangered Species Protection Bulletins set forth geographically-specific pesticide use limitations for the protection of endangered or threatened species and their designated critical habitat. If your pesticide label directs you to the EPA Bulletins Live Web site (http://epa.gov/espp/bulletins.htm), you are required to follow the pesticide use limitations found in the Bulletin for your county, pesticide active ingredient, and application month.

3.3.2.2 Other Regulations

Other applicable directives, laws, and regulations concerning pesticide applicators and pest management operations are listed and described in appendix F.

3.4 PESTICIDE MANAGEMENT

Chemical control of pests using pesticides can be an integral part of an IPM program. Proper management of pesticides will ensure a safe and cost-effective pest management program. Management of pesticides includes the proper selection of pesticides, pesticide approval, procurement, storage, mixing, use of pesticide application equipment, and clean-up. The pesticide label provides most of the information needed to manage pesticide use and must be affixed to the container at all times.

3.4.1 Pesticide Selection

The following criteria should be used when selecting a pesticide:

1. Determine the need for a pesticide. Is a chemical pesticide really needed? In some situations non-chemical control methods may be more effective or less costly and time-consuming in the long term. Will exclusion or habitat elimination take care of the problem?

2. Choose a pesticide with a low toxicity. Can the pest be sufficiently controlled with a pesticide that has a low toxicity to humans?

3. Choose pesticides and pesticide formulations with minimal environmental impact. Avoid using "Restricted Use" pesticides if possible. The environmental impact of pesticide spills is reduced when using a granular pesticide formulation rather than a liquid. Can attractant bait stations be used instead of broadcast application of a pesticide?

4. Choose pesticides that provide a long-term or sustainable solution. For example, contact insecticides applied to ant trails will only temporarily halt the infestation, and may cause the colony to bud and form new colonies, while baits can kill the entire colony including the queen.

3.4.2 Pesticide Procurement

Pesticides used by contractors are included in the cost of the contract and are procured through commercial sources. Pesticides used by DOD personnel may be purchased through the Federal Stock System. Contractors cannot purchase pesticides through the Federal Stock System. A list of pesticides approved by the DOD and found in the stock system can be found at http://www.acq.osd.mil/eie/afpmb/pest_equiplists.html. These are not the only pesticides that may be used on the installation. Only pesticides listed on the installation's pesticide AUL (appendix D) may be purchased. All pesticide products and pest control services procured via government credit cards must also be pre-approved by the NAVFAC Atlantic PPMC according to DON eBusiness Operations Office Instruction (EBUSOPSOFFINST) 4200.1A, Department of Navy Policies and Procedures For the Operation and Management of the Government Commercial Purchase Card Program (chapter 6,

paragraph 7). For information on requesting new pesticides to the installation pesticide AUL, see section 2.2, Pesticide Approval.

3.4.3 Pesticide Storage

Pesticide storage facilities, retail sales, and vehicles each have specific requirements in regards to pesticide storage.

3.4.3.1 Pesticide Storage Facilities

DODI 4150.07, section E4.5.1, states that pesticide storage facilities "shall comply with all applicable regulatory standards and shall, where feasible, be modified to meet the minimum standards for new pesticide storage facilities." The Department of Defense standards are described in AFPMB TG No. 17 Military Handbook, Design of Pest Management Facilities. The NAVFAC Atlantic PPMC should be consulted during the design phase of new pesticide storage facilities to ensure that the latest requirements are included.

At a minimum, all existing facilities shall meet the following standards:

1. An active ventilation system that provides a minimum of six air changes per hour
2. Backflow prevention on all water sources used for mixing/filling
3. No floor drains and a surrounding berm that provides containment of any pesticide spills
4. Warning signs
5. Surrounded by a climb-proof fence with access only through doors with locks.

Sewells Point golf course stores pesticides in outdoor Hazmat storage buildings in the maintenance area on the golf course.

Raytheon stores pesticides in Building 446 at the Northwest Annex per contract specifications. Other contractors are not permitted to store pesticides on the installation.

The Marine Corps Security Forces Training Company stores glyphosate herbicide and wasp killer (aerosol) in a designated locker inside a temporary building at the firing Range on Northwest Annex.

3.4.3.2 Retail Sale Pesticide Storage

Household, pet, and garden pesticides displayed and sold at the commissary and NEX shall be stored in their original, sealed containers.

3.4.3.3 Vehicles

Pest control vehicles must carry pesticide spill kits in accordance with OPNAVINST 6250.4C (paragraph 13d). Pesticides shall not be transported in the vehicle's passenger compartment and pesticide containers shall be secured to vehicles to prevent spillage.

3.4.4 Pesticide Mixing

Pest control operators must mix pesticides in accordance with the pesticide label in appropriate areas that minimize the risk of safety and environmental hazards. Contracted pest control operators must also mix pesticides in accordance with the contract specifications. Persons mixing pesticides with water shall protect the water supply from back-siphoning of the pesticide mixture. They shall also ensure accurate measurement of concentrated pesticide to ensure proper application rate. Precautions must be taken to minimize the risk of a pesticide spill. See section 5.3.4 for pesticide spill prevention measures. Spill kits must be maintained on pest control vehicles and must be available at the mixing site.

When contractors mix pesticides to apply a soil treatment for termite prevention during building construction, the contractor must mix the termiticide on-site while the PMPAR or IPMC is there to witness.

3.4.5 Pesticide Application

All pesticides shall be applied in accordance with federal, state, and label directions. In accordance with label directions, personal protective equipment should be worn during the application of pesticides. Application of pesticides should be timed to ensure contact with and maximum kill of the pest and to prevent use under adverse weather conditions that can cause drift of the chemical outside the target area. See section 4.2.2 for more information on timing and drift prevention

3.4.5.1 Service containers

Containers other than the original pesticide container that are used for transporting pesticides to the job site must have a copy of the label attached. Service containers used for the application of a pesticide must have the following information on a tag attached to the container: name of party responsible for the container, the identity of the chemical in the container, and the signal word of the chemical. Containers commonly used for food, drink, or household products shall not be used to hold pesticides.

3.4.5.2 Equipment

Only pest control equipment that is in good repair and safe to operate shall be used by PMSPs. The equipment should be in good condition, free from corrosion, clean, and free from leaks. The PMPAR shall inspect equipment used by contract applicators. Applicators shall also ensure that they use equipment suitable to ensure proper application of pesticides.

3.4.6 Pesticide Disposal

All pest control equipment shall be properly cleaned. Contract PMSPs are not allowed to dispose of excess pesticide, used containers, or residues on the installation per contract specifications; they must conduct all cleaning off-site. Spray tanks and pesticide containers must be triple-rinsed prior to storage or disposal. Disposal of pesticide spray tank rinse water should be performed by applying to a site listed on the pesticide label, used for future mixing of the same pesticide, or disposed of as hazardous waste. Rinse water shall not be allowed to enter storm drains.

3.4.6.1 Sprayer Clean-Outs

When cleaned, spray equipment will be triple rinsed in the field using 10 percent of the tank capacity divided into 3 doses. The rinse material will be sprayed on the application site in accordance with the pesticide label.

3.4.6.2 Empty Containers

OPNAV-M 5090.1 (paragraph 24-3.12) requires disposal of pesticide wastes be in accordance with 40 CFR § 262, EPA Regulations for Hazardous Waste Generators. The disposal of pesticides, their containers, and related wastes is strictly regulated. Empty liquid pesticide containers will be triple-rinsed with 10 percent of the container's capacity divided into 3 doses. Disposal of empty containers will be coordinated with the installation's environmental division. Empty containers will not be reused. If possible, pesticide containers shall be returned to the manufacturer for recycling.

3.4.6.3 Rinse Water

Water from rinsing out equipment will be used immediately. If it cannot be sprayed on the application site, rinse water should be stored in marked plastic containers and used as the diluent for the next time the same pesticide is formulated for application. Wastewater formulations that contain pesticides shall not be discharged into any storm or sanitary sewer system.

3.4.6.4 Excess Pesticides

Disposal or redistribution of excess pesticides shall be coordinated through Environmental and the IPMC. Environmental and the Consolidated Hazardous Material Reutilization and Inventory Management Program will determine whether the pesticide can be redistributed or if it needs to be disposed of. Excess pesticides shall never be disposed in any storm or sanitary sewer system.

3.5 MINIMUM RISK PESTICIDES

Minimum risk pesticides, such as those marketed under the EcoEXEMPT brand, may be used by pest management service providers as part of their IPM program. According to the EPA, "Minimum risk pesticides are a special class of pesticides that are not subject to federal registration requirements because their ingredients, both active and inert, are demonstrably safe for the intended use." These pesticides are exempt from federal registration under section 25(b) of the FIFRA and are not labeled with an EPA registration number. Since there is no federal review of these pesticides or their pesticide label, there is no federal review of the instructions for effective use of these products. Although these pesticides are exempt from federal registration, they still need to be approved prior to use on DOD property, primarily for efficacy and safety reasons.

3.6 CANCELED PESTICIDES

The EPA has canceled or restricted several common pesticides.

3.6.1 Organophosphates

Chlorpyrifos (e.g., Dursban, Lorsban) and diazinon were, widely used pesticides that have been canceled. The following actions are allowed with these pesticides:

1. End users (e.g., PMSPs and private, residential users) should check with NAVFAC Applied Biology or state/local regulatory agencies for guidance. Some canceled pesticides are allowed to be used until stocks are depleted, while others are under a stop use order.

2. PMPARs should monitor the use of the pesticides by contractors to ensure that they are not using an increased amount of the pesticides as a means of using up their stock.

Fenamiphos (e.g., Nemacur), a systemic insecticide/nematicide commonly used for the control of turf nematodes, was canceled by the EPA on May 31, 2008 with an end use date on October 6, 2017. Use any remaining stocks in accordance with the label until the end use date.

3.6.2 Organic Arsenicals

The EPA is also canceling most organic arsenical pesticide registrations, which consist of monosodium methanearsonate (MSMA), disodium methanearsonate (DSMA), calcium acid methanearsonate (CAMA), and cacodylic acid and its sodium salt. All uses of DSMA, CAMA, and cacodylic acid and its sodium salt were canceled as of September 30, 2009.

All uses of MSMA except cotton, sod farms, golf courses, and highway rights-of-way, were canceled as of September 30, 2009. Use of MSMA on sod farms, golf courses, and highway rights-of-way was to have been prohibited after December 31, 2013, but because the EPA is considering newly-submitted information, these uses remain registered. These uses, in addition to the cotton use, will be considered in the pending registration review process for MSMA. Users can continue to apply MSMA on sod farms, golf courses, and highway rights-of-way until further notice, but thoughtful use and consideration of depleting stocks is highly encouraged. For golf courses and highway right-of-ways, the following restrictions currently apply:

1. For golf courses:

    a. Spot treatments only (100 square feet per spot), not to exceed 25 percent of the total golf course acreage per year

    b. One broadcast treatment for newly constructed courses only.

2. For highway right-of-way:

    a. Two broadcast applications only on highway rights-of-way

    b. A 100-foot buffer around permanent water bodies.

CHAPTER 4

Health and Safety

4.1 PESTICIDE APPLICATOR SAFETY

To ensure the safe use of pesticides, pesticide applicators shall handle and apply pesticides in accordance with the product's label directions.

4.1.1 Potential Occupational Hazards

The following hazards may be encountered by pesticide applicators or Government representatives that may be exposed while inspecting pest management operations. Occupational safety and health guidance is found in the OPNAVINST 5100.23G, The Navy Occupational Safety and Health Program Manual.

4.1.1.1 Direct Contact Toxic Chemical Exposure

Many chemicals used as pesticides are also harmful to humans. The three routes of exposure to applicators are dermal, inhalation and ingestion. For applicators, the most common route of exposure is dermal and is frequently due to not wearing the appropriate personal protective equipment. Severity of the harmful effects is determined by duration of exposure and toxicity of the chemical. The effects can be acute (rapid onset due to high-dosage, high-toxicity chemicals) or chronic (slow or delayed onset due to long-term exposure to low-dosage, low-toxicity chemicals). The highest risk for severe acute chemical exposure occurs during pouring and mixing of concentrated pesticide resulting in high-dose, rapid-onset chemical poisoning. Chronic exposure can occur when the applicator fails to use appropriate PPE during frequent pesticide applications and the chemical accumulates in the body of the individual over a period of time leading to delayed or gradual onset of illness or injury. Direct chemical exposure can result not only in pesticide poisoning, but also in skin burns due to corrosive chemicals.

4.1.1.2 Heat

The use of protective equipment such as a respirator, goggles, gloves, and coveralls increases the risk of heat injury especially in warm climates. Heat injury can occur during long periods of work outdoors during warm weather or in enclosed spaces where machinery or equipment may generate heat.

4.1.1.3 Noise

Some pesticide application equipment use gas-powered air compressors or pumps that produce noise hazards. Gas-powered backpack sprayers are particularly hazardous due to the proximity of the noise source to the ears.

4.1.1.4 Eye Hazards

Eye hazards may result from chemical splashed into the eyes causing corrosive, toxic, or impact injury. Some pesticides are labeled "Restricted Use" due to their corrosive nature. The highest risk occurs during pesticide pouring, mixing, and application. During pesticide applications, chemicals may enter the eyes

through splash back when applying the chemical under pressure into a crack or crevice or when applying pesticides overhead. Injury may also occur during equipment cleaning.

4.1.1.5 Infectious Zoonotic Disease

Care should be taken when trapping and handling live or dead animals. Hantavirus may be transmitted from rodents to humans through body fluid exposure or when breathing aerosolized rodent excreta. Pest management providers may be exposed when handling rodent carcasses after trapping or handling traps contaminated with rodent urine and feces. Feral dogs, cats, skunks, raccoons, and bats may carry and transmit rabies through a bite.

4.1.1.6 Inhalation Hazards

Many pesticides release hazardous vapors and are particularly hazardous in enclosed spaces. Some pesticides are labeled “Restricted Use” due to the high risk of inhalation injury. Personnel may be exposed during mixing, application, and equipment cleaning.

4.1.1.7 Electrical and Fire Hazards

Spot and crack and crevice applications may require application of a pesticide to areas near motors of refrigerators, compressors, and other machinery where it can become an electrical shock hazard. They may also be applied to areas near pilot lights resulting in an explosion and/or fire hazard.

4.1.1.8 Head Impact and Sharp Hazards

Surveys and pest control procedures may be done in attics, crawl spaces, basements, and other areas with low overheads where head impact hazards exist. Some devices used for bird roosting exclusion and rodent control have sharp edges and can cause cuts, puncture wounds, and abrasions.

4.1.1.9 Trip and Fall Hazards

Trip hazards may occur when applicators are spraying without close attention to where they are stepping. Spraying around buildings where there are various obstacles (e.g., plants, utility boxes, plumbing) in the path of the applicator can be particularly hazardous. Pest control may also need to be performed from ladders, on roofs, in ceilings, and in trees. Wet surfaces on the ground or on elevated surfaces can increase the risk of trips and falls.

4.1.1.10 Exposure to Harmful Animals

Venomous animals such as bees, wasps, rattlesnakes, and spiders are potential hazards when attempting to control them. Some of these are very dangerous due to envenomation and allergic reactions. Feral dogs, cats, coyotes, raccoons, and other large pest animals can inflict serious bites or clawing wounds.

4.1.2 Hazard Abatement

Detecting and reporting unsafe or unhealthful working conditions as early as possible, and then promptly controlling the reported hazards, is essential to a successful safety and occupational health program.

4.1.2.1 Operational Risk Management

Operational risk management (ORM) is a decision-making tool to reduce the risk of mishaps, whether in military contingency or support operations Pest management operations pose risks to human health and

the environment that affect the installation's mission that can be reduced and minimized through ORM. Pest management ORM uses the following process to minimize hazards:

1. Identify hazards—the hazards may involve the pesticide or the application equipment (see list of hazards in section 4.1.1).

2. Assess hazards—determine the degree of risk based on the probability and severity of these hazards. For example, the risk may be high if a highly-toxic pesticide is used daily.

3. Make risk decisions—develop risk control options. Decide whether benefits of control outweigh the risks involved.

4. Implement controls

    a. Engineering controls—e.g., use a less-toxic pesticide for controlling the pest

    b. Administrative controls—e.g., place warning placards around pesticide vehicles and pesticide storage areas.

    c. Personal protective equipment—e.g., wear a respirator when an inhalation hazard exists.

5. Supervise—follow-up to determine effectiveness of controls and monitor changes to hazards.

For more information on ORM, go to the Navy Safety Web site at http://www.public.navy.mil/navsafecen/Pages/index.aspx.

4.1.2.2 Training and Education

Pesticide safety is a core requirement for DOD and civilian pesticide applicator certification and licensing programs. Topics included in the DOD training are listed in DODM 4150.07, Volume 1, The DOD Plan for the Certification of Pesticide Applicators. Safety topics are also given during recertification courses. See section 2.4 for specific training information.

4.1.2.3 Read the Pesticide Label

Pesticide labels are found on all pesticide containers used by installation PMSPs. The pesticide label provides directions for mixing, applying, and disposing of pesticides safely. It also includes a list of hazards to humans and first aid treatment. It may also include a list of personal protective equipment that must be worn and user safety recommendations. The label should always be read completely and thoroughly by the applicator before purchasing and using a pesticide. The label is a legal document mandated by FIFRA.

4.1.2.4 Personal Protective Equipment

Personal protective equipment (PPE) should always be used when applying pesticides. The type and level of protection needed will be determined by the toxicity, formulation, and method of application of the pesticide. The pesticide label provides guidance on what PPE to use.

1. Respirator

2. Chemical-resistant gloves

3. Chemical-resistant coveralls or long-sleeve shirt and long pants
4. Chemical-resistant boots
5. Hard hat
6. Goggles
7. Apron
8. Face shield
9. Self-contained breathing apparatus (for fumigation).

Personal protective equipment must be appropriate for the type and application of the pesticide being used. It is the applicator's responsibility to maintain the PPE. Contractors must provide appropriate PPE to their applicators.

4.1.2.5. Pest Control Vehicle Safety Devices

Pest control vehicles should be equipped with safety devices and information.

1. Labels and SDSs for all pesticides in vehicle
2. Emergency medical information including nearest emergency treatment center
3. Fire extinguisher
4. Spill kit
5. First aid kit
6. Cell phone or radio
7. Drinking water supply
8. Rinse water supply for washing pesticide off skin.

4.1.2.6 Pesticides and Equipment

The risk of pesticide exposure can be reduced by selecting the appropriate pesticide and equipment for the job. Applying small amounts of low-toxicity pesticide using appropriate and properly-maintained equipment greatly reduces the risk of harm. Using pesticides that are formulated (e.g., contain emetics) or packaged (e.g., water-soluble packets) to minimize chemical exposure and increase safety should be considered when purchasing pesticides. Pesticide selection is addressed in section 3.4.1. Equipment should be tested with water prior to use to ensure proper application and that it is not leaking. Situational awareness, such as monitoring meteorological conditions and location, may also prevent harmful exposure to pesticides.

4.1.2.7 Protection from Infectious Zoonotic Diseases

Pest control personnel who handle trapped animals or dead animal carcasses should wear gloves to prevent exposure to potentially infectious body fluids. A respirator fitted with a high-efficiency particulate air filter should be worn when entering enclosed spaces with large amounts of rodent feces that might be disturbed and become airborne. Additional protection from hantavirus can be provided by spraying dead rodents and rodent feces with a commercial disinfectant. This will kill hantavirus as well as wet the feces to prevent it from becoming airborne. Detailed guidance on rodent handling is found in AFPMB TG No. 41, Protection from Rodent-borne Diseases with Special Emphasis on Occupational Exposure to Hantavirus.

4.1.2.8 Hazard Communication

All pesticide applicators must receive Occupational Safety and Health Administration (OSHA) Hazard Communication training (29 CFR § 1910.1200). Contractors must carry safety data sheets in their vehicles or, as appropriate, at their on-base administration office. Applicators must understand all of the hazards associated with the chemicals they will use and be able to communicate those to the customer if necessary.

4.1.2.9 Medical Surveillance Program

Department of Defense pesticide applicators are required to be in a medical surveillance program depending on their hazard exposure. Applicators possibly facing exposure to organophosphate or carbamate pesticides should have their cholinesterase levels tested in accordance with https://nmcpeh-simweb.med.navy.mil/Content/medMatrix/MedicalMatrix.pdf, Medical Surveillance Procedures Manual and Medical Matrix. Medical surveillance is conducted by the occupational health clinic at the Naval Branch Health Clinic in accordance with http://www.med.navy.mil/sites/nmcphc/Documents/oem/OccMedFieldOpsManual_Aug2006.pdf, Occupational and Environmental Medicine Field Operations Manual.

4.2 PUBLIC SAFETY

By their nature, many pesticides may pose some risk to humans, animals, or the environment because they are designed to kill or otherwise adversely affect living organisms. Safely using pesticides depends on using the appropriate pesticide and using it correctly.

4.2.1 Potential Hazards to the Public

A potential hazard is the risk of harmful effects from pesticides and the level of risk depends on the toxicity of the pesticide and the exposure a human will receive in any situation.

4.2.1.1 Direct Contact with Pesticides

Pesticide exposure can occur through dermal contact with a pesticide on a surface, inhalation of vapors, or ingestion of pesticide through contaminated food or eating utensils. This type of exposure can occur if a pesticide application is done while unprotected building occupants are present, occupants are allowed entry into buildings before the pesticide has dried, or food and food preparation and serving equipment are not properly protected or cleaned after an application.

4.2.1.2 Pesticide Drift

Pesticide drift occurs when a pesticide leaves the target area and affects unprotected persons outside the area. This commonly occurs outdoors when winds can carry the pesticide off-site. Drift can occur indoors if there is air movement or pesticides are drawn up through ventilation ducts. Pesticide applications that involve small pesticide droplets, such as fogging or ultra-low volume application, or dusts are most susceptible to drift.

4.2.1.3 Contact with Contaminated Water

Some pesticides can move through soil and contaminate groundwater used for drinking. Others, if applied in or close to surface water, can cause contamination of recreational waterways.

4.2.1.4 Injury Due to Animals

The use of an inappropriate pesticide may cause collateral injury due to an insufficient knockdown of the target pest. This can occur with bees and wasps. Some insecticides do not knockdown the insects rapidly and may actually excite them causing them to become more aggressively defensive in behavior. Unprotected persons blocks away from the pesticide application may become the target of their aggression. Injury can also occur when persons get too close to or try to release a trapped animal or try to capture feral animals by themselves.

4.2.1.5 Fumigation Exposure

Fumigants are highly toxic and can cause immediate death upon exposure. Fumigations can be performed in the housing area where it poses a potential hazard to neighbors and pets. During fumigation the chemical is injected into a tarped structure and allowed to remain for 24 hours. The highest risk of injury or death occurs if a person or animal were to enter the tarp during this period or after the tarp is removed, but before the building is completely ventilated. The fumigant, when exposed to air, dissipates rapidly and readily.

4.2.2 Hazard Abatement

Pesticide applicators should continually be aware of the hazards associated with pesticide use in order to protect the public from exposure.

4.2.2.1 Proper Timing of Pest Control Operations

Most indoor application of pesticides should be conducted when building occupants are not present. An exception to this is the application of pesticide baits that are enclosed in a tamper-resistant bait station that does not allow exposure to occupants or pets. The building occupants must remain out of the building to allow the liquid pesticide to dry. Some pesticide labels are specific about re-entry times (time after application that occupants are allowed back into the treated building). Some pesticides, such as fumigants, provide specific directions on aeration of spaces to remove pesticide prior to re-entry. Certain operations, such as bee and wasp control or removal, are best conducted after the area has been cleared of unprotected persons. Refer to the product label for specific information.

4.2.2.2 Preventing Pesticide Drift

Pesticide drift from target areas to areas where humans, animals, and plants can be affected can be reduced through the following means (adapted from University of Nebraska publication G1773, Spray Drift of Pesticides).

1. Select low or nonvolatile pesticides.
2. Read and follow the pesticide label. Apply a pesticide only if an application is warranted.
3. Use spray additives that decrease drift within label guidelines. This will increase the droplet sizes and pesticide effectiveness.
4. Use larger spray nozzle orifice sizes. This will give larger droplets and will increase the number of tank refills, but will improve coverage and effectiveness.
5. Avoid high pressure. High pressure creates finer droplets; 45 PSI should be considered maximum for conventional broadcast spraying.
6. Use drift-reduction nozzles. These will produce larger droplets when operated at low pressures.
7. Use wide angle nozzles and low boom heights, and keep the boom stable.
8. Drift is minimal when wind velocity is less than 10 mph. Do not spray when wind is greater or blowing towards sensitive crops, gardens, dwellings, livestock, or water sources.
9. Use shielded spray booms. When banding, use shroud covers to keep chemical from drifting.
10. For indoor applications, turn off ventilation and close doors to prevent air currents.

4.2.2.3 Prevent Tampering with Animal Traps

Caged animals can be very aggressive. Traps should be placed in areas where they will not be tampered with by humans or pets. Warning signs can be placed on the traps and area occupants can be warned of the risk of injury. Live and dead rodents in traps can also be a hazard for hantavirus. Traps should be placed in areas where humans or domestic animals will not be exposed to the rodents.

4.2.2.4 Protection of Fumigation Sites

Warning signs should be posted at the fumigation site warning of the hazards. Some installation contracts require the contractor to provide a 24-hour roving watchperson to patrol the fumigation site to prevent entry by unauthorized personnel.

4.2.3 Special Safety Considerations

Certain areas require special considerations due to the sensitive nature of the area or the people contained in that area.

4.2.3.1 Child Development Center

Children can be sensitive to pesticides and other chemicals. Parents are also concerned about potential hazards that their children may be exposed to and have a right to know about these hazards. Best practice

is to minimize pesticide use in and around child development centers and schools, use only enclosed baits and low-toxicity pesticides, do not apply pesticides when people are present, and inform staff and parents of any pesticides used on the property. Integrated pest management methods should be used to reduce the health risks of pesticides to children.

4.2.3.2 Branch Clinic

Persons undergoing medical treatment may be highly sensitive to pesticides and pesticide odors in the environment. Additionally, medical equipment and supplies may be contaminated during pesticide applications. Alternative IPM methods must be considered prior to using pesticides in medical treatment areas. If pesticides must be used, then only crack and crevice treatments with low toxicity pesticides or enclosed baits can be used. Application of any liquid or dust formulation must only be done when the area is unoccupied. Guidance for pest management operations in medical treatment facilities can be found in AFPMB TG No. 20, Pest Management Operations in Medical Treatment Facilities.

4.2.3.3. Food Service Areas

Food contaminated with pesticides can lead to pesticide poisoning. Sanitation and exclusion should be the primary means of preventing and reducing pest infestations. Pesticide use in food service areas should be limited to low-toxicity pesticides, applied to cracks and crevices, and baits. The area should be properly prepared for treatment by putting away utensils and equipment and covering food preparation services. After treatment, the area should be thoroughly cleaned to prevent contamination.

4.3 PEST CONTROL ACCIDENTS

In the case of a pest control accidents, applicators should be trained in first aid procedures and identify the nearest medical services.

4.3.1 First Aid

First aid for pesticide accidents is included on the pesticide label. The applicator should be familiar with first aid procedures required for the pesticide they are using. A copy of the label must be available at the application site. For some pesticides, immediate first aid and medical treatment may be required.

4.3.2 Medical Emergencies

Pesticide applicators experiencing an acute exposure to hazardous pesticides or significant injuries sustained in control operations should immediately go to the nearest emergency room capable of treating their emergent condition. Pesticide applicators that are government employees enrolled in a medical surveillance program with the occupational health department should schedule a follow-up appointment after their condition has subsided. The name, address, and telephone number of an emergency medical care facility should be posted in the commercial applicator's vehicle. For pesticide poisonings, a copy of the pesticide label should be given to the medical first responders or taken to the emergency medical facility. If cholinesterase-inhibiting pesticides (e.g., malathion) are used, the proper antidotes include atropine and 2-pam chloride.

CHAPTER 5

Environmental Considerations

5.1 ENVIRONMENTAL MANAGEMENT SYSTEM FOR PESTICIDES

This IPMP puts pesticide management within the framework of the DOD and the Navy Environmental Management System (EMS). This plan provides the tools and products to include pesticide management in the installation's overall EMS program.

5.1.1 Department of Defense Policy

Department of Defense policy states, "The Department of Defense shall integrate EMS into missions, activities, functions, contracts, and installation support agreements as a business practice for improving overall performance. EMS is a vital supporting component of the DOD mission and is therefore the responsibility of all DOD personnel. It is not just an environmental function responsibility, but requires active participation from all functions and organizations." The remainder of this policy and details on the EMS program are found in DODI 4715.17, Environmental Management Systems.

5.1.2 Definition of an Environmental Management System

According to the Council on Environmental Quality, Instructions for Implementing Executive Order 13423, Strengthening Federal Environmental, Energy, and Transportation Management, March 29, 2007, "Environmental Management System means a set of processes and practices that enable an organization to increase its operating efficiency, continually improve overall environmental performance and better manage and reduce its environmental impacts, including those environmental aspects related to energy and transportation functions. EMS implementation reflects accepted quality management principles based on the "Plan, Do, Check, Act," model found in the ISO 14001:2004(E) International Standard and using a standard process to identify and prioritize current activities, establish goals, implement plans to meet the goals, evaluate progress, and make improvements to ensure continual improvement."

5.1.3 Conformance of the Pest Management Program to the Environmental Management System

An EMS is composed of five basic components. The components and how the pest management program conforms to these components are:

5.1.3.1 Policy

The installation has established an environmental policy to support "mission readiness through environmental stewardship." Pest management environmental objectives to meet this policy are:

1. Reduce pesticide pollution that affects the installation's neighbors through the use of IPM to prevent adverse impact on air, water, and land resources

2. Use IPM to preserve aspects of the natural environment by managing and controlling invasive and nuisance pests and preventing pesticide pollution

3. Ensure and maintain the competence of pest management personnel through certification and training to ensure that effective operations and technologies are used to control pests that minimize waste, prevent air and water pollution, minimize health and safety risks, and dispose of waste safely and responsibly

4. Enable the IPMC to maintain effective oversight and coordination of the program and liaison with local agencies in order to ensure regulatory compliance.

5.1.3.2 Planning

This IPMP is the installation's primary planning document. Specific planning items included in the IPMP are:

1. Legal and other requirements as identified in section 3.3, appendix F, and throughout the plan.

2. General objectives and targets as included in section 1.3.2 and specific pest management objectives included in the IPM sheets in chapter 8.

5.1.3.3 Implementation

Implementation of the EMS is addressed in the following sections of the IPMP:

1. Roles and responsibilities—section 2.1.

2. Pest management personnel training and awareness—section 2.4.

3. Program documentation includes record keeping, reporting, and IPMP updates—sections 2.3 and 1.1.4.

4. Operational requirements—section 1.3.3. Operational control is the responsibility of the pest management service providers and is maintained through their contract. Integrated pest management is the operation used for reducing environmental impacts and supporting mission priorities.

5. Safety considerations—chapter 4.

5.1.3.4 Checking and Corrective Action

The success of an EMS depends on the ability of an installation to assess and correct itself. The self-assessment checklist (appendix C) provides the basis for a self-assessing and self-correcting system.

5.1.3.5 Management Review

The review of the program is conducted during environmental audits by Commander, Navy Installations Command (CNIC).

5.1.3.6 Emergency Management System Definitions

The following are common terms used in EMS:

1. Practice—any activity conducted by an installation or its tenants in performing their missions that has an actual or potential impact on the installation's assets. The term practice includes equipment, processes, and facilities. It includes both business and management practices.

2. Practice owner—the person, unit, or organization that operates, conducts, controls, or is otherwise responsible for a practice.

3. Environmental aspects—elements of an organization's activities, products, or services which can interact with the environment.

4. Impact—the positive or negative effects on assets of conducting business and management practices.

5. Vulnerable assets—A resource on which the installation depends or for which it has some responsibility, and which may be impacted by the conduct of practices. Vulnerable assets may include environmental, historical, and cultural areas on and off the installation; personnel health and safety; mission effectiveness; military training lands; real property; financial resources; and public relations status.

5.2 ENVIRONMENTAL CONSIDERATIONS ON THE PESTICIDE LABEL

If the pesticide is potentially harmful to the environment, information will be provided in the following sections of the label:

1. Directions for Use—If pesticide drift is a potential environmental hazard, the directions may require certain application equipment and/or the addition of an anti-drift agent to the tank mix.

2. Environmental Hazards—This section may indicate the pesticide is particularly hazardous to specific animals (e.g., bees, fish). It will also provide information on how to avoid environmental damage.

5.3 MANAGING ENVIRONMENTAL IMPACT

Air, water, and soil risk contamination from pesticides. Pesticide drift to outside the target application area is the primary reason for contamination. Pesticides that pose the highest risk of contamination are herbicides applied to improved and unimproved grounds. Despite being applied in water, pesticides to control mosquito larvae pose a minimal risk due to the target-specific nature of the pesticide (e.g., the biopesticide, *Bacillus thuringiensis israelensis* (Bti), and insect growth regulators). Many procedures to reduce the impact of pest management practices on vulnerable assets are already in place.

5.3.1 Pesticide Pollution

A pesticide is unique as a potential environmental pollutant. When it is applied properly for the correct target pest and to the target location, it is not considered a pollutant. When a pesticide is applied or it drifts outside of the target area, it becomes a pollutant. Pollution can occur during most pest management practices as the result of accidental spills, air and water emissions, and container disposal. Pollutants can be in the form of pesticide residues from equipment and container cleaning or be waste containers.

5.3.1.1 Synthetic Pyrethroids

Pyrethroids are insecticides that are widely used for household, garden, and agricultural pest control. Most were replacements for more toxic and environmentally-hazardous organophosphate and carbamate

insecticides. Surveys have indicated that some pyrethroids are being detected in urban stream sediment and at least one chemical has been shown to be toxic to sediment dwelling organisms. Specific pyrethroids of concern include:

1. Bifenthrin (e.g., Talstar)
2. Cyfluthrin (e.g., Cykick, Tempo)
3. Beta-Cyfluthrin (e.g., Tempo Ultra)
4. Cypermethrin (e.g., Demon, Cynoff)
5. Deltamethrin (e.g., Deltadust)
6. Lambda-Cyhalothrin (e.g., Demand)
7. Permethrin (e.g., Permanone)
8. Tralomethrin

Outdoor operations pose the greatest risk for pyrethroid contamination of surface water and stormwater runoff. Increased risk operations that may use pyrethroids include landscape plant insect control, agricultural insect control, and uniform repellent treatment.

5.3.1.2 Pollinator Protection from Pesticides

The Office of the Under Secretary of Defense distributed a memorandum on the DoD Policy to Use Pollinator-Friendly Management Prescriptions dated 5 Sep 2014 (located in additional source documents). This memorandum is issued in accordance with and references DoD Instruction 4150.07 on DoD Pest Management and DoD Instruction 4715.03 on Natural Resources Conservation Programs. In response to this memorandum, NAVFAC Applied Biology put together the "Pollinator Friendly Pesticide Applicator Best Management Practices" fact sheet (located in additional source documents).

Pollinators, such as bees, bats, birds, and butterflies, are essential to the majority of the flowering plants in the environment and to the production of more than 130 different food crops. Protection of both managed bee colonies that are used in the agricultural outleases and feral bees must be considered in pest management operations. Pollinators are highly sensitive to many pesticides, especially insecticides. Best management practices to protect pollinators include:

1. Read the pesticide label for any precautions for bees and apply the product in a manner consistent with the label directions.
2. Use less hazardous insecticides. Certain classes of insecticides, such as organophosphates, carbamates, and neonicotinoids (i.e., imidacloprid), are highly toxic to bees.
3. Choose the least hazardous insecticide formulation if possible. Granules are the least hazardous. Dusts are the most hazardous because they are similar in size to pollen, stick readily to the hairs on the insect, and can be carried back to the nest.
4. Use insecticides with short residuals. The label will include a residual toxicity (RT) time that is the time after application until there is minimal toxic effect on bees.

5. Avoid applying any bee-toxic pesticides on blooming plants that attract bees.

6. Do not apply insecticides when temperatures are forecast to be unusually low or when the evening forecast is for dew. These conditions extend the period in which the insecticide residue remains toxic.

7. Apply pesticides that are toxic to bees at night when most honeybees have stopped foraging and returned to their hives.

8. Use ground applications instead of aerial applications to reduce pesticide drift out of the target area.

Efforts should be made to conserve bee colonies. If the situation allows, bee swarms and hives should be removed and relocated rather than destroyed. For more on protecting bees and other pollinators from pesticides go to the EPA Pollinator Protection Web site: http://www2.epa.gov/pollinator-protection.

5.3.1.3 Pollution Prevention

The following pollution prevention best practices should be used on the installation:

1. Determine the need for pesticide use by conducting surveillance.

2. Apply pesticides and clean equipment away from storm drains to prevent storm water contamination.

3. Do not pour pesticide container rinsate into drains. Apply rinsate to a site listed on the pesticide label, store rinsate to use for future pesticide mixing, or dispose of according to local regulations.

4. Use less-toxic and target-specific pesticides.

5. When applying permethrin repellent to uniforms outdoors, do not mix or apply near storm drains or where water run-off will result in storm water contamination, avoid overspray of pesticide onto the ground, and apply spray tank rinsate to uniforms.

6. Minimize outdoor applications of pyrethroid pesticides.

7. Use targeted spot spraying or crack and crevice applications rather than broadcast or baseboard spraying.

8. Minimize pesticide storage on the installation through proper inventory management and by not allowing contractors to store pesticides on the installation.

9. Use rodent traps rather than rodenticides.

5.3.2 Natural and Cultural Resources Protection

Natural resources on the installation have the potential to be impacted by pest management operations or have an impact on these operations. These pest management operations include, but are not limited to, surveys, trapping, weeding, biological control, and pesticide use. The installation's INRMP provides detailed information on the natural resources found on the installation. The INRMP also lists management objectives and recommendations to protect and enhance the installation's natural resources programs.

Any archeological sites on the installation are at low risk for damage due to pest management operations. Certain historical buildings may require special treatment depending on the pest management activity. The installation's ICRMP provides detailed information on the cultural resources found on the installation.

5.3.2.1 Environmentally-Sensitive Areas

Sensitive habitats are declared in the installation INRMP. The IPMC is responsible for knowing the boundaries and restrictions of sensitive habitat(s) on their respective site and communicating this information to any pest control or grounds contractors via the PMPAR. Although the IPMC should have a general knowledge of these areas, any proposed application of pesticides in any of these areas must first be coordinated and approved by the natural resources manager. Applications of pesticides to wetlands or other environmentally sensitive sites, such as tidal marshes and beaches, or around these areas should be carefully planned. Strict adherence to both the pesticide label and the clearances described in the INRMP are required.

5.3.2.3 Invasive Species Prevention

Invasive species can cause damage to native habitats and introduce diseases to native plants and animals. All military vehicles and materials that have been in contact with foreign soil and returning from foreign locations including Hawaii are required to be cleaned by the deployed unit and inspected by the U.S. Department of Agriculture Plant Pest Quarantine Officer prior to disembarkation onto U.S. soil per SECNAVINST 6210.2A, Quarantine Regulations of the Armed Forces. The purpose of these inspections is to prevent the introduction of disease causing organisms and plant pests. Although the inspections are generally thorough, the equipment of recently redeployed units should be monitored to ensure that any introduced pests are destroyed properly. Any pests found on this equipment should be reported to the environmental division.

5.3.2.4 Threatened and Endangered Species

Section 7(a) of the Endangered Species Act (ESA) (16 U.S.C. § 1536(a)-(d)), as amended, requires federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat. Regulations governing this interagency cooperation are included in 50 C.F.R. § 402.

A comprehensive list of endangered and threatened species is listed on the U.S. Fish and Wildlife Service (USF&WS) Web site. Listed species habitats are also protected as critical habitat under the ESA. Critical habitat information can be found through species information found at the USF&WS Web site.

Most species of mammals (including bats, raccoons, and skunks) and all but a few birds are protected by state or federal law. Federally-protected species, their nests, or their eggs may not be taken without obtaining permits from the U.S. Fish and Wildlife Service. Control of state-protected species may require permits from the state. All attempts shall be made to solve the problem through habitat alteration, exclusion, fright techniques, or similar approaches before lethal control is attempted.

There is one species designated as threatened (T) by the federal government, and several state endangered (SE), state threatened (ST), or state species of special concern (SSC) which are known to occur on the Northwest Annex. These are the northern long-eared bat, *Myotis septentrionalis* (T), Rafinesque's big-eared bat (SE), canebrake rattlesnake (SE), bald eagle (ST), Dismal Swamp southeastern shrew (ST), Atlantic white cedar community (SSC), bald cypress community (SSC), silky camellia (SSC), and a southern coastal plain mesic mixed hardwood forest (SSC). No threatened or endangered species are

known to occur on the Portsmouth Annex, Lafayette River Annex, or the Norfolk locations of NSA Hampton Roads.

5.3.2.5 Cultural Resources

Pest control operations should be checked for consistency with the Integrated Cultural Resources Management Plan. Pest management operations requiring alteration of the historical structure, including exclusion modifications and significant changes in landscape, will require consultation with the cultural resources program manager (CRPM) through the IPMC.

Termites damage wooden structures and incidental wood in steel and concrete buildings, such as trim or molding, paneling, or door and window frames. Annual termite inspections detect termite infestations before significant damage occurs. Any termite inspections of historical buildings should be documented using DD Form 1070 and reported to the CRPM.

NSA Hampton Roads does not have any historic buildings or known cultural resources of importance, although uncovered archaeological sites may be present in undeveloped areas.

5.3.3 National Pollutant Discharge Elimination System

Water pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The permit is available to operators who discharge to waters of the United States from the application of either biological pesticides or chemical pesticides that leave a residue when application is for one of four use patterns:

1. Mosquito and other flying insect control
2. Aquatic weed control
3. Aquatic nuisance animal control
4. Forest canopy pest control.

If pesticide applications for the above use patterns are expected to exceed thresholds, a Notice of Intent (NOI) and preparation of a Pesticide Discharge Management Plan (PDMP) (PDMP template included in appendix G) may be required. Practicing integrated pest management, recordkeeping, and monitoring are also requirements under the NPDES permits.

5.3.4 Spill Prevention and Management

Installation spill prevention guidelines shall be followed. The following spill prevention actions shall be taken:

1. Spill kits shall be readily accessible in all pest management vehicles, mixing sites, and pesticide storage facilities.
2. Pesticides shall only be stored in an area with containment to hold a spill and without a floor drain.

3. Portable mixing pads shall be used when appropriate.

4. All pesticide applicators shall be familiar with the installation emergency management plan, if available, and whom to notify in case of a spill.

All pesticide applicators are trained on spill response procedures as part of their initial pest management certification/licensing training. In accordance with OPNAVINST 3440.17 "Navy Installation Emergency Management Program", spills will be managed as described in the installation emergency management plan. Further information on preventing and controlling pesticide spills is contained in the AFPMB TG No. 15, Pesticide Spill Prevention and Management.

5.3.5 Hazardous Materials and Hazardous Waste Management

Pesticides, being hazardous materials, shall be managed in accordance with the applicable hazardous materials regulations, instructions and installation orders/procedures. Proper inventory management and planning will prevent waste generation. The appropriate use of pesticides produces very little hazardous waste. Rinse water containing pesticide residues usually has very small quantities of chemical and is often applied to the target pest site. Not permitting contractor storage of pesticides and on-site disposal of pesticide waste eliminates the need for hazardous material and waste management. In general, pesticides that are not applied must be disposed of as hazardous waste. Large quantities of hazardous waste may be produced when a pesticide is not used by its expiration date. It may also be produced if a pesticide is not used up before the registration for that pesticide is canceled and the stop-use date has occurred. These pesticides may be disposed of as universal waste only when allowed by the standards for universal waste management found in 40 CFR § 273. Any excess pesticides or absorbent material used for spill clean-up requiring disposal requires evaluation by the hazardous waste coordinator in the environmental division to ensure proper disposition.

5.4 PUBLIC PERCEPTION

The misuse of pesticides that lead to animal or human injury can lead to negative publicity for the installation. This is also the case with accidental pesticide spills, especially if they occur off-base or cause contamination of a local natural or cultural resource.

CHAPTER 6

Emergency Pest Management

6.1 PUBLIC HEALTH EMERGENCIES

Pests create a public health emergency when the pests increase in number and/or are found to carry human disease pathogens. A public health emergency, or potential emergency, requiring pest management action may be indicated in several ways. See the Emergency Vector-borne Disease Control Plan (EVDCP) for more information (appendix H).

6.1.1 Natural or Manmade Disaster

Usually pest problems do not develop immediately after a disaster, such as earthquakes, wildfires, floods, vehicle accidents and terrorist attacks. Public health pest problems may be the result of increased amounts of refuse, collapse of local infrastructure (e.g., lack of garbage pick-up), decay of human and animal bodies, and accumulation of standing water. The potential pest-related consequences are vector-borne or zoonotic disease outbreaks and increased contact with rodents and feral animals that may cause injury.

6.1.2 Vector-Borne or Zoonotic Disease

The report of human cases of vector-borne or zoonotic disease or the detection of infected mosquitoes or sentinel animals is an indicator of a public health emergency or potential emergency and often warrants an increase in pest management activities.

1. Reports of human cases—Many human cases of vector-borne and zoonotic disease identified in local medical facilities are reportable to the local and/or state health agencies. A report of a human case of West Nile virus or other vector-borne disease may initiate an investigation and result in alerts going out to other hospitals and clinics if it appears that the case was locally acquired. Immediate vector control may be necessary to prevent further transmission.

2. Detection of infected mosquitoes or sentinel animals—Routine surveillance for mosquito-borne diseases are conducted by local and state health agencies. These agencies report testing results through the public health system. This surveillance program is an early warning system that indicates when vector control should be initiated or increased to prevent human disease. The CDC's ArboNET Maps, http://diseasemaps.usgs.gov/mapviewer/ provide mosquito-borne disease information by state.

6.1.3 Animal Attack

Attacks on humans by vertebrate animals almost always require an emergency medical response. If a person is bitten or scratched by a mammal such as a dog, cat, skunk, coyote, fox, raccoon, opossums, or bat, they are at risk of contracting rabies and should begin a treatment program. If the animal that was involved can be positively identified and safely captured, it should be held for testing to determine if it is infected with rabies or other zoonotic diseases.

Bites by venomous snakes are always emergencies, and the victim should be immediately transported to the nearest medical treatment facility. If the snake can be identified or killed/captured, it may help in the selection of the proper antivenin for treatment.

Certain ants, bees, and wasps can cause painful stings and, in some cases, severe allergic reactions. The local fire department is usually the primary responder to bee sting incidents. Fire department personnel have been trained to protect and manage bee sting victims. A stinging incident is not considered a pest control response issue, but rather, an emergency response and any and all appropriate bee control measures can be used. If fire department response is delayed, installation first responders should be trained how to protect themselves and victims from bee stings.

6.2 AGRICULTURAL EMERGENCIES

Agricultural emergencies are the result of the introduction of insects or other animals that can cause extensive damage to agriculture or forestry in the state. Examples of introduced agricultural pests include the Mexican fruit fly and gypsy moth. Military installations can be a conduit for the introduction of these pests due to the movement of military equipment and personnel in and out of the state and the country. The military's role in preventing introduction of these pests is described in OPNAVINST 6210.2, Quarantine Regulations of the Navy and SECNAVINST 6210.2A, Quarantine Regulations of the Armed Forces. Inspections to prevent importation of pests are normally conducted at the port of debarkation in the foreign country.

6.3 EMERGENCY PEST MANAGEMENT RESOURCES

Installation PMSPs maintain pesticides and equipment to manage most emergencies. Contract PMSPs can be used for emergencies if it is written in the contract specifications. The Naval Branch Health Clinic should develop an EDVCP to manage public health emergencies (appendix H). It includes additional Navy and local government contingency vector surveillance and control resources.

CHAPTER 7

Program Resources

NSA Hampton Roads has access to the following support agencies and organizations for pest management assistance. Contact information specific to the installation is included in appendix B.

7.1 NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC APPLIED BIOLOGY

Naval Facilities Engineering Command, Atlantic Applied Biology is currently staffed by full-time, civilian DOD professional pest management consultants certified in DOD pesticide applicator categories 3, 5, 6, 7, 8, and 11. These personnel are assigned the following responsibilities:

1. Review and approve installation IPMPs in accordance with DOD and Navy policies

2. Provide technical assistance to the installation IPMCs, environmental managers, safety officers, medical officers, and other regional and installation personnel regarding pest management and pesticide regulatory compliance

3. Review and approve or reject pesticides and equipment to be used on installations

4. Conduct on-site program reviews and environmental compliance program external assessments to ensure compliance with the regulations and IPMPs

5. Compile and report actual pesticide use and pest management operations to appropriate DOD agencies

6. Provide IPM recommendations and pest identification;

7. Assist installations with writing or re-writing IPMPs

8. Provide recertification training for DOD-certified applicators as well as initial and recertification training for PMPARs/IPMCs.

The NAVFAC Applied Biology Web site is at: https://hub.navfac.navy.mil/webcenter/portal/ev/EV+Divisions/EV2+Planning+and+Conservation/Applied+Biology. This site is on the Naval Facilities Engineering Command intranet and is only available to NAVFAC, CNIC, and U.S. Marine Corps personnel who have an account. To request an account, personnel must have a sponsor with access approve the request through the initial single sign-on page.

7.2 NAVY ENVIRONMENTAL AND PREVENTIVE MEDICINE UNIT TWO

The Navy Environmental and Preventive Medicine Unit Two (NEPMU-2) is staffed by three full-time, active duty Navy entomologists. The entomologists are certified in DOD pesticide applicator categories 3, 5, 6, 7, 8 and 11 and are assigned the following responsibilities:

1. Acts as BUMED's professional pest management consultants to provide BUMED review of Emergency Vector-borne Disease Control Plans

2. Provides technical assistance on the surveillance and control of vectors on installations

3. Provides vector-borne disease risk assessments and disease prevention recommendations when requested

4. Provides disease vector management consultation and identification services

5. Provides contingency pest management in the event of a disaster or disease outbreak.

The NEPMU-2 Web site is at: http://www.med.navy.mil/sites/nepmu2/Pages/default.aspx.

7.3 VIRGINIA COOPERATIVE EXTENSION

The Virginia Cooperative Extension responds to the needs of individuals and organizations in Virginia by providing information and guidance in the areas of agriculture, natural resources, and consumer sciences.

The Web site is at: https://www.ext.vt.edu/.

The Virginia Cooperative Extension, Norfolk and Chesapeake local offices serve the cities where NSA Hampton Roads is located. Pest management service providers can obtain soil sample kits from the office and send them in for analysis. Extension agents can also visit the base to help in diagnosing problems.

The Norfolk Virginia Cooperative Extension Web site is at: http://offices.ext.vt.edu/norfolk/. The office can be contacted at (757) 683-2816.

The Chesapeake Virginia Cooperative Extension Web site is at: http://offices.ext.vt.edu/chesapeake/. The office can be contacted at (757) 382-6348.

7.4 VIRGINIA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

Personnel from the Virginia Department of Agriculture and Consumer Services are the pesticide regulatory officials for the Virginia. The main office is located in Richmond and is staffed with personnel that can provide information regarding Virginia and local pesticide regulations.

The Virginia Department of Agriculture and Consumer Services Web site is at: http://www.vdacs.virginia.gov/.

7.5 VIRGINIA DEPARTMENT OF HEALTH

Public health biologists provide vector surveillance and control assistance throughout Virginia. They are Virginia-certified in public health pest management and provide assistance to counties that either do not have or only have limited vector surveillance programs.

The Virginia Department of Health, Vector Borne Disease Control Web site is at: http://www.vdh.virginia.gov/environmental-epidemiology/vector-borne-disease-control.

CHAPTER 8

Integrated Pest Management Sheets

The following sheets provide general guidance for control of common pests and are not installation specific. They should be used as a basis for pest management action, but should not be considered "regulations" for the job. Management sheets should be used as guidelines to help implement reasonable, cost effective, safe, environmentally responsible control of pests. The integrated pest management coordinator (IPMC) or other pest control personnel may choose to establish different thresholds and use IPM methods that are more appropriate to their local circumstances. Write in any new ideas or programs to maintain a document that will remain applicable over time. Any suggested pesticides from these sheets are required to be approved before use.

NUISANCE PESTS

American Cockroaches

Cockroaches in Food Preparation Areas

Drain Flies

Fruit Flies

Nuisance Ants

Stored Product Pests in Food Storage Areas

HEALTH-RELATED PESTS

Bed Bugs

Filth Flies

Fleas In and Around Buildings

Mites

Mosquitoes, Adult Control

Mosquitoes, Larval

Spiders

Stinging Insects

Ticks

STRUCTURAL PESTS

Drywood Termites

Subterranean Termites

TURF AND ORNAMENTAL PESTS

Fire Ants

Ornamental Plant Pests

Snails and Slugs

VERTEBRATE PESTS

Bats

Nuisance Birds

Feral Cats

Raccoons

Rodents

VEGETATION MANAGEMENT

Invasive Plants in Natural Areas

Terrestrial Weeds

Weeds in Rights-of-Way

Nuisance Pests

American Cockroaches

Cockroaches in Food Preparation Areas

Drain Flies

Fruit Flies

Nuisance Ants

Stored Product Pests

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American Cockroaches

TARGET PEST	
TARGET PEST(S)	American cockroaches (*Periplaneta americana*)
TARGET SITE(S)	Office buildings, warehouses, residences, storm sewers
PURPOSE	Control cockroaches that may cause damage through food contamination, affect human health through allergic reactions or "entomophobia", or be an aesthetic or morale nuisance.
RESPONSIBILITY	• All Personnel: Ensure proper sanitation in all living and working spaces. • Preventive Medicine Technicians: Conduct facility sanitation inspections, enforce food-handling regulations, and provide pest management recommendations. • Pest Management Service Provider: Conduct integrated pest management to control pest infestations. • Integrated Pest Management Coordinator: Oversee all pest management operations and ensure the use of IPM. • Pest Management Performance Assessment Representative: Ensure contracted PMSPs perform work in accordance with contract specifications. • Facilities Maintenance Provider: Perform facility repairs and improvements that prevent and minimize pest infestations as requested.
SURVEILLANCE	

METHODS	• Visual inspections (visual surveys of low to moderate infestations may require visiting the facility at night)
	  o Observation of pests in harborages
	  o Inspect floor drains
	  o Inspect areas with heat and moisture
	• Application of a flushing agent to suspected harborages
	• Sticky trap surveys
	• Vacuum surveys of harborages
	• Personnel complaints: including information on when, where, and how many pests were observed
	• Conduct pre- and post-treatment surveys to determine whether control operation was effective

FREQUENCY	• Daily observation by building occupants • Monthly observation and/or sticky trap monitoring by cognizant pest management or preventive medicine personnel

RECOMMENDED ACTION THRESHOLD	• Visual sighting of one or more cockroaches (all life stages) per room per survey—flushing agents or sticky traps may be used • Sighting of one egg capsule per survey
NONCHEMICAL CONTROL	
SANITATION	• Thoroughly clean potential food sources in buildings, especially coffee messes and food preparation areas. • Clean spills up as soon as possible. • Clean out floor drains by rinsing with hot water or using cleaners specifically designed to remove sludge from pipes. • Store food in pest-proof containers. • Empty trash cans daily or avoid putting food items in trash. • Do not eat at desk; eat in a designated coffee mess or dining area.
ELIMINATE HARBORAGE	• Seal cracks and crevices with caulk. • Remove corrugated cardboard and other materials that can serve as harborage.
ELIMINATE STANDING WATER	• Fix leaking plumbing especially around sinks, faucets, and dishwashers. • Remove standing water from floors after daily cleaning.
PREVENTION	Inspect food boxes before bringing them into a building.
MECHANICAL REMOVAL	Vacuum cockroaches from their harborages. Use a wet/dry vacuum cleaner filled with water or empty and dispose of vacuum bag immediately.
PEST PROOFING	• Seal holes in walls and ceilings and other areas that may serve as cockroach harborage as required. Request support from facilities maintenance provider if necessary. • Screen floor drains if possible.
EDUCATION	Proper storage of food and sanitation to prevent infestations.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethroids, fipronil, hydramethylnon, indoxacarb, imidacloprid, abamectin, boric acid, insect growth regulators.
METHODS	• Flushing Agents: The pest management service provider may use aerosol contact pesticides directed into potential harborage areas to flush out and kill pests as needed. • Crack and Crevice/Spot Treatment Residuals: The pest management service provider may apply a residual pesticide spray to all known or suspected harborages, feeding sites, or passageways (such as under dishwashers and refrigerators or behind stoves). • Baits: Cockroach baits (station containing solid bait or injectable style gel baits) will be used as much as possible. Gel bait can be applied to a sheet of hardware cloth and hung in manholes. Proper bait placement is critical to the success of treatment. Do not apply other insecticides around bait treatment areas. • Dusts: Boric acid dust is an effective low-toxicity insecticide that can be applied to wall voids and into manholes of storm sewers. The treatment area should remain dry after the application to avoid washing the dust away. • Growth Regulators: Affect the growth of the insect and prevents them from developing into egg-laying adults. Insect growth regulators will always be mixed with knock-down pesticides.

CONSIDERATIONS	
SENSITIVE AREAS	• Exposed food products, food containers, counter tops, any surface where food may be stored or prepared, or any food storage area. • Minimize application of pesticides directly into drains. • Use care in selecting pesticides for use in storm sewers as this can lead to storm water pollution problems. Applications should be made when dry and storm water is not anticipated within a week.
PROHIBITED PRACTICES	• Do not do preventive baseboard spraying in the absence of a pest. • Do not apply liquid or dust formulations to occupied spaces or in the presence of exposed food. • In food service areas, use only insecticides specifically labeled for those areas.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Most insecticides used for indoor pest control are low in toxicity (signal word "Caution"), but care should be taken to prevent exposure to humans and domestic animals. • Outdoor treatments with pyrethroids are susceptible to runoff and contamination of storm water. • Disposing of pesticides in a drain or storm drain is strictly prohibited.

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Cockroaches in Food Preparation Areas

TARGET PEST	
TARGET PEST(S)	Cockroaches (primarily German cockroach, *Blatella germanica*)
TARGET SITES(S)	• Food service facilities • All government dining facilities including galleys, sculleries, bakeries, storage, and mess decks. • All MWR facilities including clubs, restaurants, and storage. • All commercial lessees. • Coffee messes and snack bars in administrative areas.
PURPOSE	Control cockroaches that may cause food contamination, allergic reactions, or a nuisance.
RESPONSIBILITY	• Food Service Personnel: Ensure compliance with food handling regulations that prevent pest infestations. • Installation Preventive Medicine Technicians: Conduct food service inspections, enforce food handling regulations, provide quality assurance for pest control, and provide pest management recommendations. • Pest Management Service Provider: Conduct integrated pest management to control infestations. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	

METHODS	• Visual inspections
	  ○ Observation of pests in harborages
	  ○ Application of a flushing agent
	• Sticky trap surveys
	• Vacuum surveys of harborages
	• Personnel complaints: including information on when, where, and how many pests were observed.
	• Conduct pre- and post-treatment surveys to determine whether control operation was effective.
	• Surveys should identify environmental conditions conducive to infestation.

FREQUENCY	• Daily observation by food service personnel. • Monthly observation and/or sticky trap monitoring by cognizant preventive medicine personnel.

ACTION THRESHOLD	• Visual sighting of 3 or more cockroaches (all life stages) per room per survey. Flushing agents or sticky traps may be used. • Sighting of 1 egg capsule per survey.
NONCHEMICAL CONTROL	
SANITATION	• Cleaning of floors and all surfaces to include debris and grease removal. • Clean up spills. • Store food in sealed containers. • Remove cardboard boxes from storage areas. • Keep garbage in containers with tight-fitting lids and use liners.
ELIMINATE STANDING WATER	• Fix leaking plumbing especially around sinks, faucets, and dishwashers. • Remove standing water from floors after daily cleaning.
MECHANICAL REMOVAL	Vacuum cockroaches from their harborages. Use a wet/dry vacuum cleaner filled with water or empty and dispose of vacuum bag immediately.
PEST PROOFING	Seal holes in walls, ceilings, and other areas that may serve as cockroach harborage as required. Request support from facilities maintenance provider if necessary.
EDUCATION	• Proper storage of food and sanitation to prevent infestations and increase effectiveness of pesticide applications • Understanding of how baits work
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Fipronil, hydramethylnon, boric acid, indoxacarb, imidacloprid and abamectin baits; boric acid dust; pyrethroids
METHOD OF DISPERSAL	• Flushing Agents: The pest management service provider may use aerosol contact pesticides directed into potential harborage areas to flush out and kill pests as needed. • Crack and Crevice Residuals: The pest management service provider may apply (by crack and crevice technique) a residual pesticide spray to all known or suspected harborages, feeding sites, or passageways. • Spot Treatment Residuals: A residual pesticide may be applied as a spot treatment to indicated areas (such as under dishwashers and refrigerators or behind stoves). • Baits: Cockroach baits (station or injectable style gel baits) will be used as much as possible. Gel baits can be more effective than dry baits due to the moisture in the bait and because it can be applied to more areas. • Growth Regulators: Insect growth regulators will always be mixed with knock-down pesticides.
RESTRICTIONS/ REGULATIONS/ PERMITS	• Do not do spot treatments indoors. • Do not apply to baseboards as a preventive residual spray. • Do not apply liquid or dust formulations of insecticides in occupied spaces.
CONSIDERATIONS	
SENSITIVE AREAS	• Exposed food products, food containers, counter tops, any surface where food may be stored or prepared, or any food storage area. • Ensure that insecticides do not enter drains, streams, lakes, or other surface water.

PROHIBITED PRACTICES	• Do not use ultrasonic pest repelling devices. • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces or when food is exposed; baits may be applied when spaces are occupied • Do not do preventive baseboard spraying in the absence of a pest.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Allow for ventilation of spaces after liquid insecticides have been applied. • Clean food preparation surfaces after treatment. • Applicators must wear personal protective equipment as required by the product label. • Environmental impact is minimal since applications are performed indoors

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Drain Flies

TARGET PEST	
TARGET PEST(S)	Drain flies (*Psychoda* sp.); sometimes called moth flies, sewage flies, or filter flies.
TARGET SITES(S)	Buildings where adult flies may become a nuisance. These flies may be very common around sewage treatment facilities, where they are considered beneficial decomposers of organic matter.
PURPOSE	Control flies that may be both a nuisance and a health hazard due to respiratory problems that can be associated with the inhalation of fly hairs and body parts. Drain flies are also able to mechanically transfer bacteria and other microorganisms from their breeding sites to places where humans live and work.
RESPONSIBILIES	• All personnel: Ensure proper sanitation in all living and working areas to avoid conditions that are attractive to flies. • Facilities Maintenance Service Provider: Periodically clean drain pipes to prevent buildup of organic matter where drain flies breed. • Pest Management Service Provider: Conduct integrated pest management to control infestations. • Pest Management Performance Assessment Representative: Ensure contracted pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	• Visual sighting: Adult drain flies will congregate on walls and windows of rooms containing drains where drain flies are breeding. Adults are weak fliers, and usually make a series of short, erratic flights to move from one area to another. The body and wings are hairy, and the wings are held roof-like over the body when at rest, giving the fly a moth-like appearance. Adult coloration is yellow, gray, or black. • Source drain: An attempt should be made to locate the drain(s) from which flies are emerging so that the breeding sites can be targeted. Sealing the suspected drain opening with a glue board, masking tape, or inverted plastic cup overnight should trap adult flies if they are present.
FREQUENCY	Scheduled surveys are not typically required. The presence of flies resting on walls in restrooms and other areas with drains will typically prompt a request for pest control.
ACTION THRESHOLD	Sufficient numbers of flies to constitute a nuisance indicate the need for treatment.

NONCHEMICAL CONTROL	
HABITAT REMOVAL	• Drain cleaning: Drain flies breed in accumulated organic matter inside drainpipes. This material may be removed with over-the-counter drain cleaners. A stiff brush may be necessary to remove heavy buildup. • Bacterial drain cleaners: Products containing a specialized complex of bacteria can be used to digest the organic matter in which drain fly larvae breed and should then be followed by rinsing with very hot water. These products cannot be used in conjunction with other cleaning products, and are only available to pest control operators.
EDUCATION	• Educate building occupants on sanitation, and proper food disposal.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethrum-based
METHOD OF DISPERSAL	Pyrethrum-based aerosols may be used to kill adult flies. However, the breeding site must be eliminated to prevent additional flies from emerging.
RESTRICTIONS/ REGULATIONS/ PERMITS	Do not apply liquid or dust formulations in occupied spaces.
CONSIDERATIONS	
SENSITIVE AREAS	• Chemical pesticide use inside hospitals should be minimized as much as possible to avoid exposing patients. Control should focus on drain cleaning, which will provide better control and reduce the health risks associated with pesticides. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.
PROHIBITED PRACTICES	• Do not use ultrasonic pest repelling devices. • Do not apply aerosols, dust, and other insecticide formulations that can become airborne to occupied spaces or when food is exposed.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Allow for ventilation of spaces after liquid insecticides have been applied. • Clean food preparation surfaces after treatment. • Applicators must wear personal protective equipment as required by the product label. • Minimal

Fruit Flies

TARGET PEST	
TARGET PEST(S)	Small flies in the family Drosophilidae, commonly called fruit flies or vinegar flies.
TARGET SITES(S)	Refuse containers, offices with windows facing the loading docks, galleys, and other areas that may have ripening fruit.
PURPOSE	Control flies that reduce the quality of life.
RESPONSIBILITY	• All Personnel: Ensure proper sanitation in all living and working areas to avoid conditions that are attractive to flies. • Janitorial Personnel: Ensure that refuse containers are emptied daily. Also, periodically clean refuse containers to prevent the buildup of organic matter where flies breed. • Facilities Maintenance Provider: Provide necessary building repairs and modifications needed for pest exclusion. • Pest Management Service Provider: Conduct integrated pest management to control infestations. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	• Flies are attracted to ripening and rotting fruit, as well as other decaying organic matter. • Flies can be seen hovering around refuse containers and resting on walls and cabinets near refuse containers. Fruit flies can be distinguished from other small flies by their tan or yellow colored bodies and red eyes.
FREQUENCY	• Scheduled fly surveying is generally not necessary. • Scheduled sanitation should prevent infestations.
ACTION THRESHOLD	The presence of flies in numbers constituting a nuisance for personnel indicates a need for control.
NONCHEMICAL CONTROL	
SANITATION	• Refuse removal: Waste baskets and other refuse containers should be emptied daily to prevent the buildup of decaying matter that will attract flies. • Refuse container sanitation: Fruit flies are attracted to moist fermenting foods. All they need for breeding is a moist film of decaying organic matter. They will lay their eggs in garbage disposals, empty bottles and cans, trash containers, mops and cleaning rags. Keep all these items clean. Over time organic debris builds up on the bottom and sides of waste containers,

	particularly large dumpster and other trash bins. Refuse containers should be periodically steam-cleaned or washed to remove organic matter.
ELIMINATE FOOD SOURCES	Fruit bowls: Fruit flies are attracted to volatiles produced by ripening fruit. Store fruit in the refrigerator in order to avoid attracting fruit flies and other pests.
PEST PROOFING	Exclusion: Flies may migrate indoors from breeding sites located outdoors. Tight fitting screens and weather proofing around doors and windows (caulking, weather stripping, etc.) may delay entrance.
CHEMICAL CONTROL	
METHOD OF DISPERSAL	• For chemical controls to work, all breeding sites must be found and cleaned first. Potential breeding sites which are inaccessible (e.g., garbage disposals and drains) can be inspected by taping a clear plastic food storage bag over the opening overnight. If flies are breeding in these areas, the adults will emerge and be caught in the bag. • Adults may be killed with pyrethrum-based aerosol insecticides applied as a space spray or surface residual.
CONSIDERATIONS	
SENSITIVE AREAS	• Fruit fly infestations often occur in food-preparation areas. Ensure that the insecticide is labeled for use in food preparation areas, and that foods are not contaminated during application. • Ensure that insecticides do not enter drains, streams, lakes, and other surface water.
PROHIBITED PRACTICES	• Do not use ultrasonic pest repelling devices. • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces.

Nuisance Ants

TARGET PEST	
TARGET PEST(S)	Pharaoh ants, Argentine ants, black ants, crazy ants, and other nuisance species that invade structures
TARGET SITE(S)	Offices, food preparation and storage areas, living spaces, playgrounds, patios, barracks, medical treatment facilities, and other spaces invaded by ants
PURPOSE	Control ants that are a nuisance in offices, eat and contaminate food, and can make spaces uninhabitable or unusable.
RESPONSIBILITY	• All Personnel: Ensure proper sanitation in all living and working spaces. • Preventive Medicine Technicians: Conduct facilities sanitation inspections, enforce food-handling regulations, and provide pest management recommendations. • Pest Management Service Provider: Conduct integrated pest management to control pest infestations. • Integrated Pest Management Coordinator: Oversee all pest management operations and ensure the use of IPM. • Pest Management Performance Assessment Representative: Ensure contractor PMSP performs work in accordance with contract specifications. • Grounds Maintenance Provider: Control aphids and similar insects on ornamental plants that attract and feed ants. • Facilities Maintenance Provider: Perform facility repairs and improvements that prevent and minimize pest infestations as requested.
SURVEILLANCE	

METHODS	• Visual inspections
	  o Observation of foraging scout ants or ant trails
	  o Follow ant trails to building entryways and to food source
	  o Follow ant trails to nests
	• Personnel complaints: including information on when, where, and how many pests were observed.
	• Conduct pre- and post-treatment surveys to determine whether control operation was effective

FREQUENCY	• Daily observation by building occupants • Monthly inspections outdoors around buildings to identify ant nests

RECOMMENDED ACTION THRESHOLD	• Visual sighting of ants indoors • Food service areas: 3/room • Living areas: 5/room • Medical treatment facilities: 1/room • Grounds: 2 mounds/yard
NONCHEMICAL CONTROL	
SANITATION	• Thoroughly clean potential food sources in buildings, especially coffee messes and food preparation areas. • Thoroughly clean food preparation surfaces, countertops, and stoves. • Remove and discard food that is attractive to ants. • Clean up food and drink spills as soon as possible. • Do not leave dirty dishes on countertops or in sinks. • Some ants are attracted to moisture. Fix leaky plumbing and remove other sources of water.
MECHANICAL REMOVAL	• Use a wet sponge or cloth to wipe up ants. • Spray ant trail with household cleaner or soap water then wipe up.
PEST PROOFING	• Put food in tightly sealed containers. • Seal holes in walls with caulk or, temporarily, with petroleum jelly.
CONTROL OF PLANT INSECTS	• Ants live in cooperation with some plant-infesting insects such as aphids. • These insects produce sugars that are food for the ants, while the ants provide protection for the plant-sucking insects. • Control aphids and other plant-sucking insects on plants
EDUCATION	• Proper storage of food and sanitation to prevent infestations. • Use of soapy water to control ants indoors.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	• Arsenic trioxide, abamectin, borate-based products, fipronil, hydramethylnon, sulfuramid; pyrethroids (e.g., bifenthrin, lambda cyhalothrin)
METHOD OF DISPERSAL	• Baits: Bait stations can be used indoors or outdoors. Granular baits can be applied outdoors near nests. Baits are very specific to the species of ant, and effective in killing the egg-producing queen of the colony, but may require 2–3 days for complete control. • Barrier Spraying: Application of a residual outdoors around a building may be necessary if there are many nests and entryways into the building. May also be necessary if nests are difficult to find. Usually requires periodic reapplication if ant nests are not destroyed. • Dusts: Boric acid dust is an effective low-toxicity insecticide that can be applied to wall voids where ants may be nesting. The treatment area should remain dry after the application to avoid washing the dust away. • Granular insecticide: Acute toxicant in granular form. Only effective if applied directly to the nest.
CONSIDERATIONS	
SENSITIVE AREAS	• Exposed food products, food containers, counter tops, on any surface where food may be stored or prepared, or any food storage area. • Outdoors where children or pets may be exposed to pesticides. • Medical treatment facilities. • Streams, lakes, and other water sources. Avoid stormwater runoff of insecticides and do not apply directly to water. Many insecticides are highly toxic to aquatic organisms.

PROHIBITED PRACTICES	• Do not do spot treatments indoors. • Do not do preventive baseboard spraying in the absence of a pest. • Do not apply liquid or dust formulations of insecticides in occupied spaces.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Liquid and dust insecticides should not be applied to occupied spaces or when food is exposed; baits may be applied when spaces are occupied. • Allow for ventilation of spaces after liquid insecticides have been applied. • Clean food preparation surfaces after treatment. • Applicators must wear personal protective equipment as required by the product label. • Pyrethroid insecticides can be highly toxic to aquatic organisms.

COMMENTS:

For most people, ants become a problem and require action when they enter a building. Sometimes ants may nest in walls, especially if there is moisture in those areas; particularly bathrooms and kitchens. Surveys need to determine if the source of the infestation is indoors or outdoors. Control of ant nests outdoors during the spring and early summer may reduce ant problems later in the season. The most effective ant baits are slow acting to give worker ants enough time to carry small amounts of bait back to the nest where they will feed other ants and eventually kill the entire colony. For this reason, it may take several days to see results.

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Stored Product Pests in Food Storage Areas

TARGET PEST	
TARGET PESTS	Beetles and moths that infest food products
PURPOSE	Control stored product pests (SSPs) that may cause food contamination, medical problems, or be unsightly.
RESPONSIBLE PARTY	• Food Service Personnel: Ensure compliance with food handling regulations that prevent pest infestations; report infested food items to appropriate authority. • Installation Preventive Medicine Technicians: Conduct food service inspections, enforce food handling regulations, and provide pest management recommendations. • Pest Management Service Provider: Conduct integrated pest management to control infestations. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • U.S. Army Veterinary Services: Perform food quality inspections of storage facilities including surveys for SPPs.
SURVEILLANCE	
METHODS	• Visual inspections of food items before and during storage. Conduct in accordance with MILSTD 904B. • Attractant traps may be used to monitor movement and spread of SPPs in storage areas. They are inefficient as a means of control. Guidelines for the use of traps are found in AFPMB TG 27, Stored Product Pest Monitoring Methods • Personnel complaints
FREQUENCY	• Particular attention should be given to animal feed which are a common source of infestation. • Daily observation by food service personnel • Monthly observation by cognizant preventive medicine personnel. • Routine food inspections by US Army veterinary technicians.

ACTION THRESHOLD	• Observation of any number of SPP (whole insect, webbing, droppings, skins) inside or immediately outside of package. This should initiate a more thorough survey and control if necessary. • Observation of one SPP on a monitoring trap.
NONCHEMICAL CONTROL	
SANITATION	• Maintain thorough sanitation of food storage area • Clean up all spills immediately
PACKAGING AND STORAGE	• Ensure all packages are intact. Place in sealed insect proof containers if available • Repair any torn packages • Rotate food items: "first-in-first-out"; do not allow food to remain stored for long periods of time • Store on pallets off the floor. • Maintain adequate ventilation and lighting in storerooms.
ISOLATION	Remove infested items from the storeroom if they can't be disposed of immediately.
MECHANICAL REMOVAL	Vacuuming, sweeping, mopping of floors on which SPPs are found may be used. Ensure that a wet/dry vacuum filled with water is used or remove, empty, and dispose of vacuum bag immediately.
FREEZING/ HEATING	SPPs may be killed by freezing or cooking. Insects can be removed from food item by sifting
SURVEY (DISPOSAL)	Dispose of infested food items (see MIL-STD-904C, Detection, Identification, and Prevention of Pest Infestation of Subsistence for guidance)
CHEMICAL CONTROL	
METHOD OF DISPERSAL	• Since many infestations are confined to the food packages, nonchemical methods are the preferred control method. • Crack and Crevice Applications: The pest management service provider may apply (by crack and crevice technique) a contact or residual pesticide spray to areas in storerooms where insects may be found after leaving infested packages. • Insect Growth Regulators: Insect growth regulators (IGR) prevent immature insect larvae from developing into mature adults. IGRs may be useful for chronic SPP problems, but cannot be applied to food or cause immediate kill of the pest. It must be used in conjunction with other forms of control. • Fumigation: Consult a NAVFAC pest management consultant before considering fumigation. Fumigation can be performed on pallets of food items. It will penetrate most materials to kill insects inside the food without harming or making inedible the food item.
CONSIDERATIONS	
PROHIBITED PRACTICES	• Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces. • Do not do preventive baseboard spraying in the absence of a pest.
SENSITIVE AREAS	• Exposed food products, food containers, counter tops, on any surface where food may be stored or prepared, or any food storage area. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.

COMMENTS:

Review TG 29, Integrated Pest Management In and Around Buildings or view the Department of Defense Armed Forces Pest Management Board web site at
http://www.acq.osd.mil/eie/afpmb/docs/techguides/tg29.pdf

Review TG 27, Stored Product Pest Monitoring Methods at
http://www.acq.osd.mil/eie/afpmb/docs/techguides/tg27.pdf

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HEALTH-RELATED PESTS

Bed Bugs

Filth Flies

Fleas In and Around Buildings

Mites

Mosquitoes, Adult Control

Mosquitoes, Larval

Spiders

Stinging Insects

Ticks

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Bed Bugs

TARGET PEST	
TARGET PESTS	Bed Bugs (*Cimex* spp.)
PURPOSE	Control bed bugs that can cause bites or allergic reactions, be a nuisance, and affect morale and quality of life. Can be carried on board ship from infested barracks.

RESPONSIBLE PARTY	• Berthing Quarters Managers:
	  o Establish rules and regulations to prevent establishment and propagation of pests.
	  o Prevent movement of furniture between rooms if bedbugs are identified
	• Berthing Quarters Residents:
	  o Comply with quarter's rules and regulations.
	  o Maintain sanitation and cleanliness of personal items such as bedding.
	• Cognizant Military Unit Leadership: The command leadership, from the commanding officers to the non-commissioned officers, is responsible for their personnel and must enforce public health measures to protect their health and well-being. Sanitation and other pest prevention measures should be enforced through room inspections if necessary.
	• Installation Preventive Medicine Technicians:
	  o Conduct berthing inspections
	  o Enforce berthing regulation per NAVMED P-5010
	  o Provide informal quality assurance for pest control
	  o Provide pest management recommendations
	• Pest Management Service Provider: Conduct integrated pest management to control infestations.
	• Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications.
	• Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.

SURVEILLANCE	

METHODS	• Personnel complaints: Complaints are commonly received when a patient goes to medical complaining of itching or dermatitis due to bites.
	• Visual inspections
	  o Look for pests in mattresses, box springs, bed frames, and headboards. Less commonly found on baseboards and on walls behind furniture.
	  o Application of a flushing agent to cracks and crevices
	• Sticky trap surveys
	• Vacuum surveys of harborages
	• Conduct pre- and post-treatment surveys to determine whether control operation was effective
	• Dry ice/CO_2 attractant traps
	• Bed-bug sniffing dogs are available.

FREQUENCY	• Daily observation by residents. • Observation during zone inspections by unit command leadership personnel. • Monthly observation and/or sticky trap monitoring by PMT of spaces post-treatment. • In visitor's quarters, lodges and other hotel rooms, housekeeping should perform inspections during cleaning.
ACTION THRESHOLD	Detection of 1 bed bug, cast skins, or fecal stains should initiate survey and control.
NONCHEMICAL CONTROL	
SANITATION	• Thorough cleaning (field day) shall be performed in each room. • Remove all clutter particularly from under and around beds to reduce harborage. Removal of clutter also enables easier inspection of furniture and mattresses. Note: When removing materials from an infested room, either treat the material or place in bags then seal before taking out of room to prevent spread of the bugs.
WASHING/ CLEANSING	• Thoroughly wash bedding • Clean mattresses, box springs, frames, headboards with soap and water.
MECHANICAL REMOVAL	Vacuum bedbugs from their harborages on mattresses, headboards and other surfaces where they are found. Use a wet/dry vacuum cleaner filled with water or empty and dispose of vacuum bag immediately.
ISOLATION AND EXCLUSION	• Prevent removal of furniture from rooms found to be infested until they are cleaned. • Remove debris from around outside of buildings • Repair cracks in walls • Caulk windows and doors • Caulk cracks and crevices in bed frames and furniture • Specially designed mattress encasements without seams will prevent bed bugs from getting on mattresses and leaving mattresses to infest other areas.

HEAT	• Heat infested articles and/or areas through to at least 113 °F (45 °C) for at least one hour. The higher the temperature, the shorter the time needed to kill bed bugs at all life stages. • A pesticide barrier around doorways may be necessary to prevent spread of fleeing bed bugs to adjacent spaces. • Infested bedding and clothing can be placed in a clothes dryer on high heat. Note: Heat may damage sprinkler systems and will require protective measures before treatment of rooms.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	• Pyrethrin, pyrethroids (cyhalothrin, bifenthrin, deltamethrin), hydroprene (IGR), chlorfenapyr, dichlorvos strips, silica gel, boric acid • Chemicals that leave a residual are preferred.
METHOD OF DISPERSAL	Chemical control using insecticides alone will not control/prevent a bed-bug infestation. • Flushing Agents: The pest management service provider may use aerosol contact pesticides directed into potential harborage areas to flush out and kill pests as needed. • Crack and Crevice Residuals: The pest management service provider may apply (by crack and crevice technique) a residual pesticide spray to all known or suspected harborages. • Spot Treatment Residuals: A residual pesticide may be applied as a spot treatment to indicated areas. • Mattress Treatment: Infested mattresses can be treated. Using a residual insecticide will prevent future infestations. • Slow-release vapor strips: A plastic strip impregnated with Dichlorvos slowly releases an insecticide vapor that will control flying and crawling pests. Treatment times are 48–72 hours for adults and nymphs and 7–1- days for eggs. Any room/area where strip is placed must be vacated by people and pets during the treatment. This can also be placed in containers or bags to treat infested materials. • Insect Growth Regulators (IGRs): Affect the development and reproduction of predators. When properly applied, IGRs have essentially no effect on vertebrate metabolism because of their mode of action and low application rates, but they have a significant impact on bed-bug molting, fertility, and egg hatching success.
RESTRICTIONS	• Insecticide resistance may cause treatment failure • Use of aerosols, dusts, and other insecticide formulations that can become airborne shall not be applied in occupied spaces. Spaces must be vacated before treatment and then ventilated and the insecticide allowed to dry before personnel are allowed to occupy the space.
CONSIDERATIONS	
SENSITIVE AREAS	• Some persons may be sensitive to some pesticides. Pesticide applications should be avoided if possible and be made only to areas where pests have been observed. • The insecticide on treated mattresses should be allowed to dry and then should be covered with a mattress cover before use. • Ensure that insecticides do not enter drains, streams, lakes, or other surface water.

PROHIBITED PRACTICES	• Do not use ultrasonic pest repelling devices. Do not apply aerosol, dust, or other insecticide formulations that may become airborne in occupied spaces. • Do not do preventive baseboard spraying in the absence of a pest.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	Minimal

ADDITIONAL INFORMATION:

Treatment failure may be due to incomplete surveys for the pest, improper application, and insecticide resistance. Follow-up inspections and control are crucial to eliminating the bugs.

Filth Flies

TARGET PEST	
TARGET PEST(S)	House flies (*Musca domestica*), face flies (*Musca autumnalis*), stable flies (*Stomoxys calcitrans*), little house flies (*Fannia* spp.), and other fly species that breed in garbage, compost, manure, or other organic debris.
TARGET SITES(S)	• Animal kennels or stables • Refuse storage areas • Any places where organic debris may accumulate • Dumpsters • Garbage dumps and recycle centers
PURPOSE	Reduce populations of flies that are a nuisance and may mechanically transmit pathogens.
RESPONSIBILITY	• Food Service Personnel: Ensure compliance with food handling regulations that prevent pest infestations • Installation Preventive Medicine Technicians: Conduct food service inspections, enforce food handling regulations, provide quality assurance for pest control, and provide pest management recommendations • Pest Management Service Provider: Conduct integrated pest management to control infestations. • Janitorial Personnel: Ensure that refuse containers are frequently emptied and sanitized. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • Facilities Maintenance Provide: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	

METHODS	• Visual sighting o Flies that enter buildings will congregate around windows. o Flies may be seen crawling on or flying around organic debris. o Flies are active during the daytime in warm weather. o Flies may be seen flying and landing on dumpsters and trash cans. o Visual surveys of adult flies should also identify where flies are entering a building and where they are breeding. • Bites o Adult stable flies will painfully bite humans, dogs, and livestock. o Stable flies may be surveyed by counting the flies on all four legs of livestock animals. o Most filth flies do not bite. • Trapping o Light traps: traps can be used to control adult flies as well as monitor populations. Flies are attracted to ultraviolet light and trapped on a sticky pest strip. o Sticky traps: Traps can be placed around areas where filth flies are known to be a problem. Many types contain visual lures. o Pheromone traps: Use a fly pheromone (muscamone) to attract flies to a container. Directions for constructing a baited jug trap can be found at http://ohioline.osu.edu/b853/b853_4.html. • Spec counts o Index cards (3×5) may be placed around areas to be monitored. Flies that land on the cards will leave vomit or fecal specs that can be counted. Though inexpensive and simple, this technique gives no indication of fly species and may overestimate fly numbers since a single fly may leave multiple specs. Note: Identification of adult flies is important in determining where flies are breeding in order to target control at the source of the infestation. If you can't find the breeding locations of the flies, then collect some flies and identify or send to an entomologist for identification.
FREQUENCY	• Visual observations should be made around likely breeding sites (e.g., dumpsters). • Traps should be inspected weekly. More frequent inspection may be necessary if sticky traps are placed in areas where they will quickly become covered with dust, insects, or other debris. • Counts of flies on animals should be conducted weekly.
ACTION THRESHOLD	• The presence of biting flies in numbers constituting a nuisance for people or animals indicates a need for control within 24 hours if the presence is interfering with the mission or activities. • For counts on livestock, an average of 10 stable flies per animal indicates a need for control. • For counts on sticky traps, 100 flies per week indicates a need for control.

NONCHEMICAL CONTROL	
BIOLOGICAL CONTROL	• Several species of parasitic wasps can be purchased for use against filth flies. • Biological control agents do not kill adult flies. Wasps lay their eggs in fly pupae, where the wasp larvae consume the developing fly, preventing it from emerging. • Biological control agents will not sting or otherwise harm humans or animals. • Biological control agents are not compatible with chemical insecticides. • Release timing, climatic conditions, release frequency, and number of agents released are all critical for biological control success. • Contact pest management consultants for additional information before instituting a biological control program.
TRAPPING	• Ultraviolet light traps may be used to reduce adult fly populations in buildings invaded by flies. • Exercise caution when placing traps; if the trap is visible from outside the structure, it may attract flies into the building. • Traps by themselves are unlikely to control heavy fly infestations. • Do not use bug zappers that electrocute flies in food-preparation areas or eating facilities. Use attractant light traps that collect flies on sticky traps.
SANITATION TO ELIMINATE BREEDING SITES AND FLY ATTRACTANTS	• Eliminating breeding sites is critical for effective filth fly control. • Filth flies often breed in neglected refuse containers. • Cover outdoor trash containers with tight-fitting lids. • Empty trash containers frequently. • Sanitize trash containers that have accumulated organic material. • Steam clean dumpsters regularly. • Do not allow animal manure to build up. • Maintain compost piles to promote rapid decay of organic material. • Do not place compost piles near areas where flies are likely to become a nuisance. • Hydrated lime may be applied to stable floors to speed manure decomposition and render stables less suitable for fly breeding.
PEST PROOFING	• Seal cracks and other openings around doors and windows. • Use tight-fitting screens. • Air-screens/air-curtains may be installed in commercial facilities.
EDUCATION	• Educate building occupants on sanitation, excluding flies by closing doors and maintaining screens, and proper food storage.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethroids, dichlorvos (in insecticide strips), methomyl, and others

METHOD OF DISPERSAL	• Non-residual space spray or aerosol: may temporarily control adult fly populations in buildings; will not provide long-term control unless breeding sites are eliminated. • Residual insecticides: may be applied to areas outside where adult flies rest; will not provide long-term control unless breeding sites are eliminated. • Baits: may be used around refuse containers and other places to which flies are attracted. Do not use baits indoors or in other areas where flies are not already present. Baits may attract flies to an otherwise fly-free area. • Impregnated strips: Plastic/paper strips impregnated with insecticides will kill adult flies that contact the strips. Useful when placed inside trash cans or other unoccupied spaces. • Insect repellents: may be used on humans or animals for temporary prevention of stable fly bites. Will not provide long-term control of fly populations, and must be frequently re-applied. • Oral larvicides: may be administered to livestock; will render manure unsuitable for fly breeding.
RESTRICTIONS/ REGULATIONS/ PERMITS	• Do not apply liquid or dust formulations in occupied spaces. • Dichlorvos is a carcinogen and cannot be placed in occupied spaces.
CONSIDERATIONS	
SENSITIVE AREAS	• Filth fly infestations often occur in food-preparation areas. Ensure that the insecticide is labeled for use in food preparation areas, and that foods are not contaminated during application. • Emphasize nonchemical control in areas frequented by children (e.g., child development centers). • Ensure that insecticides do not enter drains, streams, lakes, and other surface water.
PROHIBITED PRACTICES	• Do not use ultrasonic pest repelling devices. • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Take precautions when using pesticides around food service areas and the child development center. • Applicator should use personal protective equipment as required by the product label. • Avoid contaminating water with pesticides. • Space spraying outdoors can result in drift and have impact on non-target organisms.

COMMENTS:

The numbers of products available for filth fly monitoring and control is overwhelmingly large. The efficacy of a given product often depends on local climatic characteristics, the severity of the infestation, the species comprising the infestation, and other localized conditions. Also, many products are available that do not work or whose efficacy is unproven. Pest management consultants or county or Virginia extension personnel can assist with choosing fly control methods that are most appropriate for a given area.

Fleas In and Around Buildings

TARGET PEST	
TARGET PESTS	Dog, cat, and rodent fleas
TARGET SITES(S)	Military family housing, administrative and industrial buildings that harbor feral cats and other animals, and dog kennels
PURPOSE	Control fleas that are a biting nuisance and pose the potential for transmission of diseases such as murine typhus.
RESPONSIBILITY	• Veterinary Services: Prescribe pet treatments for flea control • Pet owner/Dog handlers: Treat animals for flea infestations. • Installation Preventive Medicine Technicians: Conduct surveys and inspections of pests of public health importance to assess health risk. • Pest management service provider: Conduct integrated pest management to control infestations. • Pest Control Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	
METHODS	• Observe for fleas on pets or while grooming and washing pets • Walk around a room with light colored pants • Pull a white cloth across the floor • Concentrate on areas where pets animals frequent or rest • Survey for feral cats and buildings under which they may be harboring; survey in crawl spaces
FREQUENCY	Flea infestations are usually reported by housing residents or building occupants. Survey should be conducted by the PMSP to determine where to treat.
ACTION THRESHOLD(S)	• One flea per room • One flea-infested animal in or under a building

NONCHEMICAL CONTROL	
VACUUMING	Using a vacuum cleaner with a rotating brush on an infested carpet will remove a majority of the adults, larvae, and eggs. Should be done even if an insecticide will be applied. Hard surfaces should also be vacuumed if they contain cracks and crevices.
CARPET CLEANING	Steam cleaning or cleaning with a carpet cleaner, especially after vacuuming, may be sufficient to remove remaining fleas from carpet.
CLEAN PET BEDDING	Launder in soap and water all pet bedding and any other materials upon which dogs or cats sleep
CONTROL AND EXCLUDE FERAL CATS	• Feral cats are a common source of fleas in industrial and office buildings and are often encouraged by uninformed cat lovers to harbor under buildings. • DOD policy requires removal of feral animals from installations; neutered cats still carry fleas. • Cat harborages under buildings should be cleaned and treated with an insecticide. • Openings to crawl spaces should be sealed to exclude animals.
GROOM AND WASH PETS	• Flea combs can be used on pets to extract fleas. • Washing pet with soap and water is very effective at killing fleas.
EDUCATION	• Teach pet owners about ways to prevent fleas and treat pets for fleas • Provide awareness to installation personnel about the risk of flea infestations caused by feral cats. • Pre-treatment awareness of the need to clean/treat pets and pet bedding concurrently with the PMSP's insecticide treatment of the premises.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethroids, methoprene and pyriproxyfen (insect growth regulators), fipronil, imidacloprid, lufenuron, spinosad, and others

METHODS OF DISPERSAL	• <u>On-pet Treatments</u>:
	  o Spot-on treatments, such as Frontline (fipronil) and Advantage (imidacloprid) are convenient and easy to use and very effective at preventing fleas when monthly treatments are maintained throughout the season (late spring to early fall).
	  o Oral treatments, such as Program (lufenuron) are effective and useful on pets that frequently swim or are bathed frequently.
	• <u>Indoor Treatment</u>: These treatments target areas where pets rest or on carpets and other surfaces that might hold adult and immature fleas. The most effective treatments contain IGRs which are often mixed with a contact insecticide (such as a pyrethroid). The contact insecticide will kill any existing adult fleas while the residual IGR will prevent larvae from becoming biting adults.
	• <u>Outdoor Treatment</u>: This is rarely necessary in residential situations if indoor and on-pet treatment is done correctly. Outdoor dog kennels and crawl spaces where feral cats were harboring should be treated if infested. Again, an IGR / contact insecticide treatment is most effective.

CONSIDERATIONS	
SENSITIVE AREAS	Medical treatment facilities, child development centers

PROHIBITED ITEMS	Do not use ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	Applicators should use personal protective equipment as required by the product label.

ADDITIONAL INFORMATION:

Successful control of fleas in a building requires room cleaning (vacuuming and carpet cleaning, cleaning pet bedding), pet treatment or washing, and insecticide treatment be done within 12 hours of each other. Some of the products and devices that aren't effective for flea control are indoor aerosol foggers, (otherwise known as bug bombs), ultrasonic devices, herbal collars, vitamin B1, brewer's yeast, and flea repellents.

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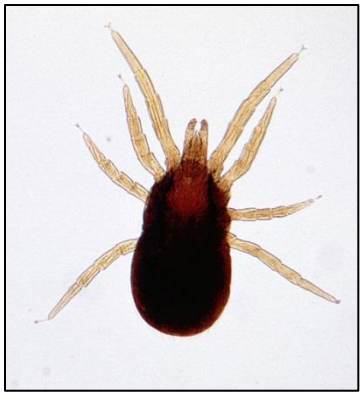

Mites

TARGET PEST	
TARGET PESTS	Mite parasites of animals (especially birds and rodents)
TARGET SITES(S)	Office buildings, industrial buildings, outbuildings, and residences
PURPOSE	Control mite infestations that may cause a biting nuisance.

RESPONSIBLE PARTY	• Pest Management Service Provider: Conduct integrated pest management to control infestations
	• Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications
	• Installation Preventive Medicine Technicians:
	  o Conduct surveys when pests pose a health threat
	  o Provide pest management recommendations.

SURVEILLANCE	

METHODS	• Personnel complaints:
	  o Most often mite infestations are recognized when personnel complain of bites associated with specific work spaces or areas of a building; the mite may or may not be observed.
	  o Have the personnel who are being bitten keep transparent tape nearby. When they feel like they are being bitten, tap the area of the biting with the sticky side of the tape. Personnel should take the tape to preventive medicine to have it identified.
	• Workspace investigations:
	  o Have personnel being bitten identify the specific areas in which they are being bitten.
	  o Ask if any bird or rodent problems have occurred in the building and, if it has, ask if control has been performed recently.
	  o Look for evidence of rodent or bird infestation in false ceilings, under floor boards, in rafters, inside walls, and outside of the building.
	  o Observe light colored surfaces for mites.
	  o Identify other sources of nonliving material that may cause a biting sensation such as visible particles especially those coming from ventilation ducts.
	• Sticky traps: place sticky traps around the area of infestation.
	• Identification of the mite will indicate whether the source is from a bird or rodent. Precise identification may require an entomologist. Contact NECE or NAVFAC Applied Biology.

FREQUENCY	When notified of a potential problem.
ACTION THRESHOLD	Identification of mites collected from a person(s) or from a sticky trap.
NONCHEMICAL CONTROL	
RODENT AND BIRD MANAGEMENT	• Preventing birds and rodents from entering a building will prevent mite problems. • See commensal rodent and nuisance bird pest management fact sheet for more information.
NEST REMOVAL	• Nests are the usual source of most mites. • Apply a pesticide to the nest to kill any mites (see below). • Remove nesting material and place in a double plastic bag. Clean area around nest with soap and water.
MITE REMOVAL	• Use soap and water to wipe up mites observed on surfaces. • Use a wet/dry vacuum filled with water to vacuum area where mites are found.
CHEMICAL CONTROL	
METHOD OF DISPERSAL	• Aerosols: Apply to cracks and crevices and other areas where mites are seen. • Dusts: Use in enclosed spaces where mites have been found.
CONSIDERATIONS	
SENSITIVE AREAS	Childcare facilities
PROHIBITED PRACTICES	Do not do preventive baseboard spraying in the absence of a pest.

Adult Mosquito Control

TARGET PEST	
TARGET PEST(S)	Flying adult pest mosquito species.
TARGET SITES(S)	Industrial and residential areas
PURPOSE	Control adult mosquitoes that are a nuisance or may transmit disease.
RESPONSIBILITY	• Housing Residents: o Use personal protective measures to prevent mosquito bites. o Ensure maintenance of window and door screens. o If screens are not available, keep doors and windows closed when mosquitoes are present. • Installation Preventive Medicine Technicians: o Conduct adult mosquito trapping to identify problem areas and mosquito species. o Map locations of trapping sites. o Conduct disease risk assessments including pathogen testing if available. o Provide information to housing residents on how to prevent mosquito biting. • Mosquito Control Provider: o Conduct surveys to verify presence of adult mosquitoes at site to be treated. Treat only when and where adult mosquitoes are present. o Use pesticides in accordance with the label. • Pest Management Performance Assessment Representative: o Ensure contractor pest management service provider performs work in accordance with contract specifications. o Conduct pre- and post-treatment surveys to monitor efficacy of control measures • Natural Resources Manager: Review and approve mosquito control operations conducted adjacent to sensitive areas to ensure minimal impact on the environment. • Housing Director: o Ensure that residents keep premises clear of clutter that can hold water and become breeding sites. o Ensure distribution of mosquito prevention and control information to residents. • Integrated Pest Management Coordinator: o Coordinate with PMTs, control provider, PMPAR, and natural resource manager to identify mosquito-breeding sites that can be permanently

	eliminated by nonchemical methods. o Maintain mosquito control operation records.
SURVEILLANCE	
METHODS	• Conduct surveys using visual assessments (i.e., landing counts) and/or traps at sites where personnel complain about mosquito bites to verify presence of mosquitoes. • Record sites of verified complaints on a map. Use GPS receiver if available. • Use traps weekly at same locations to reveal seasonal trends in mosquito abundance. Surveys can be used in subsequent years to plan mosquito control program. • Trap mosquitoes for virus testing. • PMTs will continue to conduct adult mosquito surveys.
FREQUENCY	• Ongoing surveys by residents. • Survey prior to application of adulticide. For visual surveys, post-treatment surveys may be conducted immediately after the treatment. For traps, survey within 24 hours after application.
ACTION THRESHOLD	• Light traps: 25 biting females or 1 vector species in an un-baited light trap • Disease emergencies declared: light traps: 1 female of a species which has been identified as carrying disease within 5 miles of base caught in a trap NOTE: Action thresholds can be changed on advice of a BUMED entomologist
	Vector species of concern — Primary diseases of concern
	Aedes albopictus — Dengue, Chikungunva
	Culiseta melanura — Eastern equine encephalitis (EEE),West Nile Virus (WNV)
	Culex spp. — EEE, St. Louis encephalitis, WNV
	Culex nigripalpus — EEE, St. Louis encephalitis, WNV
NON-CHEMICAL CONTROL	
PERSONAL PROTECTION	• Encourage use of repellents when outdoors in mosquito-infested areas. Products with the active ingredient diethyl toluamide (DEET) are most effective. • Avoid outdoor activities at dusk and during the evening hours to lessen chances of being bitten. • Wear long-sleeved shirts and pants when outdoors in mosquito infested areas.
EXCLUSION/PEST PROOFING	• Window and door screens • Remove tall weeds and overgrowth to remove possible resting areas for mosquitoes.
TRAPS	Propane-powered trapping devices that use heat and a chemical attractant have been shown to be effective for small to moderate area control of certain species of mosquitoes.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	• Organophosphates (i.e., malathion, naled): Some chemicals may be corrosive. Resistance to organophosphates is widespread. • Pyrethrum and Pyrethroids: Safer for humans and mammals. May be toxic to non-target insects and fish.

METHOD OF DISPERSAL	• Organophosphates (i.e., malathion, naled): Apply with ULV or fog-generating equipment. • Pyrethrum and Pyrethroids: Apply with ULV equipment.
SENSITIVE AREAS	All ULV-applied pesticides may affect aquatic organisms especially fish. Care should be taken to ensure proper insecticide droplet size, timing of application, environmental conditions, and calibration of equipment. The installation environmental department should be consulted regarding sensitive areas.

COMMENTS:

Emergency control operations as the result of a disease outbreak may require large area application of an adulticide. Aerial spraying using an appropriately labeled pesticide and application equipment may be used. However, all aerial spraying operations must be reviewed and approved by a pest management consultant from NAVFAC Applied Biology. Aerial spray operations must also be reviewed and approved by the installation's operations officer.

See AFPMB Technical Guide 13 for more information on ULV application of pesticides.

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Larval Mosquitoes

TARGET PEST	
TARGET PEST(S)	Mosquito larvae
TARGET SITES(S)	• Permanent: Catch basins, culverts, ponds, planters, gutters, drainage ditches, and freshwater marshes • Temporary: Any containers that collect water, trash piles, tires, flower pots, boats, rain gutters, bird/backyard pond.
PURPOSE	Control larval mosquitoes that are a nuisance or that may transmit diseases.
RESPONSIBILITY	• Housing Residents: o Eliminate backyard mosquito breeding sites. o Keep gutters and backyard ponds clean. • Preventive Medicine Technicians: o Survey and identify larval breeding sites o Map locations of breeding sites o Conduct disease risk assessments o Provide information to housing residents and installation personnel on how to prevent mosquito breeding and biting. • Mosquito Control Provider: o Conduct surveys to verify presence of larvae at site to be treated o Use integrated pest management methods to control mosquito larvae o Use pesticides in accordance with the label. • Pest Management Performance Assessment Representative: o Ensure contractor pest management service provider performs work in accordance with contract specifications o Conduct pre- and post-treatment surveys to monitor efficacy of control measures. • Natural Resources Manager: Review and approve mosquito control operations conducted adjacent to sensitive areas to ensure minimal impact on the environment.

	• Housing Director:
	  o Ensure residents keep premises clear of clutter that can hold water and become breeding sites
	  o Ensure distribution of mosquito prevention and control information to residents.
	• Integrated Pest Management Coordinator:
	  o Coordinate with preventive medicine technicians, mosquito control provider, performance assessment representative, and natural resources manager to identify mosquito-breeding sites that can be permanently eliminated by nonchemical methods
	  o Maintain mosquito control operation records.

SURVEILLANCE	

METHODS	• Maps should be used to identify non-residential water-holding sites; verify presence of sites.
	• Record all water-holding sites on a map or on a GPS receiver regardless of the presence or absence of mosquito larvae.
	• Survey water-holding sites for larvae. Use a dipper to take water samples. Dip as follows:
	  o 1 dip/10 ft in linear sources
	  o 1 dip/100 ft^2 in wide sources
	  o 2 dips/source when small source (i.e., catch basin)
	For the first two sources, dip until larvae are found, then record number of dips after that; do not count negative dips prior to this.
	• Record quantity as number of larvae/dip. Record negative sources.
	• Mark locations for treatment or treat immediately.
	• All positive sites will be identified on the map as larval sampling stations. These stations will be used in the ongoing surveillance program to detect the presence of mosquitoes after a high tide and when the action threshold for that site is exceeded, then control will be initiated.
	• PMTs will continue to look for and identify additional non-residential water-holding and breeding sites.

FREQUENCY	• Ongoing surveys by residents. • Weekly survey of permanent or semi-permanent sites. • Survey prior to application of larvicide and within 24 hours after application. (Method cannot be used after application of methoprene.)
ACTION THRESHOLD	One or more larvae per dip
NONCHEMICAL CONTROL	
SOURCE REDUCTION	• Ponds may be drained to eliminate breeding sites. • On base residential housing, water-holding containers (ex. pet food dishes, garbage cans, garden pots, boats, flower pots, and wheel barrels) should be emptied of water and prevented from collecting water. • Trash or tire piles identified within the installation should be cleared immediately.
VEGETATION REMOVAL	• Aquatic vegetation encourages mosquito breeding by slowing down water movement in ditches and streams and by providing larvae with protection from predators. Emergent and floating vegetation can be removed mechanically.

PROPER IRRIGATION	• Lawn and landscape should be irrigated properly to prevent over watering and run-off that can collect and produce mosquitoes.
MOSQUITO FISH	• Gambusia affinis, or mosquito fish, feed on mosquito larvae and other small aquatic animals and can eliminate and prevent mosquito breeding. • Mosquito fish can be placed into large ornamental ponds. • Mosquito fish are often introduced into a water source after treatment with a larvicide.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	*Bacillus thuringiensis israelensis* (Bti), *Bacillus sphaericus,* methoprene, temephos, insect growth regulations (e.g., s-hydroprene, s-kinoprene), mineral oils, monomolecular films
METHODS OF DISPERSAL	• Bti.: Apply by hand (granules), hand-compressed or hydraulic sprayer (liquid), as briquettes, or by manual or powered granule spreader. Liquid cost-effective when applied to open water; granules effective when water is covered by heavy vegetation. • Methoprene: Apply by hand or manual or powered granule spreader (granules and pellets), as briquettes, or by hand-compressed or hydraulic sprayer (liquid). Methoprene slow-release briquettes can be applied as a pre-flood application to dry water-holding areas that have been surveyed and are known to produce mosquitoes. • Surface Films: Apply by hand compressed sprayer.
SITE PREPARATION	Survey treatment site prior to application of Bti and methoprene to ensure that majority of mosquitoes are in larval stage. Both are not effective on pupae.
CONSIDERATIONS	
SENSITIVE AREAS	• Some catch basins and culverts drain into environmentally-sensitive habitats and pesticide use may have adverse effects. • Some permanent and semi-permanent water sources may be habitats for birds, fish, and other animals. Alterations, such as vegetation removal or drainage, introduction of fish, or herbicide application may have significant impact on these habitats. • Some drainage channels drain into environmentally-sensitive habitats and pesticide use may have adverse effects.

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Spiders

TARGET PEST	
TARGET PEST(S)	Various spiders. Medically important spiders such as the black widow (*Latrodectus hesperus*), the brown widow (*Latrodectus geometricus*), the desert recluse (*Loxoceles deserta*), the brown recluse (*Loxoceles reclusa*), and the hobo spider (*Tegenaria agrestis*).
TARGET SITES(S)	Housing and child development centers where young children may be at risk for spider envenomation, especially under playground equipment. Other areas where spiders are unwanted.
PURPOSE	• Control spiders that may cause envenomation or painful, serious bites. • Reduce discomfort or fear associated with the presence of spiders. • Webs are a nuisance.
RESPONSIBILITY	• All Personnel: Ensure proper of all living and working spaces as spiders harbor in areas that are rarely disturbed. • Installation Preventive Medicine Technicians: Conduct sanitation inspections. Investigate reported spider bites. Provide control recommendations. • Pest Management Service Provider: Conduct integrated pest management to control infestations. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	• Visual inspections: look for spiders and webbing in areas where people may be at risk for spider bites. • Personnel complaints: including information on when pests were observed, where, and how many. • Conduct pre- and post-treatment surveys to determine whether control operation was effective
FREQUENCY	• Daily observation by building occupants • Monthly inspections outdoors around buildings by PMSP to identify spiders.
ACTION THRESHOLD	Visual sighting of one medically-important spiders indoors/room.
NONCHEMICAL CONTROL	
VIGILANCE TO PREVENT BITES	Be cautious when entering areas that are infrequently visited and disturbed such as storage sheds, wood piles, attics, utility sheds, etc.

SANITATION	• Routinely clean out storage areas. • Vacuum carpets and furniture routinely. • Remove webbing from ceilings.
MECHANICAL REMOVAL	• Smash the spider. • Place a jar over the spider and slip a piece of paper under the opening. Relocate the spider outdoors. • Vacuum spiders and webs while cleaning. Use a wet/dry vacuum filled with water or carefully empty bag when done.
PEST PROOFING	• Avoid attracting flying insects to buildings with exterior lighting. Reducing flying insects near buildings will deny spiders of their food. Save energy and turn off lights, or use motion detectors or colored lamps that do not attract insects readily. • Seal cracks in the foundation and other parts of the structure and gaps around windows and doors.
EDUCATION	• Emphasize the importance of sanitation in preventing spiders. • Education and awareness to reduce the fear of spiders and to highlight the benefits of spiders
CURRENT NONCHEMICAL CONTROL PRACTICES	• Sanitation: in indoor storage areas, place boxes off the floor and away from walls to reduce harborages. Seal boxes with tape. • Vigilance
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Pyrethroids, silica gel, and other insecticides
METHOD OF DISPERSAL	Pesticides are a last resort for recurring problems, since non-chemical control methods, particularly mechanical, are very effective. • Residual application: Pesticide applications should be done only as a last resort for recurring spider problems. • Liquid Aerosol: Most indoor-use insecticides do not leave a residual and require direct application to the spider. • Dust: Sorptive dusts, such as silica gel, that are formulated with pyrethrin can provide residual control. Preventive baseboard spraying in the absence of a pest is prohibited.
SENSITIVE AREAS	• Outdoors where children or pets may be exposed to pesticides. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.
CONSIDERATIONS	
PROHIBITED PRACTICES	• Do not use ultrasonic pest repelling devices. • Do not use aerosols, dusts, and other insecticide formulations that can become airborne in occupied spaces.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Applicators must use personal protective equipment as required by the product label. Insecticide liquid and dusts shall not be applied to occupied spaces. • Minimal. Avoid contamination of water with pesticides.

COMMENTS:

The greatest problem posed by spiders is arachnophobia, the fear of spiders. Most spiders are harmless and are very beneficial in controlling insects around buildings. Education of the public is an important part of control.

Brown recluses—Many of the purported bites attributed to brown recluses are probably other arthropod bites, skin infections, or allergic reactions misdiagnosed as brown recluse bites. For general information on brown recluse identification, go to https://spiders.ucr.edu/recluseid.html.

Brown widow—venom is more potent than black widow venom. However, they do not inject as much venom as a black widow, are very timid, and do not defend their web so their bites are rare.

ADDITIONAL INFORMATION:

Eliminating spiders around homes and buildings, http://www2.ca.uky.edu/entomology/entfacts/ef623.asp

Common spiders in and around homes,
http://labs.russell.wisc.edu/insectid/files/2014/03/ControllingSpidersinandAroundHomes.pdf

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Stinging Insects

TARGET PEST	
TARGET PEST(S)	Bees, wasps, and yellow jackets
TARGET SITES(S)	Outdoors
PURPOSE	• Control stinging insects that can cause painful stings, massive envenomization, or serious allergic reactions. • Remove bee hives that can cause property damage and attract other unwanted pests.
RESPONSIBILITY	• Installation Preventive Medicine Technicians: Evaluate medical threat of stinging insects if necessary • Pest Management Service Provider: Conduct inspections and integrated pest management to control infestations through killing or removal. Arrange for removal of beehives in buildings. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • Facilities Maintenance Provider and Grounds Maintenance Provider: Report any stinging insect nest sightings.
SURVEILLANCE	
METHODS	• Observation of insect nesting or swarming. • Routinely examine buildings for openings where bees or other stinging insects appear to be entering and exiting. • Personnel complaints: including information on when pests were observed, where, and how many. • Identify whether bees are swarming or nesting. (see remarks below)
FREQUENCY	As observed by personnel.
ACTION THRESHOLD	• Nesting bees, wasps, or yellow jackets near populated areas require immediate response. • Swarming bees, especially near areas where few people are found, should be left alone. • Swarming bees in areas that cannot be avoided by people and appear to be a threat should be controlled. • Individual bees are foraging and are docile, but may be nesting nearby.
NONCHEMICAL CONTROL	

DISCOURAGE AND ELIMINATE NESTS	Nests should be removed by trained personnel
AVOIDANCE	Stay away from stinging insects if possible.
ELIMINATE FOOD SOURCES	• Keep pet foods indoors. • Cover trash cans.
ELIMINATE STANDING WATER	• Some stinging insects are attracted to water. • Repair leaking outdoor faucets and other mechanical water sources. • Eliminate standing water.
TRAPS	• Wasps and yellow jackets: o Trapping should start in the spring and be continued through the summer. Early elimination of queen will reduce the size of populations later in the year. o Lure traps—baited with a chemical attractant or with meat. o Water traps—Meat hung on a string hung 1-2 inches over a bucket of soapy water. Cover bucket with mesh to exclude other animals. • Bees: Swarming bees can be lured into a trap that mimics a nesting site.
MECHANICAL REMOVAL	Wet/dry vacuums may be used to remove bees, but should only be done by trained personnel.
PEST PROOFING	• Seal holes in exterior walls of buildings. Request support from facilities maintenance provider if necessary. • Remove debris that can serve as nesting areas. • Cover tree holes.
CHEMICAL CONTROL	
METHOD OF DISPERSAL	• Aerosol knockdown agents: High pressure aerosols that can be applied from a long distance can be used. Application of these insecticides results in a rapid knockdown of the insects. • Dusts: Dusts can be applied to nesting areas. • Baits: Baits mixed with a toxicant can be used for wasps and yellow jackets
CONSIDERATIONS	
SENSITIVE AREAS	• Personnel that may be harmed by bees or pesticide application. • Buildings that may be damaged by hives. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.

NOTES REGARDING AFRICANIZED HONEY BEES (AHB):

Africanized Honey Bees (AHBs), or killer bees have colonized most of the southwestern United Virginias. Most feral colonies of bees are considered to be AHB colonies.

AHB are often mistaken to be more venomous than their European counterparts that are raised for honey production and pollination. The venom that AHB produce is not more toxic. In fact, AHBs inject less venom than EHBs because they are smaller. AHB are more dangerous than EHB because they exhibit a more aggressive response to a disturbance of their nest or colony. An “attack” usually involves a large number of bees resulting in a large number of stings; often ranging into the hundreds. Injuries in these

types of attacks are the result of massive envenomation. Massive envenomation for small children, elderly and disabled persons and pets can be very serious and sometimes fatal.

Precautions that should be taken when dealing with any feral bee colony include:

1. Hiring a professional pest controller to kill or remove the bees.

2. Be aware of hives in the area. AHB are easily disturbed by loud noises or vibrations caused by lawn mowers and other machinery.

3. Warn people not to disturb hives or swarming bees.

4. Do not leave pets tied up in areas where they may be attacked by bees.

5. If attacked by bees, run and/or cover yourself up with a coat or heavy blanket or seek shelter in a building or a car immediately. Do not stop to swat at the bees or jump into water.

6. Call 911 or other emergency phone number in the event of an aggressive bee attack on a human.

Refer to Technical Information Memorandum (TIM) 34 "Bee Resource Manual with Emphasis on the Africanized Honey Bee" or view TIM 34 on the Department of Defense Armed Forces Pest Management Board web site at http://www.uscg.mil/mlclant/Kdiv/Envrn%20Hlth/IPM/AFPMB%20TIMs/tim-34.pdf

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Ticks

TARGET PEST	
TARGET PESTS	Ticks
TARGET SITES(S)	Outdoors, especially near or in wooded areas
PURPOSE	Prevent the spread of tick-borne diseases.

RESPONSIBLE PARTY	• Pest Management Service Provider: Pesticide applications.
	• Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications.
	• Installation Preventive Medicine Technicians (PMT):
	  o Conduct surveys when pests pose a health threat.
	  o Identify any collected ticks
	  o Contact point for disease emergencies
	  o Respond to complaints of tick bites.
	• Environmental Division: Recommendations and approval for land modifications near improved areas to eliminate tick harborage
	• Grounds Maintenance Provider: Vegetation removal.

SURVEILLANCE	
METHODS	• Cloth drag surveys (conducted by PMTs) • CO_2 ground traps (conducted by PMTs) • Customer complaints
FREQUENCY	When notified of a potential problem.
ACTION THRESHOLD	• 5 or more adult vector species captured in a 5 minute drag near training or encampment areas • During disease emergencies declared, one or more adults or nymphs that have been identified as carrying the disease within 5 miles of base NOTE: Action thresholds can be changed on advice of a BUMED entomologist

Vector species of concern	Primary diseases of concern
Dermacentor variabilis	Rocky mountain spotted fever (RMSF)
Ixodes scapularis	Lyme Disease
Amblyomma americanum	Ehrlichiosis

NONCHEMICAL CONTROL	
HABITAT MODIFICATION	Eliminate brush and high grass from improved and high traffic area
CHEMICAL CONTROL	
METHOD OF DISPERSAL	Barrier spray: Vegetation surrounding training areas and encampments may be sprayed with a pesticide that leaves a residual barrier to ticks. Dispersal is accomplished via a truck mounted power sprayer.

STRUCTURAL PESTS

Drywood Termites

Subterranean Termites

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Drywood Termites

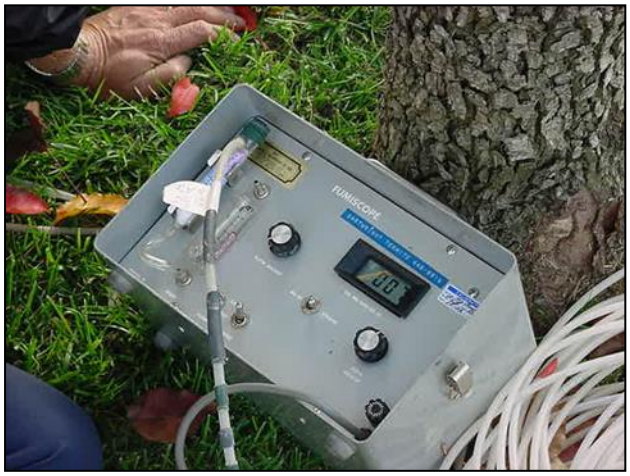
TARGET PEST	
TARGET PEST(S)	Several species of termites in the family Kalotermitidae, particularly *Incisitermes minor*.
TARGET SITES(S)	Structures containing wood
PURPOSE	Control termites that reduce the aesthetics and integrity of real property
RESPONSIBILITY	• All Personnel: Report termite damage and signs to the Pest Management Coordinator. • Pest Management Service Provider: Conduct integrated pest management to control infestations. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	Visual inspections • Inspect wood in crawl spaces that is touching or near the soil surface. • Pay particular attention to wood that is damp. • Termite galleries will be filled with excrement and other debris. • Infested wood may be discolored (darkened) and can often be easily punctured by a knife or screwdriver. • The surface of a severely damaged piece of wood may appear blistered or peeled.
FREQUENCY	Annually
ACTION THRESHOLD	Presence of termites indicates a need for treatment.
NONCHEMICAL CONTROL	
SANITATION	Remove scrap and decaying wood from yards.
HEATING	• Items that may be damaged by high temperatures are removed from the building. • Building is then tented using nylon tarpaulins, and propane heater is used to pump hot air into and around the building, bringing the temperature of all parts of the structure to 120°F or 35 minutes.

	• Temperatures as high as 130°F for 50 minutes may be used.
FREEZING	• Liquid nitrogen is pumped into infested areas. • Termites are killed by the extreme cold.
MICROWAVES	• Microwave generators are placed against walls and structures to be treated. • The resulting heat kills termites.
ELECTRICITY	• Electro-gun is used to apply low-amperage, high voltage current to infested wood. • Termites are killed by the electrical shock.
EDUCATION	• Water-damaged wood is attractive to termites and residents and GMPs should be educated on avoiding landscape irrigations that cause water to contact wood. • Recognition of termite infestations • Flying termites near buildings do not necessarily indicate an infestation; they are attracted to light.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Sulfuryl fluoride (Vikane) fumigant, borates
METHOD OF DISPERSAL	Borate dust or liquid application for spot treatment or wood protection Chemical fumigation
RESTRICTIONS/ REGULATIONS/ PERMITS	Sulfuryl fluoride is a restricted-use pesticide.
CONSIDERATIONS	
SENSITIVE AREAS	Gases used for fumigation are potentially lethal to humans. A 24-hour guard should be posted outside to ensure that no people enter the building before it has been cleared for re-entry by the pest management service provider.
PROHIBITED PRACTICES	Do not use of ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Whole structure fumigation is a dangerous operation. DOD-specific safety requirements are required including securing doors, warning signs on building and on tarp, a barrier with warning signs, and contractor personnel on-site during the duration of the fumigations. • Impact minimal. Sulfuryl fluoride dissipates into the air rapidly and does not leave a residual. Borates are low toxicity for non-target animals, but contamination of water should be avoided.

COMMENTS:

Navy policy is to spot-treat unless infestations are spread throughout the structure. Fumigation is expensive and not cost-effective to use on limited infestations. Though several treatment options exist for drywood termites (see NONCHEMICAL CONTROL), chemical fumigation is by far the most common and currently the most effective method of control. Nonchemical control methods may be indicated in certain situations, such as highly-localized infestations or infestations in very large buildings where the logistics and cost of fumigation are prohibitive. Some of these methods may cause structural damage. Any termite treatment should include a warranty that includes follow-up inspections.

Note that pre- or post-construction soil treatments are not effective in preventing drywood termite infestations. Inspections are critical to the success of drywood termite control to identify where infestations exist and the extent of the infestations. Post-treatment inspections are critical to ensuring effectiveness of the treatment. Consult with the NAVFAC pest management consultant about specific situations where nonchemical control methods may be indicated.



Fumiscope for monitoring fumigant gas in structure.

Drywood termite damage.

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Subterranean Termites

TARGET PEST	
TARGET PEST(S)	Several species of termites in the family Rhinotermitidae, particularly the western subterranean termite, *Reticulitermes hesperus*
TARGET SITES(S)	Structures containing wood
PURPOSE	Control termites that reduce the aesthetics and integrity of real property.
RESPONSIBILITY	• All Personnel: Report termite damage and signs to the Pest Management Coordinator. • Pest Management Service Provider (PMSP): Conduct integrated pest management to control infestations. • Facilities Maintenance Provider (FMP): Provide facility repairs and modifications needed for termite exclusion. • Pest Management Performance Assessment Representative (PMPAR): Ensure contractor pest management service provider performs work in accordance with contract specifications.
SURVEILLANCE	
METHODS	• Inspect wood that is touching or near the soil surface. • Pay particular attention to wood that is damp • Look for shelter tubes in crawl spaces and in walls. • Termite galleries will be filled with excrement and other debris • Infested wood may be discolored (darkened) and can often be easily punctured by a knife or screwdriver. • The surface of a severely damaged piece of wood may appear blistered or peeled.
FREQUENCY	• Annually in most regions • Biannually in arid regions
ACTION THRESHOLD	Presence of termites indicates a need for treatment

NONCHEMICAL CONTROL	

BUILDING DESIGN AND MAINTENANCE	• Several design and construction techniques can help prevent subterranean termite infestations
	  o Use wood species that are resistant to termite attack
	  o Keep all wooden components at least 12-inches above the surface of the soil
	  o Replace soil around the foundation of the building with sand (particle size ranging from 10 to 16 mesh)
	  o Provide adequate ventilation in crawl spaces to keep wood dry.
	  o Before pouring slab, install termite-resistant mesh and eliminate openings around plumbing and other utilities protruding from slab.
	• Reduce excess moisture in the building by correcting leaky plumbing and moisture associated with air conditioning condensate

PEST PROOFING	• Use screening over vents and other openings to discourage entry by winged reproductives. • Remove scrap wood from around structures.
SAND BARRIER	Replace soil around foundation and in crawl spaces with sand. Sand particles should be 10 to 16 mesh. Termites are unable to tunnel through sand.
EDUCATION	Difference between a winged ant and a termite swarmer.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Fipronil, sulfuramid., diflubenzuron, hydramethylnon, chlorantraniliprole, and others.
METHOD OF DISPERSAL	• Chemically Treated Lumber: Lumber to be used near the soil surface is impregnated (pressure treated) with a variety of repellent/fungicidal/insecticidal chemicals prior to construction. Some of these products are also available to topical application to wood after construction. These products are not effective for controlling pre-existing termite infestations. • Pre-Construction Soil Treatment: The soil under and around the perimeter of a slab is treated with an insecticide prior to construction. The insecticide acts as a barrier, either by killing termites that contact the treated soil or repelling foraging termites. Only non-repellent termiticides should be used. • Soil Insecticide Injection: This is the most common method for controlling termites if a pre-construction chemical barrier fails or was never applied. Holes are drilled through the foundation of the building, and insecticides are injected into the soil. Insecticides will kill termites already infesting the building and prevent future infestations for several years. A licensed professional is recommended; applying pesticide to the wrong place can cause contamination in the pluming or heating ducts. • Baits: Bait stations containing a slow acting insecticide are placed around the building. Termites feed on the bait, and then return to the colony where they share the bait with other members of the colony. Some baits are available to the general public whereas others are available only to licensed pest management personnel. Proper bait placement is critical to the success of the procedure, and is therefore best performed by pest management personnel with experience in termite baiting.

CONSIDERATIONS	
SENSITIVE AREAS	• If properly applied, insecticide pre-treatments and injections should pose little risk of unwanted insecticide exposure. • Bait stations should be placed to minimize the chances that children or facilities maintenance personnel will disturb them. • Ensure that insecticides do not enter drains, streams, lakes and other surface water.
PROHIBITED PRACTICES	Do not use ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Applicators must use personal protective equipment as required by the product label. • Termiticides leave a long residual in soil. Care must be taken when applying to prevent contamination of non-target areas.

ADDITIONAL INFORMATION:

Formosan Subterranean Termites

Formosan subterranean termites (FST) are a more destructive species of termite due to its colony size and foraging range. A single FST colony can contain several million termites compared to several hundred thousand for the native subterranean termite species. FST species share interconnected forage galleries in the soil and can forage up to 300 ft, posing a threat to nearby structures. Their distribution includes the southeastern United Virginias and Hawaii. Other differences between an FST colony and a native subterranean colony include:

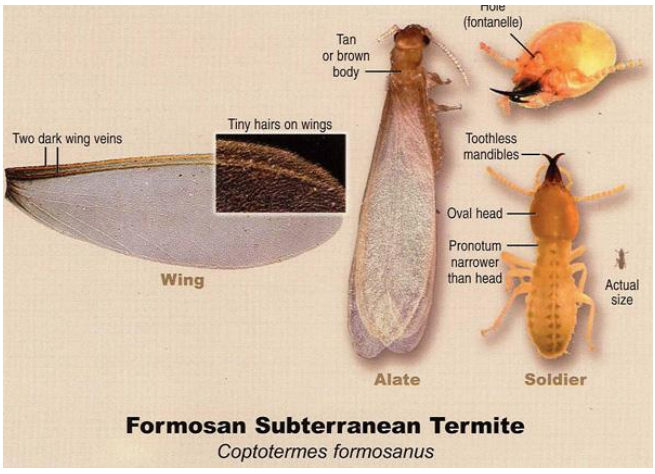
1. FST colonies contain more termite soldiers (have a hardened head capsule) in the colony (10–15% compared to 1–2%) and swarmers are larger

2. They form a material called “carton” in structure voids which allows them to obtain moisture without returning to ground (photo on right).

3. They can readily form aerial colonies by going the top of the structure to obtain moisture which makes controlling them difficult or impossible.

A more aggressive treatment program for FST colonies is required, using the same treatment options as above. Any cartons in voids should be located and removed.

Subterranean termite shelter tubes.



TURF AND ORNAMENTAL PESTS

Fire Ants

Ornamental Plant Pests

Snails and Slugs

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Fire Ants

TARGET PEST	
TARGET PEST(S)	Fire ants
TARGET SITE(S)	Outdoors and inside buildings
PURPOSE	Control fire ants that can cause painful stings or allergic reactions, be a nuisance, and short circuit electrical circuits.
RESPONSIBILITY	• Pest Management Service Provider: Respond to trouble calls and conduct routine inspections during seasonal outbreaks. Thorough inspections will be made prior to any control operation. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • Grounds Maintenance Provider: Control aphids and similar insects on ornamental plants that attract and feed ants. • Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	

METHODS	• Visual inspections
	  ○ Observation of foraging scout ants; ants aggressive when mound is disturbed
	  ○ Aboveground mounds
	• Personnel complaints: including information on when, where, and how many pests were observed.

FREQUENCY	• As needed • Areas designated by customer complaints, or with a history of infestation.
ACTION THRESHOLD	Visual sighting of fire ants.
NONCHEMICAL CONTROL	
SANITATION	• Remove indoor plants which are attractive to ants and/or aphids • Trim trees and shrubs touching buildings
OUTSIDE BARRIER	• Keep a vegetation-free, clear area approx. 24” wide (often filled with gravel or coarse sand) around foundations to inhibit pest movement to structures and facilitate barrier treatments.
PEST PROOFING	• Reduce moisture • Replace outside hollow core doors with solid doors.

CONTROL OF PLANT INSECTS	• Ants live in cooperation with some plant-infesting insects such as aphids. These insects produce sugars that are food for the ants, while the ants provide protection for the plant-sucking insects. • Control aphids and other plant-sucking insects on plants
CHEMICAL CONTROL	
METHOD OF DISPERSAL	• Baits: Improved areas should be treated with a granular bait annually in the late summer or early fall. Bails are slow-acting and require weeks to months to achieve 80 to 90% control. • Drench, Dust, or Granular Insecticide: Three to five days after initial broadcast application, specific nuisance mounds should be treated with a drench, dust, or granular application labeled for fire ant mounds. Nuisance mounds are those located in sensitive or high traffic areas.
CONSIDERATIONS	
SENSITIVE AREAS	• Exposed food products, food containers, counter tops, any surface where food may be stored or prepared, or any food storage area. • Outdoors where children or pets may be exposed to pesticides.
PROHIBITED PRACTICES	• Do not apply liquid or dust formulations of insecticides in occupied spaces. • Do not do preventive baseboard spraying in the absence of a pest.
SAFETY PRECAUTIONS	• Treatment of child development centers and schools will be scheduled at night of the last day during the work week if practical. Pesticides will be allowed to dry and air out for at least 36 hours before children are allowed to enter treated spaces. • Additional re-entry interval time requirements specified by the product label must be strictly adhered to. • If a liquid, dust, or aerosol is used, treatments will be made after hours or at other times when the spaces are vacant.

COMMENTS:

Baits should not be applied if heavy rains are expected within 24 hours. Baits work best when they are fresh and are applied when ants are foraging, usually in the late afternoon and evening.

NOTES REGARDING FIRE ANTS:

The red imported fire ant (RIFA) is a very destructive pest that is well established along the southern tier of the United Virginias. These ants are reddish brown and 1/8" to 1/4" long. RIFA nests are generally constructed in open, sunny areas such as lawns and around yard plants and trees. These ants can invade utility vaults and structures. The sting from the RIFA is very painful and, in certain cases, may require medical attention. Never use gasoline to burn out any ant nest. Gasoline is a soil and groundwater contaminant, and is very hazardous. For more information on red imported fire ants, contact your pest control service provider or go to http://fireant.tamu.edu/.

Ornamental Plant Pests

TARGET PEST	
TARGET PEST(S)	Insects and mites attacking ornamental plants
TARGET SITES(S)	All interior and exterior areas with ornamental plants
PURPOSE	• Prevent damage to real property (valuable ornamental plants) • Prevent unsightly honeydew and mold accumulation on vehicles and structures
RESPONSIBILITY	• All Personnel: properly care for houseplants in working areas • Pest Management Service Provider: conduct integrated pest management to control infestations. • Pest Management Performance Assessment Representative: ensure contractor pest management service provider performs work in accordance with contract specifications • Grounds Maintenance Provider: maintain the health of ornamental plants • Landscape Designer: ensure use of plants well adapted for the given areas in landscaping; ensure placement of plants in areas where their health can be maintained • Integrated Pest Management Consultant: identify unknown pests and recommend control measures.
SURVEILLANCE	
METHODS	• Visual sighting of pests: o Caterpillars: immature forms of moths and butterflies. These insects chew on leaves and are often found on the undersides of leaves. o Aphids: small (usually about 1/16-inch or smaller) globular, pear-shaped insects. Color is usually green, but may be pink, yellow, blue-green, or black. Almost always with two dorsal tubular structures on the posterior end of the body (cornicles). Wingless and winged forms may be present. Typically found on the undersides of leaves, but may also be present on stems. o Scales: flattened sessile insects that suck plant juices from leaves or, more often, stems. Usually appear as oval, waxy shells; no legs or body divisions are visible. Size and color vary depending on age and species. o Mealybugs: oval insects that superficially resemble small sowbugs. Exude loose cottony wax that may obscure the body of the insect. May be found on almost any part of the host plant, including the roots. o Whiteflies: adults usually appear as minute white flies that hold their wings roof-like over their bodies at rest (though these insects are not true flies). Dark spots or patterns are visible on the wings of some species.

	Adults typically rest on the undersides of leaves, but fly readily if disturbed. Immature whiteflies are sessile, flattened, oval insects that are almost always found on the undersides of leaves. They suck plant juices and can severely reduce plant vigor. o Mites: minute, globular arachnids very diverse in habit and form. Some are pests of plants. Adult mites will have eight legs, distinguishing them from insects which have six legs. Spider mites are the most common mite pests of ornamentals. Immature spider mites are usually yellowish or straw-colored and the adults are yellowish or green. In severe infestations, a fine web, similar to spider web will coat the plant's foliage. Bright red, fast moving, velvety mites are often present on plant foliage. These mites are predaceous and, therefore, considered beneficial. o Nematodes: microscopic, eel-like roundworms. Many species are root-feeding. They are difficult to control and can be easily spread from garden to garden on tools, in soil, or on boots. o Other pests: other insects, including cicadas, psyllids, leaf-feeding beetles, and gall-forming insects may be pests of ornamentals. Contact a pest management consultant if unsure of the identity of a pest. • Signs of pest infestation: o Leaves: chewed, spotted, curled, or otherwise disfigured leaves can indicate an insect or mite infestation. Plant pathogens, nutrient imbalances, and uptake of toxic substances can cause similar disfigurements of leaves. Consult with the pest management consultant when in doubt of the origin of plant damage. o Branches: girdled twigs are an indication of infestation by certain types of beetles. o Trunks: holes in the trunk or globules of plant resin can indicate infestation by certain types of boring beetles. o Ants: ants scurrying about the foliage of a plant may be a sign of infestation by certain plant feeding insects, especially scales, aphids, and mealybugs. These insects exude sugary waste products that ants feed upon. In return, the ants protect the plant feeding insects from predators and parasites.
FREQUENCY	Ornamental plants should be inspected weekly for pests or signs of pests.
ACTION THRESHOLD	Variable, depending on pest. A low-level of infestation is to be expected on outdoor plants. Natural controls (predators, parasites, and plant defenses) typically prevent these low-level infestations from significantly harming the plant. Infestations that significantly reduce plant health or seriously affect plant aesthetics are candidates for chemical control. Unnecessary or excessive pesticide application can compromise natural control by killing beneficial organisms and may lead to pesticide resistance.
NONCHEMICAL CONTROL	
BIOLOGICAL CONTROL	• Bti: Several formulations of the bacterial agent, *Bacillus thuringiensis israelensis* are available for use against certain pests, particularly caterpillars. • Fungi: some fungal pathogens of insects have been isolated and formulated for use against insect pests. • Natural control: Many pests of ornamentals are maintained at low, undamaging levels by the actions of natural enemies. Applying chemical pesticides only when necessary can help conserve these natural enemies. In some cases, universities and government agencies may be actively importing, rearing, and releasing natural enemies for control of particular pests.

SANITATION	• Removing, burning, or chipping dead wood and other plant debris can reduce certain pest populations, particularly beetles. • Keep gardening tools clean so as not to carry pests from one plant to the next. • Only buy plants from reputable sources. Ensure that plants don't harbor ants, nematodes, invasive weeds, or other problems.
MECHANICAL REMOVAL	• Minor infestations: simply picking pests off of plants can sometimes control small infestations. This technique is typically not practical for large infestations or infestations on outdoor landscaping. • Severe infestations: in some cases, a plant may be so severely infested that there is little chance of control, or the cost of control is not justified by the value of the plant. These plants should be removed, and their tissues destroyed (chipping or burning) so that they do not serve as a source of pests for other plants.
IMPROVE AND MAINTAIN PLANT HEALTH	• The best defense against pest infestations is maintenance of healthy, vigorous plants. Healthy plants will be able to tolerate low levels of infestation and prevent pest outbreaks. • Ensure proper watering, fertilizing, and pruning schedules. Do not over water or over fertilize. • Place plants in areas where they receive the appropriate quality and quantity of light.
USE OF NATIVE VEGETATION LANDSCAPING	• Native plants are usually less susceptible to pests because they are well adapted to survival in the area. Consider using native vegetation rather than exotic vegetation in landscape design. • Grow a diversity of plants. Plant a variety of sequentially flowering species to provide natural enemies with nectar, pollen, and shelter throughout the growing season.
EDUCATION	Education on natural enemies
CURRENT NONCHEMICAL CONTROL PRACTICES	Maintain health of ornamental plants through proper watering and pruning.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	• A number of soap and oil insecticides are available. Many of these are "25(b)" or EPA minimum-risk pesticides and are exempt from registration due to the low toxicity of the active and inactive ingredients in the product. For a list of these active ingredients, go to http://www.epa.gov/oppbppd1/biopesticides/regtools/25b_list.htm.
METHOD OF DISPERSAL	• Contact pesticides: may be sprayed directly onto infested plants. The pesticide must directly contact the pest for control. The applicator should concentrate on the undersides of leaves for most types of pests. Insecticidal soaps are a particular class of contact pesticide with very low toxicity to nontarget organisms. These can be particularly effective against some scale, mealybug, and mite infestations. • Systemic pesticides: these chemicals are absorbed by the plant and ingested by the pest when it feeds on the plant. Some systemics are applied to the foliage; others are applied to the soil and absorbed by the plant's roots.
SENSITIVE AREAS	• Use nonchemical controls whenever possible around playgrounds and childcare centers. • Avoid exposing natural areas containing endangered or threatened species. • Ensure insecticides do not enter drains, streams, lakes and other surface water.

RESTRICTIONS/ REGULATIONS/ PERMITS	None.
CONSIDERATIONS	
PROHIBITED PRACTICES	Do not use ultrasonic pest-repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Applicators must use personal protective equipment as required by the product label. • Take precautions to prevent pesticide exposure to personnel when spraying near buildings or other populated areas. • Avoid contaminating water. Do not apply before rain or irrigation to prevent runoff.

Snails and Slugs

TARGET PEST	
TARGET PEST(S)	Snails and slugs, particularly the brown garden snail (*Helix aspersa*) and the gray garden slug (*Peroceras reticulatum*), the banded slug (*Limax poirieri*), and the greenhouse slug (*Milax gagates*)
TARGET SITES(S)	Landscaped areas around buildings
PURPOSE	• Prevent damage to real property (landscaping plants) • Reduce the presence of unsightly snails and slugs on and around buildings
RESPONSIBILITY	• Pest Management Service Provider: conduct integrated pest management to control infestations. • Pest Management Performance Assessment Representative (PMPAR): ensure contractor pest management service provider performs work in accordance with contract specifications. • Landscape Maintenance Provider: maintain the health of ornamental plants.
SURVEILLANCE	

METHODS	• Visual sighting of pests:
	  ○ Snails: conspicuous, shelled slow moving animals found in moist habitats. Most active at night and on cloudy or foggy days. During hot dry periods, dormant snails may be seen attached to walls, fences, or tree trunks.
	  ○ Slugs: similar to snails, but without shell
	• Signs of pest infestation:
	  ○ Trails: snails and slugs leave silvery mucus trails wherever they crawl. Trails may be present on the ground, on the foliage of plants, or on buildings.
	  ○ Plant damage: chew irregular holes with smooth edges in leaves of succulent and herbaceous plants. Prefer plants that are close to the ground, but will climb to feed on fruits and leaves of fruit trees.

FREQUENCY	Survey during normal landscape maintenance
ACTION THRESHOLD	Populations densities sufficient to cause a nuisance or significant damage to plants warrants control
NONCHEMICAL CONTROL	
BIOLOGICAL CONTROL	• Decollate snail: a predaceous snail that feeds on young plant feeding snails and slugs. These snails pose a risk to endangered native snail populations, so their release is restricted to particular counties. They are not commercially available.

DRIP IRRIGATION	• Replacing sprinklers with drip irrigation will reduce unnecessary moisture and therefore reduce the habitat for snails and slugs to hide
HABITAT REMOVAL	Remove debris, such as boards, flat stones, dead vegetation, and low hanging limbs that provide moist cover for snails and slugs during dry periods.
MECHANICAL REMOVAL	• Picking: snails and slugs can be picked out of landscaped areas, placed in plastic bags, and disposed of in refuse containers. This method is not likely to be practical in large landscaped areas • Trapping: a board with two rails on opposite edges will serve as an attractive site for snails and slugs to hide during dry periods. The board can be periodically lifted and the snails and slugs removed.
PEST PROOFING	Barriers: consist of copper foil or screens. Copper foil can be wrapped around the bases of potted plants. Copper screen can be used to create barriers around gardens and landscaped areas.
IMPROVE PLANT VIGOR	Healthy plants will be less likely to succumb to damage by pests.
CHEMICAL CONTROL	
METHOD OF DISPERSAL	Baits: products containing metaldehyde or iron phosphate are effective for slug and snail control. Apply baits in the evening. Baits applied during hot dry conditions are less likely to be effective because snails and slugs will be inactive and therefore less likely to come in contact with the bait. **Note:** Do not use salt to kill snails and slugs. This will damage the soil and render it unusable for landscaping or gardening.
CONSIDERATIONS	
SENSITIVE AREAS	Products containing metaldehyde can be hazardous to children or pets. Emphasize nonchemical control and iron phosphate baits in areas frequented by children or pets.
PROHIBITED PRACTICES	Do not use ultrasonic pest repelling devices.

VERTEBRATE PESTS

Bats

Nuisance Birds

Feral Cats

Raccoons

Rodents

Nutria

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Bats

TARGET PEST	
TARGET PEST(S)	Bats
TARGET SITES(S)	Buildings where bats may roost
PURPOSE	• Prevent damage to real property and unsanitary conditions resulting from the buildup of bat guano (feces) • Prevent fear • Reduce the risk of disease transmission from infected bats • May be a source of bat bugs, which are in the same genus as bed bugs
RESPONSIBILITY	• Installation Preventive Medicine Technicians: Conduct surveys if bats pose a health hazard and provide pest management recommendations. • Pest Management Service Provider: Conduct integrated pest management to control bats in structures when necessary. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • Natural Resources: Implement a bat management plan developed by the contracted biological consultant and conduct bat removal from workspaces. • Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested. • All Personnel: Report bat problems, especially when they pose a health hazard.
SURVEILLANCE	

METHODS	• Visual inspections
	  o Observation of bats roosting or entering a building.
	  o Observation of signs of bat roosting such as guano
	• Personnel complaints: including information on when, where, and how many pests were observed.

FREQUENCY	Daily observation by all personnel and pest management service providers.
ACTION THRESHOLD	• When bats pose a health hazard, become a nuisance, or deface property. • Bats in human living quarters or food preparation areas should always be removed.
NONCHEMICAL CONTROL	
EXCLUSION	Seal openings to attics and other areas where bats may enter and roost

BAT REMOVAL	• One-way valves: Devices that allow bats to leave a building, but not return, can be installed on buildings already infested. Leave such devices in place for 7 to 10 days before permanently sealing the opening. • Do not install devices on roosts where mothers are nursing immature bats.
MECHANICAL REMOVAL	Bats that accidentally enter a room can be captured and released outside. To reduce stress on the animal, use the following procedure: 1. Close doors to confine the bat to a single room. 2. Allow the bat to become exhausted and land. Do not attempt to catch a bat in flight. 3. Once the bat has landed (usually on curtains or a piece of furniture), allow it to rest for 20 to 30 minutes. 4. Place a bowl, can, or other suitable container over the bat. 5. Trap the bat in the container by sliding a piece of cardboard or other rigid material between the bat and the surface on which it is resting. Wear thick leather gloves for this procedure, and avoid touching the bat. 6. Release the bat outside. The bat may not fly immediately, so release it in an area where it can remain undisturbed for several hours. If the bat is still present the next day, report it to a preventive medicine technician or pest control service provider.
PROVIDE ALTERNATIVE ROOSTS	Bat houses can provide an alternative to buildings as roosting sites. Houses must be correctly built and placed for acceptance by bats.
EDUCATION	Public education on both the benefits and the risks associated with bats.
CONSIDERATIONS	
PROHIBITED PRACTICES	Do not use ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Use care when handling bats and wear proper PPE when necessary. • Contact the natural resources manager for restrictions and guidance on bat management.

CHEMICAL CONTROL:

There are no chemical pesticides registered for use against bats. Deliberately poisoning bats or other wildlife is a violation of federal law.

COMMENTS:

Bats are generally considered beneficial organisms that reduce insect populations. Control is only necessary if the bats are causing a nuisance or public health concern.

ADDITIONAL INFORMATION:

How to build and place bat houses and bat eviction devices can be found at http://www.batcon.org/.

Nuisance Birds

TARGET PEST AND SURVEY	
TARGET PEST(S)	Nuisance birds (including pigeons, English sparrows, starlings, seagulls, etc.)
TARGET SITES(S)	• Office buildings, warehouses, aircraft hangars, and parking lots • Light posts and signs • Ledges, window ledges, and rooftops
PURPOSE	Manage birds that cause safety hazards (Bird/Wildlife Aircraft Strike Hazard), deface buildings, vehicles, and equipment, and provide a potential source of disease, mites, and bed bugs. Bird droppings which accumulate over several years may harbor spores of fungus that cause histoplasmosis, ornithosis, and cryptococcosis.

RESPONSIBILITY	• Installation Preventive Medicine Technicians: Conduct surveys if birds pose a health hazard and provide pest management recommendations.
	• Pest Management Service Provider: Conduct integrated pest management to control birds.
	• Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications.
	• Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
	• BASH Manager: Manage birds in and around airfields and aircraft facilities to prevent bird aircraft strike hazards (BASH).
	• Natural Resource Manager: Coordinate management of birds and other wildlife with USDA Wildlife Services and be the POC for depredation permits.
	• All Personnel:
	  o Report bird problems especially when they pose a health hazard.
	  o Do not feed pest birds (except for residential bird feeders)
	  o Keep lids closed on dumpsters and other receptacles

SURVEILLANCE	

METHODS	• Visual inspections
	  o Observation of birds roosting or nesting or entering into a building
	  o Observation of signs of bird roosting and nesting such as feces
	  o Observation of bird mites in buildings infested with birds.
	• Personnel complaints: including information on when, where, and how many pests were observed.

FREQUENCY	Daily observation by all personnel and pest management service providers.

ACTION THRESHOLD	When birds pose a health hazard, become a nuisance, or deface property.
NONCHEMICAL CONTROL	
REMOVAL OF FOOD SOURCES	• Cover trashcans and dumpsters which attract birds such as gulls • Avoid feeding birds especially pigeons • Sanitation
EXCLUDE ENTRY INTO BUILDINGS	• Close windows and doors to buildings • Place netting over windows and doors that must remain open • Place wood, metal, glass, masonry, rust-proofed wire mesh (1/4" thick), or plastic/nylon screen/netting or other barriers over openings or areas of buildings that might be used for nesting
ELIMINATE ROOSTING	• Design structures that prevent bird roosting. For example, place a board over ledges at a 45° angle. Make sure the ends are closed to prevent entry. • Remove structures that allow roosting. • Attach anti-roosting devices such as Nixalite bird strips • Apply a chemical repellent such as Hot Foot. • Thinning or pruning trees to remove protective cover can discourage roosting.
SHOOTING	• If allowed, a low-caliber rifle can be used indoors to eliminate birds. • Outdoors, shotgun blasts can also scare birds. • This method should only be used by personnel trained in the use of firearms. There are tight restrictions on bringing firearms onto an installation.
HABITAT MODIFICATION	Modify habitats to make them less attractive to birds (especially around airfields) • Keep grass low • Fill in areas that hold water
TRAPPING	• Pigeon traps have proven to be effective in some situations. • "Australian crow traps" collect a wide variety of birds, but may require a permit to use. • Pigeons should not be relocated as they will likely return to their roosting and feeding areas. They may need to be euthanized.
NEST REMOVAL	• Remove bird nests. Nuisance bird nests can be removed with eggs or chicks. Other bird nests cannot be removed unless abandoned or empty. • Cliff swallows: remove mud nests while they are still under construction and do not contain eggs or hatchlings. Once the nest has been established, it is illegal to destroy the nest until it is abandoned.
SCARE DEVICES	• Acoustical devices, such as propane-fired cannons, are known as bird bangers. The cannons that work most effectively are those that randomly fire at different times and are multidirectional. It is the unpredictable nature of the noise that frightens the birds • Visual repellent devices such as scare-eye balloons, bird effigies, laser lights, and streamers and flashtape. • Timing is important. It is easier to scare birds if the site has been occupied for a short period of time rather than used for many nights. Scare tactics require at least three to five evenings to be effective. • Raptor Models—strategic placement of owl decoys or raptor silhouettes may be used to discourage roosting. Models must be relocated frequently and have only a short-term effectiveness. Both visual and auditory frightening devices are only effective for short periods of time.

EDUCATION	Understanding of how baits and repellents work Importance of not feeding birds and keeping trash receptacles closed.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	• 4-aminopyridine, polybutene, methyl anthranilate
METHOD OF DISPERSAL	• Bait: One type of chemically-treated bait causes birds that ingest the toxicant to emit distress and alarm cries and visual displays that frighten the rest of the flock causing them to leave the site. (e.g., Avitrol) • Chemical repellent: Chemical repellents are non-toxic to the birds and are available for direct application to turf and other surfaces where birds feed or roost. (e.g., 4 The Birds, Hot foot, Tanglefoot, Roost No More, Bird-Proof). Another application method available is a ULV formulation that is allowed to drift directly onto the birds (e.g., Fog Force).
RESTRICTIONS/REGULATIONS/PERMITS	• Nuisance birds are not protected under the Migratory Bird Treaty Act, but control of the birds may require a depredation permit. • The NRM should always be consulted when managing non-nuisance birds.
CONSIDERATIONS	
SENSITIVE AREAS	• Areas where endangered or threatened species occur. • The use of toxicant bait can elicit a negative public response. Public education, timing, and placement of the bait are important in preventing negative publicity.
PROHIBITED PRACTICES	Do not use ultrasonic pest repelling devices.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Firearms safety if shooting • Noise hazards with auditory scare devices. • Fall hazard when working on roofs or ledges • Adverse impact on non-target bird especially when using chemicals.

COMMENTS:

All birds except rock doves (pigeons), English sparrows, and starlings are protected under the Migratory Bird Treaty Act (MBTA) and require a depredation permit to control. This also includes nests occupied by birds protected by the MBTA. Contact the installation environmental division regarding a permit before beginning new bird control operations.

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Feral Cats

TARGET PEST	
TARGET PEST(S)	Feral Cats
TARGET SITES(S)	Buildings where cats frequent
PURPOSE	Control feral cats that may contribute to flea infestations, increase the risk of rabies and other diseases, and prey on local wildlife.
RESPONSIBILITY	• Army Veterinary Detachment: Conduct surveys if cats pose a health hazard and trap cats when necessary. • Pest Management Service Provider: Conduct integrated pest management to control cats near buildings when necessary. • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
SURVEILLANCE	
METHODS	• Visual inspections • Customer complaints
FREQUENCY	Daily observation by all personnel.
ACTION THRESHOLD	• Any wild/feral animals capable of transmitting rabies and acting sick or aggressive, or damaging property shall be managed. • Any animal (capable of carrying rabies) that has bitten or scratched someone shall be managed and analyzed for rabies.
NONCHEMICAL CONTROL	
LIVE TRAPS	Cats that require extensive care will be taken to the local humane society or Society for the Prevention of Cruelty to Animals (SPCA), cats that are rejected by the SPCA will be euthanized.
SANITATION	• Remove food source • Cover trash cans/dumpsters
EDUCATION	Keep personnel from feeding the feral cat population.
HABITAT MANAGEMENT	Remove available harborage sites

COMMENTS:

Toxic baits shall not be used for feral cat management.

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Raccoons

TARGET PEST	
TARGET PEST(S)	Raccoons.
TARGET SITES(S)	Areas near buildings or populated areas where raccoons become a pest.
PURPOSE	Control raccoons due to danger when they are cornered and become aggressive, pathogens they carry such as rabies and raccoon roundworm which can be fatal to humans, and severe damage they cause to buildings and other structures.
RESPONSIBILTY	• Installation Preventive Medicine Technicians: Conduct surveys where raccoons pose an adverse health or safety risk, such as inside buildings • Pest Management Service Provider: Conduct integrated pest management to control raccoons. • Pest Management Performance Assessment Representative: Ensure contractor PMSP performs work in accordance with contract specifications. • Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude raccoons from buildings. • Base Operation Support: Ensure that dumpsters and trashcans are emptied on schedule and that they are securely covered to prevent raccoon entry. • All Installation Personnel: Practice good sanitation and do not feed wild animals to prevent attracting raccoons from becoming a pest.
SURVEILLANCE	
METHODS	• Visual sighting of raccoons or signs of raccoons. • Raccoons are nocturnal, so visual surveys are usually conducted at night. • Verify personnel reports of raccoon activity.
FREQUENCY	As needed.
ACTION THRESHOLD	Any verified sighting of a raccoon where it enters a building or poses a safety or health hazard.
NONCHEMICAL CONTROL	
EXCLUSION	Use lids/covers that can be secured on dumpsters and trashcans.

SHOOTING	• Shooting with a .22 caliber rifle may be used to control small populations in areas where:
	  o shooting is legal
	  o shooting can be safely conducted
	• Qualified marksmen should do shooting.
	• Not generally practical for large populations

TRAPPING	• Live cage-type traps should be used • Use cat food containing fish or canned tuna for bait. To avoid catching cats use marshmallows, grapes, prunes, peanut butter, or sweet rolls. • Ensure that the raccoon cannot reach through the back or side of the trap to steal the bait. • Secure trap to the ground to prevent the raccoon from tipping it over.
FOOD REMOVAL	• Deny access to trash and other sources of food. • Prevent personnel from feeding raccoons.
CHEMICAL CONTROL	
Chemicals are not available for the control of raccoons.	
CONSIDERATIONS	
PROHIBITED PRACTICES	• Use of ultrasonic pest repelling devices is prohibited. • Relocation of trapped animals greater than one mile from point of capture is prohibited by Virginia law.

ADDITIONAL INFORMATION:

Raccoon biology and management
http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74116.html

Information on raccoon roundworm infection
http://www.cdc.gov/parasites/baylisascaris/index.html

Rodents

TARGET PEST	
TARGET PEST(S)	• Commensal: Norway rats, roof rats, house mice • Peridomestic: Field mice (e.g., deer mice) • Landscape: gophers, ground squirrels
TARGET SITES(S)	Buildings, utility vaults, other structures, and landscaped areas
PURPOSE	Control rodents that may cause food contamination, disease transmission, property damage or be a nuisance.

RESPONSIBILITY	• Building Occupants: Ensure sanitation and other measures to prevent introduction and propagation of pests.
	• Installation Preventive Medicine Technicians:
	  o Conduct surveys where rodents pose an adverse health or safety risk
	  o Provide informal quality assurance for pest control
	  o Provide pest management and disease prevention recommendations.
	• Pest Management Service Provider: Conduct integrated pest management to control infestations.
	• Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications.
	• Facilities Maintenance Provider: Perform facilities repairs and improvements that exclude and minimize pest infestations as requested.
	• Grounds Maintenance Provider: Perform removal of potential food sources (e.g., fruit on trees) and creation of barriers (e.g., vegetation removal) around buildings that promote rodent invasion.
	• Natural Resource Manager: Provide guidance when rodent control operations may impact endangered or threatened species or species of concern.

SURVEILLANCE	
METHODS	• Visual inspections: observations of rodents or signs of rodents, such as nests, rub marks, gnawing, earth mounds, holes, etc. • Use of tracking powder • Personnel complaints: including information on when pests were observed, where, and how many. • Conduct pre- and post-treatment surveys to determine whether control operation was effective • Use of ultraviolet inspection lights (rodent urine and hair will fluoresce under UV light)
FREQUENCY	Daily observation by building occupants. Routine facilities inspections by cognizant PMT or pest control service provider.

ACTION THRESHOLD	Sighting of any rodent or sign of rodent in or immediately surrounding the building.
NONCHEMICAL CONTROL	
SANITATION	Remove or prevent access to all potential food and harborage sources inside and outside of buildings.
ELIMINATE STANDING WATER	Fix leaking plumbing around buildings
PEST PROOFING	• Trim ornamental plants and trees to prevent harborage. • Seal holes in exterior walls that may serve as entryways. • Trim tree limbs so that they are at least 6 feet from the building. • Trim vegetation around buildings. • Clean up debris from inside and around buildings. • Request support from facilities maintenance and/or grounds maintenance provider if necessary.
HABITAT DESTRUCTION	• For field mice: vegetation removal and disking of soil in a barrier 50 ft around buildings will prevent rodent invasion. This is usually done after area-wide rodenticide application. • Use of native landscaping will tend to reduce peridomestic and landscape rodent infestations. Avoid heavy ground covers that provide harborage and cover for rodents to move into buildings from unimproved grounds.
TRAPPING	Glue boards, snap traps, or other mechanical trapping devices. (see health precautions below)
EDUCATION	• Awareness of the importance of sanitation on preventing rodents. • Understanding and preventing diseases associated with rodents.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	• Second generation anti-coagulants: brodifacoum, bromadiolone, difenacoum, difethialone • First generation anti-coagulants: diphacinone, chlorophacinone, warfarin • Others: zinc phosphide, cholecalciferol, bromethalin • Fumigant: aluminum phosphide

METHOD OF DISPOSAL	• Anticoagulant bait: Multi or single dose blocks or pellets; toxicant effect is delayed.
	• Single dose acute toxicant bait: Acute toxicant effect; often broadcast outdoors on ground.
	• Liquid bait: Used in areas where water sources are scarce.
	  ○ When used in occupied spaces or outdoors where there is a risk of exposure to humans and non-target animals, the bait should be contained in a tamper-resistant bait station.
	  ○ Baits can be applied directly into burrows.
	• Fumigation: Used for control of rodents in burrows. Consult a NAVFAC pest management consultant if necessary.

RESTRICTIONS/ REGULATIONS/ PERMITS	All rodenticide baits are required to be applied in tamper-resistant bait stations.

CONSIDERATIONS	
SENSITIVE AREAS	• Areas where humans and non-target animals may come into contact with the rodenticide, particularly childcare centers. • Areas where endangered or threatened rodent species occur and may consume bait. • Areas where rodents may be primary food source for an endangered or threatened animal. • Habitat destruction to reduce food sources or harborage may also be destructive to critical habitats of endangered or threatened species. • The pest management coordinator shall consult the environmental compliance office before any pest management operations are conducted outdoors on unimproved grounds or wildlands.
PROHIBITED ITEMS	• Do not use ultrasonic pest repelling devices. • Myth: Allowing cats to live around buildings controls rodent population. Reality: Cats are inefficient at rodent control especially when they are already being fed. In many situations, cats pose greater hazards than rodents.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Active ingredients in rodenticides are highly toxic to humans and precautions must be taken to prevent human exposure. • Applicators must wear proper protective equipment as required by the product label. • Rodenticides can adversely impact non-target animals through direct poisoning or secondary poisoning. • Traps, such as stick traps, may catch non-target animals such as reptiles and birds. These should only be used indoors.

COMMENTS:

1. Precautions on indoor rodent control:

    a) Most rodents are infested with ectoparasites (fleas, mites, lice) that may also infest or transmit disease to humans. Ectoparasite control should be conducted prior to eliminating (trapping or rodenticides) rodents.

    b) Rat control indoors using rodenticides should be avoided. The most commonly used rodenticide baits have a delayed toxic effect that do not kill the rodent until hours (or days for multidose) after they have consumed the bait. Rodents may die in walls and other voids where the carcass is difficult to retrieve leading to odor problems due to the decaying carcass.

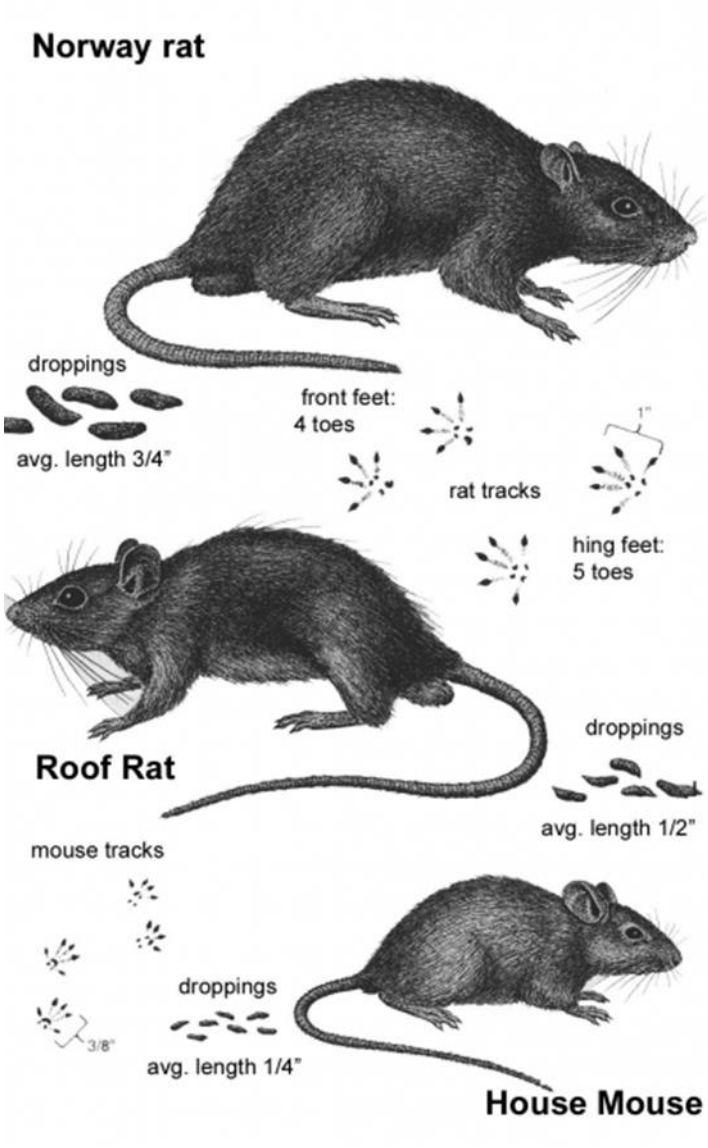
2. Disease Prevention:

    Rodents can harbor a number of human disease agents; among them are hantavirus and plague. Precautions must be taken when working in rodent infested areas. Rodent feces and dried urine may contain hantavirus that is transmitted when these waste materials are inhaled. Precautions should also be taken when handling dead rodents in traps and when found after rodenticide use. The following precautions should be taken:

    a) Avoid disturbing feces and other rodent waste when entering enclosed spaces. Use a fitted respirator with high efficiency particulate air (HEPA) filter if necessary.

    b) Soak rodent waste and dead rodents with a household disinfectant or bleach solution before removing.

c) Wear gloves when cleaning or picking up rodent carcasses. Put material in a double plastic bag and dispose of in regular trash.



Nutria

TARGET PEST	
TARGET PEST(S)	Nutria
TARGET SITES(S)	Wetlands, waterways, ponds, and estuaries where nutria are present.
PURPOSE	Control nutria to prevent damage and degradation to wetlands and aquatic habitats caused by feeding and burrowing behaviors.
RESPONSIBILTY	• Pest Management Service Provider: Conduct integrated pest management to control nutria. • Pest Management Performance Assessment Representative: Ensure contractor PMSP performs work in accordance with contract specifications. • Natural Resource Manager: Provide guidance when nutria control is needed to protect aquatic and semi-aquatic areas. • All Installation Personnel: Do not feed wild animals.
SURVEILLANCE	
METHODS	• Visual sighting of nutria, nutria carcasses, or signs of nutria damage. • Nutria tend to be crepuscular and nocturnal, so visual surveys are best conducted at night with a spotlight. • Verify personnel reports of nutria sightings.
FREQUENCY	As needed.
ACTION THRESHOLD	Installation should maintain zero tolerance for the occurrence of nutria. Natural resources personnel should be involved with management determinations.
NONCHEMICAL CONTROL	
EXCLUSION	Fencing with a buried apron of at least 6 inches may be used to exclude nutria from small bodies of water.

SHOOTING	• Shooting can be an effective control measure, especially when done at an established bait station. However, nutria quickly become wary so effectiveness decreases over time. • Shooting with a .22 caliber rifle may be used to control populations in areas where: o shooting is legal o shooting can be safely conducted • Qualified marksmen should do the shooting.
TRAPPING	• Live cage-type traps may be used. Lethal traps and locking snares may be used in areas where they will not capture pets or other non-target animals. • Sweet potatoes and carrots are commonly used as bait. • Trap should be secured to the ground.
CHEMICAL CONTROL	
TOXIC BAITS	• Nutria may be effectively controlled with carrot or sweet potato baits treated with zinc phosphide. Pre-baiting at a set site for at least two successive nights is required to assure that the bait will be consumed by nutria and not non-target species. • Zinc phosphide is highly toxic and should be used with appropriate caution.
CONSIDERATIONS	
LOCAL LAWS	• Nutria control operations must comply with state or local wildlife laws, and may require a permit in some states. • Nutria are an invasive species, and are considered a nuisance species in Virginia. Nutria may be controlled without a permit.
PROHIBITED PRACTICES	• Relocation of wildlife is prohibited in Virginia.

ADDITIONAL INFORMATION:

The Internet Center for Wildlife Damage Management - Nutria
http://icwdm.org/handbook/rodents/nutria.asp

VEGETATION MANAGEMENT

Invasive Weeds in Natural Areas

Terrestrial Weeds

Weeds in Right of Ways

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Invasive Weeds in Natural Areas

TARGET PEST	
TARGET PEST(S)	Non-native plants that are widespread and adversely affect the habitats they invade economically, environmentally, or ecologically.
TARGET SITES(S)	Natural areas, ranges, riparian areas, training areas, and encroachment buffers threatened by invasive weeds
PURPOSE	Control invasive weeds in natural areas since it is required by law and for the following reasons: • Impacts access to and use of training areas and ranges • Interferes with mission operations • Degrades natural habitats; impacts endangered and threatened species habitats • Preserve natural heritage • Reduce health and safety risks; may increase wildfire hazard • Reduce training costs
RESPONSIBILITY	• Pest Management Service Provider: Conduct integrated pest management to control weeds. • Pest Management Performance Assessment Representative: Ensure contractor invasive weed management provider performs work in accordance with contract specifications. The PAR may be the natural resources manager. • Grounds Maintenance Provider: Remove weeds during regular landscape maintenance to prevent establishment; maintain the health of desirable plants. • Natural Resources Manager: Oversee weed program coordinating detection and control. • Invasive Weed Management Provider: Manage weeds as required by the installation • Integrated Pest Management Coordinator: Ensure environmental compliance of the program.
SURVEILLANCE	
METHODS	Visual inspection and mapping
FREQUENCY	Yearly inspection, especially in the spring and summer when plants are easy to identify by their blooms.
ACTION THRESHOLD	Areas of installations where ordinance or other flammable/explosive materials are stored have zero tolerance for weeds due to fire hazard. Consequently, visual sighting of any weed warrants control.

STRATEGY	Develop a plan. Determine what resources need protection against invasive species and which plants pose an actual threat. For planning and measuring success, use a map to determine problem areas. Place highest priority on the most destructive weeds. Use the Virginia's Noxious Weed List to help prioritize. The plan should include solid knowledge on the target plant, such as growing habit, how often it sets seed, months of seed production, etc. and a solid knowledge of the native species whose populations need to be maintained. Strategy options are generally to eradicate or to control and maintain invasive species at an acceptably low threshold. One strategy is to map the infestation then break the map into sections depending on the density of the invasive weed. Some areas will be dense and completely over run, while other patches are relatively free of it. Removal efforts should begin in outlier areas that are only lightly infested. Efforts should move gradually from the easiest areas to the more densely infested areas. The densest patches should be eliminated last. Refer to the Bradley Method referenced below. At each step of the way, the areas targeted for clean-up must be of a size and quality that goals are achievable within one growing season. Because of the bank of seeds stored in the soil, weeds will re-sprout for years after the plants have been removed. In the case of some weeds, the seeds can survive for decades. It is important to return and maintain cleared areas until the seed bank has been exhausted. Maps and records can assist in targeting which areas to concentrate on. After weeds have been removed it is important to recover the area in native plants to crowd out and help stop the reinvasion of invasive species.
REPORTING	• Report all pest management operations to the IPMC. • Report invasive weed control operations to the natural resources personnel in cases where weeds are being removed to protect or restore natural habitats. • Reporting of herbicide use and application monitoring to the local water regulatory agency is required when the operation is covered under a NPDES Aquatic Pesticide Permit.
ACTION THRESHOLDS	• Priority of control of weeds is based upon the Federal and Virginia Noxious Weeds list and the impact on the mission. • Areas of installations where ordinance, or other flammable/explosive materials, is stored have zero tolerance for weeds due to the fire hazard. Consequently, visual sighting of any weed warrants control.

PREVENTION	Preventing just one new invasive weed is of greater conservation benefit in the long run and is far less costly than controlling a widespread rampant pest. Block the transport of seeds from invasive plants onto relatively clean sites or sites that are actively being cleaned. Common means of importing seeds are: • Tire tread from bicycles and vehicles • Vehicle undercarriages • Boot treads • Dung from horses or other ruminants • Top soil; seeds are often brought in with imported soils • Seed mixes; invasive species are often included in planting mixes • Potted plants; seeds are sometimes transported in the potting soil • Hay and other animal feed Check plants that are intentionally brought in to ensure none of them are invasive. Keep vehicles, tire treads, and boots clean of dirt and seeds before entering a sensitive area. If horses or other plant-eating animals are brought on the property, make sure they are moving from an infested area to an un-infested area. Import only soils from areas that do not have invasive weed problems.
GENERAL CONTROL	• Minimize soil disturbances. Soil disturbances include creating patches of bare soil or mixing and loosening soil. Many invasive plants rapidly move into disturbed areas; particularly in those areas that haven't experienced much disturbance. Choose control techniques that make the minimum amount of disturbance possible. • Anticipate unavoidable disturbances and minimize them. For example, removing a large area of plants can result in erosion issues. Landscape fabrics or mulch can reduce erosion. Some activities may disturb wildlife. Also, do not mow grasslands or remove trees during bird nesting season in sensitive habitats.
NONCHEMICAL CONTROL	
TOOLS	Hand pulling invasive weeds can be a daunting task. However, steady and persistent hand weeding over time can lead to dramatic success. There is a large variety of hand tools designed specifically for weed removal. Many of these tools can be found in online stores or ordered through the mail.
PULLING	Tools are available that help pull weeds. When pulling plants, bring as much of the root as possible out of the ground since many plants can re-sprout from even a small amount of root.
DIGGING	Digging can be used along with pulling to lift the entire plant from the soil.
CUTTING	Cutting works well with woody plants that do not re-sprout. Especially if those plants are cut as close to the ground as possible. If the plant is likely to re-sprout, chemical herbicides can be painted on top of the cut stump. For invasive trees the herbicide needs to come in contact with the cambial ring between the wood and bark of the trunk. The cambial tissues will transport the herbicide to the roots.

FLAMING	Flaming does not involve incinerating the plant, rather to heat it just long enough to produce visible wilting. Heat causes cell walls to burst, which interrupts the flow of water and nutrients. Flaming is most effective when plants are in very early stages of growth. Older plants with significant stored reserves will require repeat applications and/or concentrating enough heat on the root crown to produce mortality. Flaming is generally used as a way of coping with the huge flush of seedlings which is often triggered by the removal of parent plants. This technique is most effective and best done when the ground and vegetation are too wet to carry fire. Avoid conditions that may lead to injury or wildfire.
SOLARIZATION	Weeds and insect pests can be killed by covering the ground with layers of clear plastic allowing the sun to create enough heat to destroy all living things.
LARGE MACHINES	Large machines can remove weeds as well. Machines can clear large areas of weeds, but also tend to cause soil disturbances which encourage the invasion of weeds and sometimes pathogens.
PRESCRIBED FIRE	Prescribed fire can be effective in removing fire-sensitive invasive species from communities that evolved with fire. Blowtorches and flamethrowers can also be used to burn individual plants or small areas.
COMPETITION AND RESTORATION	Use native plants to outcompete invasive weeds. To do so, natives must be planted and cared for until they are well established. When choosing seed mixes choose seeds that are from adjacent sites and well adapted to the climate. Choosing plants from far away sources is a common cause of failure. Be careful of seed mixes that include other invasive plants.
GRAZING	Grazing animals can selectively control or suppress weeds. Cattle, sheep, goats, geese, and chickens have been used to graze undesirable species. Grazing must be continued until the weed's seed bank is exhausted. It is important never to move the animals from an infested to an un-infested site since seeds can be spread in the animals' droppings.
BIOLOGICAL CONTROL	Beneficial organisms can reduce a few certain plants. For example, two species of leaf beetle have been very effective in wiping out populations of purple loosestrife. To be effective, the insect or pathogen must be host-specific and not pose a threat to other plants.
PLANT DISPOSAL	• Avoid leaving plant remains onsite. Many plants can re-root themselves if left in piles and grow anew. • If the invasive plants have seed heads, remove them from the site in sealed bags to ensure that the seeds aren't spread to new areas on the way out.
CLEANING OF VEHICLES AND EQUIPMENT	• In order to prevent the introduction and spread of invasive weeds, all vehicles and equipment used on a base (especially those used for weed control) must be cleaned of dirt, mud, and visible plant material prior to being brought on base (if coming from off-base) or prior to coming on site (if coming from another location on base). • Vehicles and equipment must also be cleaned after construction, prior to being used elsewhere on base. • When moving vehicles/equipment from site to site when doing weed control, they should also be inspected and cleaned in order to prevent further spread. • Equipment may include things like weed whackers, shoes, shovels, etc. • Before leaving a site, workers should brush off shoes in order to prevent tracking seeds on the way to other sites.

CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Glyphosate, triclopyr, 2, 4D, imazapyr, and others
METHOD OF DISPERSAL	• Selective Broadcast Herbicides. These herbicides usually selectively kill one class of plants and are safe on other classes of plants. The herbicide is applied evenly over a large area of land usually through a boom sprayer. Boom sprayers can be mounted on a tractor, ATV, truck, airplane, or helicopter. Relatively small areas can be treated with a backpack sprayer or hand-compressed sprayer. • Non-selective Spot Treatment Herbicides. This method directly targets individual plants. Non-selective herbicides are used and are applied directly to the target and are less likely to affect nontarget plants. Care must be taken to reduce drift that could harm non-target plants. Direct application is sometimes used in conjunction with nonchemical treatments especially when removing invasive trees and shrubs which require root kill to prevent re-sprouting. • Foliar Spray • Cut Stump Treatment Note: Correct timing of the herbicide application is often essential for effective weed control. Timing will depend on the species of weed, the mode of action, and persistence of the herbicide; nonchemical practices in use; soil conditions; and climate.
RESTRICTIONS/ REGULATIONS/ PERMITS	• When applying herbicide to riparian areas or other sites near water, use only formulations labeled for aquatic sites. • Herbicide applications to, over, or near waters of the United Virginias may require coverage under a NPDES Aquatic Pesticide Permit.
CONSIDERATIONS	
SENSITIVE AREAS	• Areas frequented by children—use mechanical controls instead of chemical controls whenever possible around playgrounds and childcare centers. • Sensitive habitats—Use non-chemical methods in natural areas containing endangered or threatened plant or animal species or use herbicides with care. • Use drift-reduction methods to prevent damage to non-target plants and organisms and sensitive sites. • Prevent pesticide drift into sensitive areas.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Applicators must use personal protective equipment as required by the product label. • Since this operation is conducted in natural areas, care must be taken to prevent adverse impacts to the environment through control measures, vehicles, and workers.
SPECIAL APPLICATOR QUALIFICATIONS	• Contractors and personnel conducting invasive weed control must be knowledgeable about identifying and controlling the target plants. They must also be knowledgeable about preventing the spread of invasive plants. • They should also be able to produce maps (preferably using GPS and GIS) and write detailed reports. • All personnel applying herbicides must be licensed/certified pesticide applicators.

ADDITIONAL INFORMATION:

Management of invasive species
http://www.cal-ipc.org/ip/management/ipcw/mois.php

The Bradley Method for Control of Invasive Plants
http://courses.washington.edu/ehuf462/462_mats/bradley_method.pdf

Federal and Virginia Noxious Weed Lists
http://plants.usda.gov/java/noxiousDriver

Database of herbicide labels
http://www.greenbook.net/

Center for Invasive Plant Management
http://www.weedcenter.org/

DOD Strategic Management of Invasive Species in the Southwestern United Virginias
http://www.weedcenter.org/dodworkshop/2009/index.html

Terrestrial Weeds

TARGET PEST	
TARGET PEST(S)	Grass-like, broadleaf, and woody weeds growing on land
TARGET SITES(S)	• Landscaped areas • Natural areas threatened by invasive weeds
PURPOSE	• Reduce fire hazards • Remove vegetation coverage for rodents and other pests • Control the spread of invasive species
RESPONSIBILITY	• Pest Management Service Provider (PMSP): Conduct integrated pest management to control weeds. • Pest Management Performance Assessment Representative (PMPAR): Ensure contractor pest management service provider performs work in accordance with contract specifications. • Grounds Maintenance Provider (GMP): Remove weeds during regular landscape maintenance to prevent establishment; maintain the health of desirable plants.
SURVEILLANCE	
METHODS	Visual sighting
FREQUENCY	• Daily inspection of areas with extreme fire hazard • Weekly inspection of landscaped areas. Can be done in conjunction with regular landscape maintenance. • Yearly inspection of natural habitats targeted for ongoing weed-abatement programs
ACTION THRESHOLD	Areas of installations where ordinance or other flammable/explosive materials are stored have zero tolerance for weeds due to fire hazard. Consequently, visual sighting of any weed warrants control.

NONCHEMICAL CONTROL	
MECHANICAL REMOVAL	• Pulling or hoeing: pulling can be done either by hand or with tools such as the weed wench which works well on large plants. Try to pull up as much root as possible as roots can sprout new shoots. Digging or hoeing is sometimes used in conjunction with pulling to remove the entire root. Follow up work will be necessary until desired plants become well established. • Mulching: mulch shades the soil surface and kills sprouting weeds. Mulching also keeps lawn mowers away from ornamentals. • Mowing: Mow unwanted plants before they have a chance to set seeds. • Chaining: chains are dragged across the top of target weeds, destroying the canopy and reducing weed density. • Root plowing: horizontal blades beneath the surface of the ground sever the root system of target weeds
STEAM	Steam applied to foliage will often kill plants. This technique is unlikely to be cost effective for most weed-control situations
IMPROVE PLANT VIGOR	• Landscaping plants that are healthy will be better able to compete with weeds, thereby slowing the rate of weed invasion. • Maintain proper watering, fertilizing, and pruning schedules for desirable landscaping plants. This is particularly important for managing crabgrass in turf.
MULCH	• Organic mulches include wood chips, sawdust, yard waste, and bark chips. Course textured mulches should be applied up to 4 inches deep. Fine textured mulches should be applied to a depth of about 2 inches. • Inorganic mulches include sand, gravel, and pebbles. Use a porous landscape fabric underneath to prevent mulch from sinking into soil. • Synthetic mulches include geotextiles and landscape fabric. Synthetic mulches can be used in conjunction with organic and inorganic mulches.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Glyphosate, 2,4-D, diuron, dicamba, sethoxydim, bromacil, diquat, surflan, and others
METHOD OF DISPERSAL	• Pre-emergent: herbicide is applied to the soil before the weed emerges, preventing the weed from developing. The chemical should be applied to the soil just before seed germination. Selective pre-emergents must be used so that desirable landscape plants are not harmed. • Foliar-sprayed Post-emergent: herbicide is sprayed directly onto the foliage of the weed. Post-emergents should be applied after the weed emerges, but before seed set. Foliar application is most effective when weeds are young. • Soil-applied Post-emergent: herbicide is applied to the soil around the weed. The herbicide is absorbed by the plant through its root system. • Stump Treatment: herbicide is applied to stumps immediately following cutting. For trees, the herbicide needs to cover the cambium which is located between the bark and wood. The herbicide prevents the tree or weed from growing stump-sprouts in the next growing season. • Weed and Feed Products: Some fertilizers are formulated with herbicides to prevent the growth of weeds. Note: Correct timing of the herbicide application is often essential for effective weed control. Timing will depend on the species of weed, the mode of action and persistence of the herbicide, nonchemical practices in use, soil conditions, and climate.

CONSIDERATIONS	
SENSITIVE AREAS	ical controls instead of chemical controls whenever possible around playgrounds and nters. sing natural areas containing endangered or threatened plant or animal species. icide drift into sensitive areas and onto desirable landscape plants.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	use personal protective equipment required by the product label. t of herbicides to non-target areas and prevent contact with desirable plants. Avoid ng water.

ADDITIONAL INFORMATION:

Non-chemical methods are preferred.

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Weeds in Right-of-Ways

TARGET PEST	
TARGET PESTS	Grasses and broadleaf and woody weeds
TARGET SITES(S)	Fence lines, road shoulders, parking lots, around fuel storage tanks, and sidewalks.
PURPOSE	• Decrease fire hazard • Prevent damage to paved surfaces • Decrease rodent and other pest infestations in dense weeds • Decrease the risk for vehicle and animal collisions due to weeds along roadways hiding wildlife • Increase sight lines along security fences • Improve aesthetics.
RESPONSIBLE PARTY	• Pest Management Service Provider: Conduct integrated pest management to control weeds • Pest Management Performance Assessment Representative: Ensure contractor pest management service provider performs work in accordance with contract specifications. • Grounds Maintenance Provider: Mowing to reduce height of weeds. May be the PMSP.
SURVEILLANCE	
METHODS	• Visual observation and identification during routine inspections. Annual surveys of roadways and fence lines.
FREQUENCY	• Daily inspection of area with extreme fire hazard. • Weekly inspection of landscaped areas. Can be done in conjunction with regular landscape maintenance.
ACTION THRESHOLD	• Areas of installations where ordnance or other flammable/explosive materials are stored have zero tolerance for weeds due to fire hazard. Consequently, visual sighting of any weed warrants control.

NONCHEMICAL CONTROL	
MECHANICAL REMOVAL	• Pulling or hoeing: pulling can be done either by hand or with tools such as the weed wench which works well on large plants. Try to pull up as much root as possible as roots can sprout new shoots. Digging or hoeing is sometimes used in conjunction with pulling to remove the entire root. Follow up work will be necessary until desired plants become well established. • Mowing: Mow unwanted plants before they have a chance to set seeds. • Chaining: Chains are dragged across the top of target weeds, destroying the canopy and reducing weed density. • Root plowing: Horizontal blades beneath the surface of the ground sever the root system of target weeds.
STEAM	Steam applied to foliage will often kill plants. This technique is unlikely to be cost effective for most weed-control situations
PLANT COMPETITION	Plant areas with desirable, low-height plants to outcompete weeds such as invasive grasses.
WEED CONTROL MAT	Comes in roll form and is composed of synthetic polyester fibers spun tightly together to prevent weed growth by blocking sunlight, yet still allowing water percolation for drainage, http://www.dot.ca.gov/hq/LandArch/roadside/detail-fwc.htm
MULCH	• Organic mulches include wood chips, sawdust, yard waste, and bark chips. Course textured mulches should be applied up to 4 inches deep. Fine textured mulches should be applied to a depth of about 2 inches. • Inorganic mulches include sand, gravel, and pebbles. Use a porous landscape fabric underneath to prevent mulch from sinking into soil. • Synthetic mulches include geotextiles and landscape fabric. Can be used in conjunction with organic and inorganic mulches.
CHEMICAL CONTROL	
COMMON ACTIVE INGREDIENTS	Imazapyr, dichlobenil, bromacil, diuron, pendimethalin, prometon, tebuthiuron, hexazinone, dicamba, 2,4-D, diflufenzopyr, glyphosate, triclopyr, metsulfuron methyl, paraquat, sulfometuron, and others.
METHOD OF DISPERSAL	• Pre-emergent: Herbicide is applied to the soil before the weed emerges, preventing the weed from developing. The chemical should be applied to the soil just before seed germination. Selective pre-emergents must be used so that desirable landscape plants are not harmed. • Foliar-sprayed post-emergent: Herbicide is sprayed directly onto the foliage of the weed. Post-emergents should be applied after the weed emerges, but before seed set. Foliar application is most effective when weeds are young. Use spot treatment of weeds on paved areas. • Soil-applied post-emergent: Herbicide is applied to the soil around the weed. The herbicide is absorbed by the plant through its root system. Applications can be made to soil or paved surfaces. Herbicide treatments can also be made to graded surfaces prior to pouring asphalt or concrete during road or walkway construction. Note: Correct timing of the herbicide application is often essential for effective weed control. Timing will depend on the species of weed, the mode of action and persistence of the herbicide, non-chemical practices in use, soil conditions, and climate.

CONSIDERATIONS	
SENSITIVE AREAS	• Use mechanical controls instead of chemical controls whenever possible around playgrounds and childcare centers. • Avoid exposing natural areas containing endangered or threatened plant or animal species. • Prevent herbicide drift onto desirable landscape plants.
SAFETY AND ENVIRONMENTAL PRECAUTIONS	• Applicators use personal protective equipment required by product label. • Prevent drift of herbicides to non-target area and prevent contact with desirable plants. Avoid contaminating water.

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APPENDIX A

Points of Contact

A.1 INSTALLATION PEST MANAGEMENT POINTS OF CONTACT

A.2 NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC APPLIED BIOLOGY SECTION POINTS OF CONTACT

A.3 NAVY ENTOMOLOGY CENTER OF EXCELLENCE POINTS OF CONTACT

A.4 NAVY ENVIRONMENTAL PREVENTIVE MEDICINE UNIT TWO POINTS OF CONTACT

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A.1 INSTALLATION PEST MANAGEMENT POINTS OF CONTACT

This list provides the contact information for pesticide compliance and pest management. This page should be kept up to date to ensure the appropriate personnel may be contacted as necessary.

Name	Title	Phone Number (Area Code 757)	E-mail
Jack Markham	IPMC	341-0490	jack.markham@navy.mil
LCDR Bryan Parnell	Public Works Officer	836-1836	bryan.parnell@navy.mil
	FSC Contracting Officer		
Linda Hicks	Environmental Director	836-1862	linda.hicks1@navy.mil
	FEAD		
Emmett Carawan	Natural/Cultural Resources Manager	341-0495	emmett.carawan@navy.mil
James Bonavita	Environmental Protection Specialist – Northwest Annex	421-8114	james.bonavita@navy.mil
Michael Holdren	Preventive Medicine Department Head (Norfolk)	953-8810	michael.r.holdren.civ@mail.mil
LT Nina Paddock	Preventive Medicine Department Head (Northwest Annex)	953-9751	nina.a.paddock.mil@mail.mil
	Occupational Health Department Head		
	Industrial Hygienist		
Mike Lucas	Safety Officer	322-2915	michael.s.lucas1@navy.mil
Phil Grasty	Marine Corps Security Forces Training Company Maintenance	421-8038	phil.grasty@navy.mil
MWR Office	MWR Office	836-1765	
Tony Gardner	Golf Course Superintendent	444-5572	tgardner@mwrma.com
Chelsea Sweet	MWR Community Recreation Manager Northwest Annex	650-3710	chelsea.r.sweet@navy.mil
GYSGT A. Soto Lopez	MCX Manager	423-1187	alex.sotolopez@usmc-mccs.org

A.2 NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC APPLIED BIOLOGY SECTION POINTS OF CONTACT

NAVFAC Atlantic Applied Biology Section		
Code EV51	6506 Hampton Blvd	Norfolk, VA 23508-1278

COMMERCIAL	DSN
Commercial: (757) 322-XXXX	DSN: 262-XXXX

NAME	TITLE	EXT	EMAIL
Sabra Scheffel	Applied Biology Dept Head	4320	sabra.scheffel@navy.mil
Chris Hohnholt	Pest Management Consultant	4735	chris.hohnholt@navy.mil
Steven Holmes	Pest Management Consultant	8295	steven.p.holmes@navy.mil
Chris Martin	Pest Management Consultant	4611	chris.d.martin@navy.mil
Steve Robertson	Pest Management Consultant	4796	steve.b.robertson1@navy.mil
Kirk Williams	Pest Management Consultant	4254	kirk.williams@navy.mil

A.3 NAVY ENTOMOLOGY CENTER OF EXCELLENCE POINTS OF CONTACT

Navy Entomology Center of Excellence (NECE)		
Naval Air Station	P.O. Box 43 Bldg 937	Jacksonville, FL 32212-0043

COMMERCIAL	DSN
(904) 542-2424	942-2424

A.4 NAVY ENVIRONMENTAL PREVENTIVE MEDICINE UNIT TWO POINTS OF CONTACT

Navy Environmental Preventive Medicine Unit TWO (NEPMU-2)		
NEPMU-2	128 West D Street, Bldg U238	Norfolk, VA 23511-3394

COMMERCIAL	DSN	FAX
757-953-6600	377-6600	151-953-7212

E-MAIL	WEBSITE
nepmu2@med.navy.mil	http://www.med.navy.mil/sites/nepmu2/Pages/default.aspx

APPENDIX B

Maps

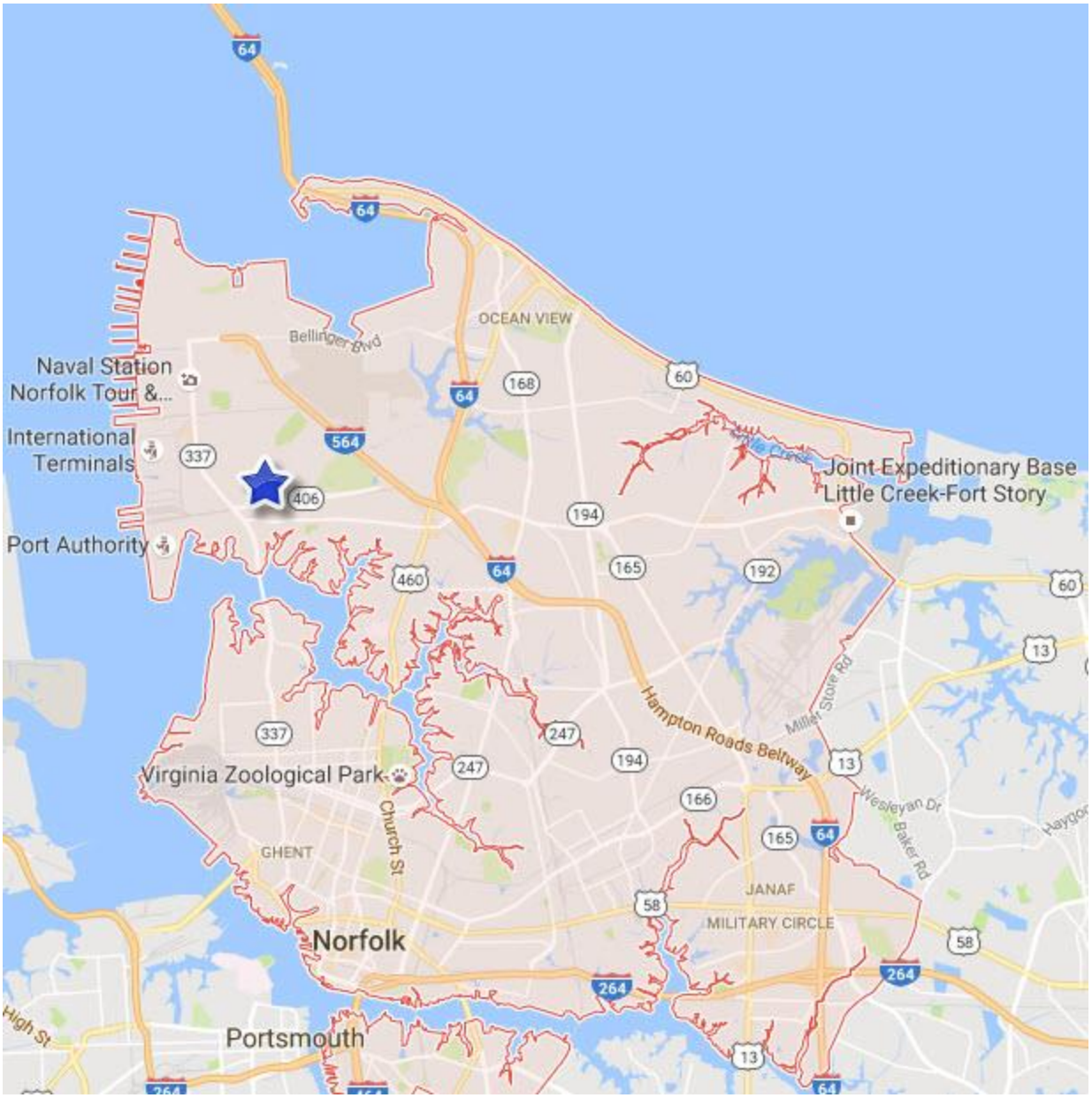
B.1 GENERAL LOCATION NSA HAMPTON ROADS – NORFOLK FACILITIES

B.2 GENERAL LOCATION NSA HAMPTON ROADS – NORTHWEST ANNEX

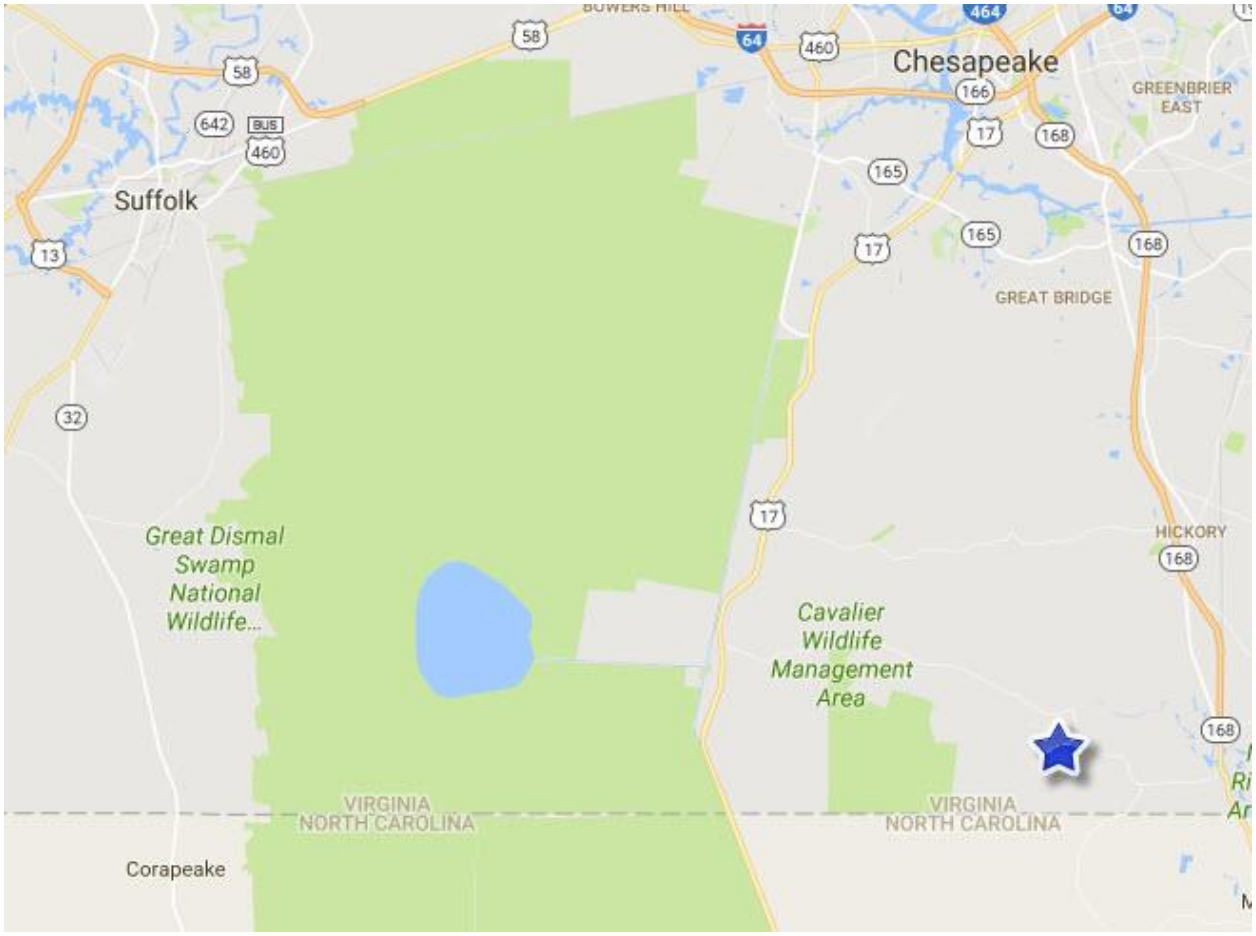
B.3 MAP OF NORFOLK FACILITIES

B.4 MAP OF NORTHWEST ANNEX

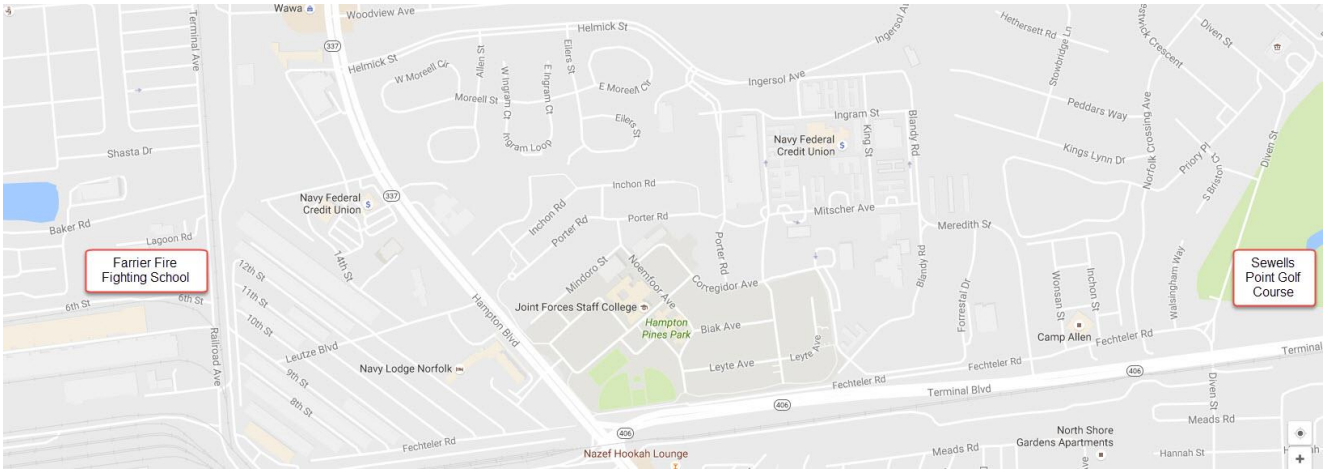
Add to appendix B: natural resource site maps, work maps, etc.



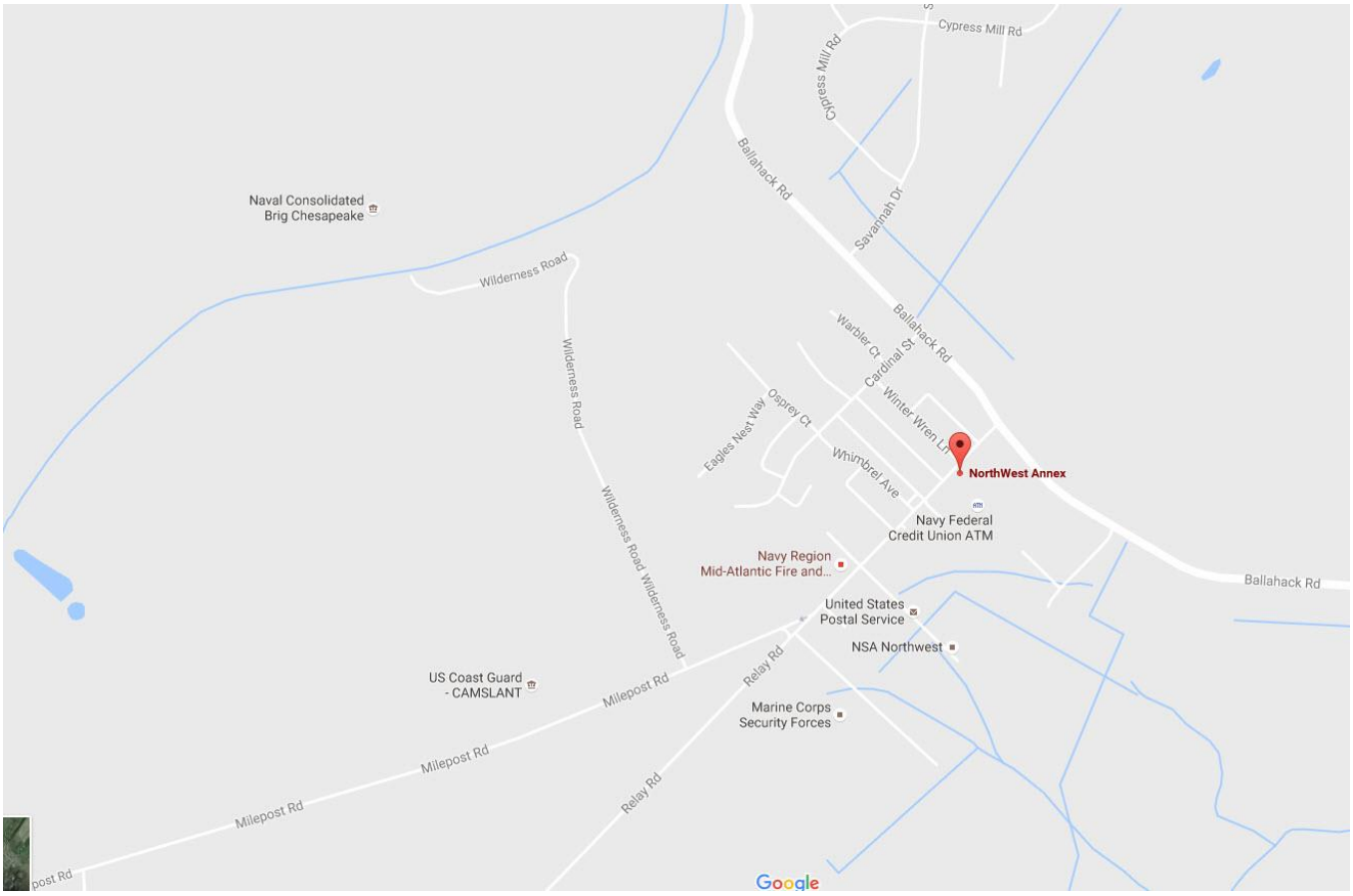
B1. General Location NSA Hampton Roads – Norfolk Facilities



B2. General Location NSA Hampton Roads – Northwest Annex



B3. Map of Norfolk Facilities



B.4 Map of Northwest Annex

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APPENDIX C

Program Review

C.1 PEST MANAGEMENT PROGRAM SELF-ASSESSMENT CHECKLIST

C.2 INTEGRATED PEST MANAGEMENT PLAN ANNUAL UPDATE FORM

Add to appendix C: copies of program review reports, EMS reports, and inspection checklists

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C.1 PEST MANAGEMENT PROGRAM SELF-ASSESSMENT CHECKLIST

NSA Hampton Roads:_____**Date:**_____

Name of Person Completing Checklist:_____

Review Item	Reference	Verification and Documentation	Y	N	N/A
Pest Management Coordinator					
Is IPMC designated and appointed by CO/CG by letter?	6250.4C: Encl. (1), Para.4.h.(6) 5090.1: 24-5.3	Copy of appointment letter.			
Is IPMC properly qualified and trained? If an IPMC selects or applies pesticides, he or she must be certified as a DOD pesticide applicator.	6250.4C: Encl. (1), Para.6.	Copy of course completion certificate or DOD pesticide applicator certificate.			
Does the IPMC oversee the installation pest management program and pest management plan and remain aware of and familiar with all pest management operations on the installation?	4150.07: E2.11	Operations documented in the installation integrated pest management plan; IPMC has copies of pesticide approvals and pest management reports; IPMC is actively involved in pest management decision making.			
Pest Management Plan					
Does installation have a current comprehensive IPMP? IPMPs remain current for 5 years.	4150.07: E4.2. 6250.4C: Encl. (1), Para.9.a. 5090.1: 24-3.9. 5090.2A: 14203	Copy of IPMP.			
If installation does not have an IPMP, has command planned and budgeted for development and maintenance of an IPMP?	4150.07: E4.2.1.1.	Environmental division should have IPMP listed as a deficiency and submit an EPR.			
Is IPMP signed by CO/CG?	6250.4C: Encl. (1), Para.9.a.	IPMP signature page.			
Is IPMP reviewed and signed by IPMC, medical department, and BUMED and NAVFAC pest management consultants?	4150.07: E4.2.1.7 6250.4C: Encl. (1), Para.6.a.	IPMP signature page.			
Is IPMP updated annually by qualified personnel (trained or certified IPMC or PMPAR) and current (contains current POCs, contracts, applicator licenses, list of approved pesticides, etc.)?	4150.07: E4.2.1.2.	View applicator licenses, dates of pesticide approvals, and other items that indicate the information is not outdated.			
IPMP includes the following sections: • List of program objectives • Description of all pest management requirements and programs and staffing requirements (including in-house, contract, agricultural outlease, golf course, NAFI, GOCO, experimental, and natural resources) • Description of IPM procedures for all pest and disease vectors • Identification of program resources (facilities, equipment, etc.) to support program • List of pesticides approved by	4150.07: E4.2.	IPMP contains information and sections as outlined in 4150.07, Encl.4.			

NAVFAC pest management consultant • Procedures for managing spills • Identification of planned measures to comply with DOD MOA and with Virginia pesticide regulatory office regarding use or application of pesticides • Description of contracted pest management operations • Description of operations with special environmental considerations • Identification of animal control efforts • Identification of potential vector-borne diseases and collaboration with local health agencies • Applicable laws and regulations • Agricultural outlease operations					
Section of IPMP pertinent to pest management in habitat(s) of endangered/threatened species is reviewed and comment provided by U.S. Fish and Wildlife Service.	4150.07: E4.8.1.	Correspondence from USF&WS that they have reviewed the IPMP is on file.			
All stakeholders (including IPMC, PMPARs, environmental division, medical department, pest control shops, NAFIs, agricultural outlease program manager, and golf course superintendent) have copy of or ready access to current IPMP.	BMP	IPMP readily available to stakeholders as hard or electronic copy.			
Program Maintenance					
Have BUMED and/or NAVFAC conducted program reviews in order for the installation to maintain program and IPMP?	6250.4C: Encl. (1), Para.10.a. 5090.1: 24-3.10. 5090.2A: 14204,1.c.	Program reviews on file.			
Have deficiencies and recommendations from past reviews been resolved or addressed in order to maintain and improve program?	6250.4C: Encl. (1), Para.10.a. 5090.1: 24-4.4 5090.2A: 14204,1.c.	Documentation of corrections on file and/or corrections made were noted in follow-up inspection or review.			
Do DOD pest management personnel remain current in IPM technologies?	BMP	Personnel attend training workshops, are provided in-service training and/or have access to pest control trade journals.			
Training and Certification					
Do all installation pest management personnel who apply or supervise the application of pesticides have current DOD certification or EPA-approved certification or license?	4150.07: E4.4.2. 5090.1: 24-3.19.	Copies of all licenses and certificates on file, preferably in IPMP, and applicators have cards while applying.			
If DOD applicator certification expired, has applicator received a six-month extension from a NAVFAC pest management consultant?	4150.07: E4.4.2.1.	Correspondence from NAVFAC approving extension.			
If DOD applicators are not certified (i.e., apprentices), are they under the direct supervision of a certified applicator while performing pesticide applications?	4150.07: E4.4.2.	Observe operations to ensure proper supervision, if necessary.			

Was evidence of contractor pesticide applicator licensing or certification provided to contracting officer prior to award?	4150.07: E4.4.2.2 6250.4C: Encl. (1), Para. 15.b.	Copies of all licenses and certificates on file, preferably in IPMP, and applicators have cards while applying.			
Are PMPARs trained in performance assessment evaluation and pest management technology?	6250.4C: Encl. (1), Para. 15.c.	Copies of training course certificates on file, preferably in IPMP.			
Do pest management personnel seek and attend continuing education courses?	BMP	Copies of course completion certificates on file.			
Staffing					
Is staffing sufficient to effectively control pests and manage program?	BMP	Interview applicators, supervisors, and managers.			
If personnel indicate that staffing is insufficient, then what indicators or data are being collected to show that staffing levels are insufficient?	BMP	View indicators or data.			
Pesticide Procurement					
Does installation use only pesticides approved by NAVFAC pest management consultant?	4150.07: E4.2.2.1. 5090.1: 24-3.16. 5090.2A: 14206.1.b.	IPMC maintains approved pesticide list. Inspect pesticides in pest control storage and on vehicles to ensure they are listed on the current pesticide approval list.			
Pest Management Records and Reporting					
Are records kept for all pest management operations conducted on the installation, including those by NAFIs and for agricultural operations and environmental protection?	7 U.S.C. § 136i-1(a)(1) 6250.4C: Encl. (1), Para. 23. 5090.1: 24-3.16. 5090.2A: 14210 4150.07: E4.11.1				
Are records retained indefinitely?	6250.4C: Encl. (1), Para.23.a. 5090.1: 24-3.4.				
Do personnel and regulatory agencies have ready access to records? (e.g., able to access records by location, pesticide, applicator, etc.)	7 U.S.C. § 136i-1(b)				
Is the installation using the NAVFAC Online Pesticide Reporting System?	BMP				
Are reports of pest management operations being sent to NAVFAC?	6250.4C: Encl. (1), Para. 23.b.				
Contracting					
Do properly trained PMPARs inspect the performance of contractors?	4150.07: E4. 6.4.(1)	Training certificates and contract monitoring documents are on file.			
Are all pest management contracts on the installation monitored by PMPARs?	4150.07: E4. 6.2.	Check also MCCS, MCX, NEX, and MWR contracted services.			
Do PMPARs measure efficacy and ensure safety and environmental compliance of contract pest control?	6250.4C: Encl. (1), Para.15.c.	Interview PMPARs to identify method and frequency of inspections. List methods of measurement.			
Are pest management contracts sent to NAVFAC for review?	5090.1: 24-3.16	Correspondence with NAVFAC.			
Are all contract pesticide applicators currently licensed in the Virginia in which they operate?	4150.07: E4.4.2.2. 4150.07: E4.6.1.	Copies of current certificates or licenses are on file, preferably in IPMP.			
Is the pest control contractor currently registered with the Structural Pest	4150.07: E4.6.1.	Copy of current registration certificate on file, preferably in IPMP.			

Control Board or the equivalent Virginia pest control business registration agency?					
Pest Control Shop					
Does pesticide storage area pose a hazard to personnel in adjacent areas or buildings?	4150.07: E4.5.1. 1028/8A: Para.2.4	Inspect building to see that exhaust vapors will not move into adjacent occupied areas.			
Does storage area have sufficient security to prevent unauthorized entry?	4150.07: E4.5.1. 1028/8A: Para.2.8	Conduct inspection to ensure doors can be locked, equipment storage areas can be secured, and that applicators lock doors when leaving premises.			
Does building have clean area for office?	4150.07: E4.5.1. 1028/8A: Para.3.1.3.1				
Are separate laundry facilities (designated only for cleaning of clothing potentially contaminated with pesticide) available for work clothing?	BMP				
Are shower facilities available for employees?	BMP				
Is separate space or cabinets provided for storage of PPE?	4150.07: E4.5.1. 1028/8A: Para.3.1.3.1.3				
Are pesticides stored off the floor and with sufficient access so that all labels are visible?	4150.07: E4.5.1. 1028/8A: Para.3.1.4.1.2				
In areas where pesticide concentrates are stored or mixed, are floor drains sealed or not present and is containment provided (bermed or sloped floors)?	4150.07: E4.5.11028/8A: Para.3.1.4.1.2 5090.1: Para.24-3.11				
Are all surfaces on which pesticides are stored and mixed and on which pesticide application equipment is serviced made of non-absorbent materials?	4150.07: E4.5.1. 1028/8A: Para.3.1.4.1.2				
Are pesticides stored in a dry room or building with a temperature between 50 °F and 100 °F?	4150.07: E4.5.1. 1028/8A: Para.3.1.4.1.2				
Are fire extinguishers provided and easily accessible to occupants?	4150.07: E4.5.1. 1028/8A: Para.3.1.4.1.2	Inspect inspection record and see that fire extinguishers are fully charged.			
For large pesticide containers with spigots, is a drip pan containing absorbent material placed below spigot?	4150.07: E4.5.1. 1028/8A: Para.3.1.4.1.2				
Are backflow prevention devices installed on faucets used to fill pesticide tanks?	4150.07: E4.5.1. 1028/8A: Para.3.5.2.10				
Are emergency decontamination facilities (i.e., eye wash, deluge shower) provided onsite and readily accessible?	4150.07: E4.5.1. 1028/8A: Para.3.5.2.12	Check to see that it is functional and that inspection records are up-to-date. Ensure that, in an emergency, personnel can easily access and operate the devices.			
Are ventilation fans available in storage and mixing areas and do they function and provide adequate ventilation (six changes of air per hour)?	4150.07: E4.5.1. 1028/8A: Para.3.5.4.2 5090.1: 24-3.11.	Operate fans. Check IH survey ventilation results (Copy may be available in shop or contact installation IH).			
Are identification signs clearly visible on building and fences to advise	4150.07: E4.5.1. 1028/8A: Para.3.8				

personnel of the contents and warn of their hazardous nature?					
Are only pesticides listed on approved pesticide list stored?	4150.07: E4.5.1. 5090.1: 24-3.16. 5090.2A: 14206.1.b.	Compare approved pesticides list with items stored on shelves.			
Do all pesticide containers have EPA-approved labels attached?	5090.1: 24-3.5.				
Are spill kits provided and readily accessible?	6250.4C: Encl. (1), Para. 13.d. 5090.1: 24-3.12(b)	Inspect to ensure contents are suitable for pesticide spills.			
Are MSDSs and labels for each pesticide stored and used maintained and readily accessible in the pest control shop?	5090.1: 24-3.5	Review MSDS/label book and compare with pesticides stored in shop and on vehicles.			
Pest control equipment					
Is equipment properly maintained and clean (no evidence of leakage and spillage)?	BMP				
Are different sprayers used for herbicides and insecticides?	BMP	Sprayers are properly marked.			
Is equipment routinely calibrated to ensure proper delivery of pesticide?	BMP	Calibrations, if needed, are recorded in a logbook or other recordkeeping system.			
Is application equipment stored in a secure area?	4150.07: E4.5.1. 1028/8A: Para. 3.4.6.				
Pest Control Vehicles (DOD and Contract)					
Are pesticides stored in a lockable compartment on the vehicle?	BMP				
Does applicator ensure that pesticides are not stored in passenger compartment of vehicle?	BMP				
Is the vehicle clean and maintained (no evidence of leakage and spillage)?	BMP				
Does the vehicle have a properly stocked spill kit?	6250.4C: Encl. (1), Para. 13.d.				
Is the vehicle properly identified to warn of pesticides on vehicle?	BMP				
Are all containers on vehicle, including service containers, properly labeled?	5090.1: 24-3.5.				
Is PPE properly stored on vehicle?	BMP				
Are SDSs (formally MSDSs) for pesticides carried on vehicle?	BMP				
Are appropriate wash racks provided for cleaning vehicles (i.e., does not drain into stormwater system)?	BMP				
Integrated Pest Management					

Is integrated pest management practiced in order to minimize pesticide use when non-chemical alternatives are available and cost effective?	7 U.S.C. § 136r-1 6250.4C: Encl. (1), Para. 3.c. (5) 5090.1: 24-3.8 5090.2A: 14202/14301.8. 4150.07: E4.2.	Pest management service providers have survey devices (i.e., sticky traps) and less toxic and sustainable pesticides (i.e., baits) in their inventory. Records include surveys and the application of less toxic pesticides and use of non-chemical methods.			
Does the installation pest management plan emphasize and describe the use of IPM to provide sustainable pest management?	7 U.S.C. § 136r-1 6250.4C: Encl. (1), Para. 3.c.(5). 4150.07: 4.2 5090.2A: 14202	Review IPMP sections that list pest control methods. Review installation instructions, orders, or policies, especially for housing, that encourage IPM practices.			
Does the installation use practices that demonstrate IPM?	7 U.S.C. § 136r-1 6250.4C: Encl. (1), Para. 3.c. (5) 4150.07: 4.4 5090.2A: 14202	Identify and list practices.			
Does the installation promote IPM?	7 U.S.C. § 136r-1 6250.4C: Encl. (1), Para. 3.c. (5) 4150.07: 4.1 5090.2A: 14202	Identify and list promotion practices.			
Pesticide Application					
Are pesticides applied in accordance with the label directions?	7 U.S.C. § 136(j) 4150.07: E4.5.3.	Interview applicators. Observe application if possible. Wear appropriate PPE.			
Are special precautions taken for operations at child development centers, housing, medical treatment facilities, and food preparation areas?	4150.07: E4.8.1, E4.8.2, and E.4.8.3.	Interview applicators and review records to see if steps are taken to minimize pesticide use or use less toxic pesticides in these areas.			
Are liquid and dust formulations of pesticides applied only when unprotected personnel are not occupying the work space to be treated?	5090.1: 24-3.2.	Interview applicators. Observe application if possible. Wear appropriate PPE.			
Are preventive pesticide treatments prohibited unless approved by a pest management consultant?	4150.07: 4.10.3.	Interview applicators regarding practices. Review pest management records to see if there is any indication of routine pesticide applications.			
Are all applicators familiar with the installation's spill response procedures?	6250.4C: Encl. (1), Para. 13.d.	Get copy of installation instruction on spill response procedures. Interview applicators.			
Are all feasible efforts and management controls used to avoid production of hazardous wastes and to ensure use of pesticides before shelf-life expiration?	6250.4C: Encl. (1), Para. 13.f.	Ask applicators how they clean equipment and dispose of rinsate. Interview shop supervisor to determine container disposal methods.			
Is the installation aware of and do they enforce pesticide "stop sale, use, or removal" orders issued by the EPA?	FIFRA	Check EPA Web site regarding the provisions of pesticide orders. Check records to see if pesticides that have a "stop sale, use, or removal" order are being used contrary to the provisions of the order.			
Aerial Pesticide Applications					
If conducted or proposed, has a plan for the aerial application of pesticides been reviewed and approved by a BUMED (medically-important pests) or	6250.4C: Encl. (1), Para. 13.e.	Ask for and review signed validation Statement.			

NAVFAC (economic pests) aerial spray-certified pest management consultant?					
Safety					
Are applicators provided with the appropriate PPE?	5090.1: 24-3.7.	Ask applicators to show you PPE in shop and on vehicles.			
Do applicators maintain and wear appropriate PPE when applying pesticides?	6250.4C: Encl. (1), Para. 12.b.	Ask applicators to show you PPE in shop and on vehicles. Observe application, if possible.			
Do all applicators receive training on use of PPE? Are applicators physically qualified to wear respirators?	4150.07: 5.4.17.	Review training record or rosters. Ask to see respirator fit test cards.			
NAFI Operations (NEX/MCX/MCCS/MWR)					
Are all NAFI pest management operations described in the IPMP? This includes operations conducted at: • NEX/MCX retail stores • NEX/MCX and MWR/MCCS food service facilities • MWR/MCCS athletic fields and golf courses	4150.07: 4.2.	Review IPMP.			
Are pesticides used by NAFI pest control providers included on the installation approved pesticide list?	4150.07: E4.2.2.1. 5090.2A: 14206.1.b.	Pesticides used by NAFIs are included on pesticide approval list.			
Are pesticide use records maintained at each facility?	7 U.S.C. § 136i-1(a)(1) 6250.4C: Encl. (1), Para. 23.a. 5090.2A: 14210	NAFI maintains records.			
Are all pest management operations reported to the installation IPMC so that it can be reported to NAVFAC?	6250.4C: Encl. (1), Para. 23.b.	Records and reports contain operations conducted by NAFIs			
If NAFIs purchase pest control services with the DON purchase card, are the services in compliance with DOD and DON pest management requirements?	4200.1: Para.7.				
Pesticide Retail Sales in the Navy Exchange, Commissary, and Veterinary Clinics					
Are only pesticides that are not Category I pesticides labeled "Danger, Poison" displayed for retail sale?	6250.4C: Encl. (1), Para. 13.c.	Inspect pesticide display.			
Are pesticides properly displayed to prevent contamination of food, equipment, utensils, linens, and single-service and single-use articles? (i.e., separated by partition or located in an area not above items)	FOOD: 7-301.11	Inspect pesticide display.			
Are spill containment items available?	6250.4C: Encl. (1), Para. 13.d.	Inspect spill containment kits.			
Are employees familiar with spill procedures?	6250.4C: Encl. (1), Para. 13.d.	Ask employees to describe procedures.			
Is the retail store aware of and do they enforce pesticide "stop sale, use, or removal" orders issued by the EPA?	FIFRA	Check EPA Web site regarding the provisions of pesticide orders. Check retail shelves to see if pesticides that have a "stop sale, use, or removal" order are being displayed for sale contrary to the provisions of the order.			

Environmental Programs					
Does the installation have a program to comply with the Federal Noxious Weed Act that is also being implemented on Virginia or private lands in the vicinity of the installation?	5090.2A: 14208.14.	Review any plans (INRMP) or contracts for noxious weed control. Identify and list specific control/prevention measures.			
If the installation has an active airfield, does the IPMP reference the BASH plan?		Review any plans, directives, or contracts for BASH. Identify and list specific control/prevention measures.			
Does the IPMP reference the INRMP? Are appropriate portions of the IPMP implemented in accordance with the INRMP?	5090.1: 24-3.9. 4150.07: 5.4.20.12	Review IPMP.			
Are pesticides used in invasive weed control, BASH, depredation and other environmental programs included in the installation approved pesticide list?	5090.1: 24-3.16. 5090.2A: 14206.1.b.	Review records or plans.			
Are pesticides used in these operations recorded and reported to the IPMC so that they can be reported to NAVFAC?	7 U.S.C. § 136i-1(a)(1) 6250.4C: Encl. (1), Para. 23.b. 5090.2A: 14210	Review records. Check to see that IPMC has records.			
Have pest management operations that may have an impact on natural resources been coordinated with and reviewed by the natural resources program manager?	6250.4C: Encl. (1), Paragraphs 20, 21, and 22. 5090.2A: 14301.18.h.	Review IPMP for environmental impacts of pest management operations and for environmental manager signature. Interview natural resources manager to ensure if he/she is aware of pest management impacts on natural resources.			
If feral cats and dogs are present or potentially present, does the installation have a program to capture and remove them from the installation?	6401.1A: Para.4-2c(4) CNO policy letter 5090 N456M/ 1U595820 of 10 Jan 2002	Visual observations. Review installation policies or directives. Identify and review procedures.			
Are installation pest management and environmental personnel and the installation commander aware of the CNO policy on feral animals?	CNO policy letter 5090 N456M/ 1U595820 of 10 Jan 2002	Does the installation have an instruction, order, or policy to prevent feral animals?			
Is the CNO feral animal policy communicated to installation personnel and enforced?	CNO policy letter 5090 N456M/ 1U595820 of 10 Jan 2002	Identify practices that support the presence of feral animals.			
Agricultural Outlease Program					
Does the IPMP describe the agricultural outlease pest management program?	4150.07: E4.2.	Review IPMP.			
Are agricultural pesticides included on the installation list of approved pesticides?	4150.7: E4.6.a.(2) 5090.1, 24-3.16 5090.2A: 14206.1.b.	Review records or plans.			
Are the pest management operations reported to the installation IPMC reported to the NAVFAC PPMC?	7 U.S.C. § 136i-1(a)(1) 6250.4C: Encl. (1), Para. 23.b. 5090.1, 17-4.2 5090.2A: 14210	Review records. Ensure IPMC has records.			
Is on-base agricultural pesticide storage in compliance with local and Virginia regulations?	4150.07: 4.3	Obtain Virginia regulations and Inspect pesticide storage or review agricultural commissioner inspection records.			
If lessee(s) use aerial pesticide application, has the aerial spray	6250.4C: Encl. (1), Para. 13.e.	Review aerial spray validation letter.			

project been reviewed and approved by NAVFAC?					
Pest Management Operations					
What are the installation's top five pests and what are their impacts on the installation?	BMP	Interview pest management service providers and complete pest management project sheets for each pest.			
What survey methods are used to detect, assess, and prescribe treatment for the top five pests?	BMP	Interview pest management service providers and complete pest management project sheets for each pest.			
What non-chemical control methods are used to prevent and control the top five pests?	BMP	Interview pest management service providers and complete pest management project sheets for each pest.			

Key to references:

- 7 U.S.C. § 136 FIFRA
- 4150.07: DODI 4150.07, DOD Pest Management Program
- 1028/8A: MIL-HDBK-1028/8A, Military Handbook, Design of Pest Management Facilities
- 6401.1A: SECNAVINST 6401.1A, Veterinary Health Services
- 6250.4C: OPNAVINST 6250.4C, Navy Pest Management Programs
- 5090.1: OPNAV M-5090.1, Environmental Readiness Program Manual
- 5090.2A: MCO 5090.2A, Environmental Compliance and Protection Manual
- 4200.1: EBUSOPSOFFINST 4200.1 (DON EBusiness Operations Office Instruction), Department of the Navy Policies and Procedures for the Operation of the Government Commercial Purchase Card Program
- FOOD: U.S. Food Code 2013

C.2 INTEGRATED PEST MANAGEMENT PLAN ANNUAL UPDATE FORM

Navy/Marine Corps Integrated Pest Management Plan Annual Update

Fiscal Year Submission Date

1. **Installation**: Please provide the following information about your installation.

NSA Hampton Roads	Virginia/Country	County(ies), if applicable	Year current IPMP was written

2. **Contact Information**: The following data provides information on installation resources and responsibilities in support of the pest management program. If not applicable, leave blank.

	Name	E-mail	Phone	Organization
Installation Pest Management Coordinator				
Lead Pest Controller				
Primary Pest Management PAR				
Primary Grounds Maintenance PAR				
Lead MWR Golf Course Applicator				
Medical Dept. Representative				
Natural Resource Manager				
Cultural Resource				

Manager				
Public Works Officer				
Installation Environmental Program Manager				

3. **Certification and Training**: List all personnel who have DOD certification or training numbers at your installation. This may include Public Works, MWR and/or Natural Resources personnel. Be sure to include all contractor personnel who apply pesticides (e.g., insecticides, herbicides, etc.) as a part of pest control or grounds maintenance contracts, including those contractor operations performed via credit card or small purchase contracts.

DOD or Virginia Certification	**Type of Work***	**Organization or Contractor Name**	**Applicator Name**	**Applicator Certification/ License Number**	**License Class/Type (i.e., Commercial, Noncommercial, Government, Registered Technician)**	**Certification Category Number(s) or Letter(s)****	**Exp Date MM/DD/YY**
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							
DoD							

*Specify the type of work (e.g., grounds maintenance, pest control, QAE/PAR, IPMC, Natural Resources, etc.)

**Provide a list of all categories of certification

4. **Plan Maintenance**: Please list any minor program changes (e.g., personnel changes, certifications, other programming changes or challenges, etc.) relative to the IPMP for the upcoming fiscal year. Major program changes require re-submittal of the entire updated plan for approval.

5. **Assistance**: Please indicate if you require on-site assistance from a NAVFAC Applied Biologist (Professional Pest Management Consultant) for your pest management program. Briefly describe the reason for such a visit. If you are planning aerial spray or other large scale pest management operations (such as large-scale weed control) please indicate the nature of the project below.

FOR OFFICIAL USE ONLY

IPMP Approved by NAVFAC Professional Pest Management Consultant ☐

Date of Approval: (FY approval)

APPENDIX D

Pesticide Authorized Use List

D.1 PESTICIDE AUTHORIZED USE LIST

D.1 PESTICIDE AUTHORIZED USE LIST

The following pesticides are authorized for use at NSA Hampton Roads as of October 2016

The most current list of approved pesticides for each installation can be found on the NAVFAC Online Pesticide Reporting System.

Pesticide Type	Pesticide Name	Active Ingredient	EPA Number
Avicide	AVITROL WHOLE CORN	4 - AMINOPYRIDINE	11649-7
Fungicide	3336 F	Thiophanate-methyl	1001-69
Fungicide	4 FLOWABLE MANCOZEB	MANCOZEB	707-156-10404
Fungicide	Avaris	azoxystrobin / propiconazole	100-1178-5905
Fungicide	BANNER MAXX	PROPICONAZOLE	100-641
Fungicide	BANOL	PROPAMOCARB HYDROCHLORIDE	45639-88
Fungicide	CHIPCO 26019	IPRODIONE	359-723
Fungicide	Chipco 26GT / Chipco 26019 FLO	iprodione	432-888
Fungicide	CHIPCO ALIETTE BRAND WDG FUNGICIDE	ALUMINUM TRIS	264-515
Fungicide	Chipco Signature	ALUMINUM TRIS	432-890
Fungicide	CLEARY 3336 WP	Thiophanate-methyl	1001-63
Fungicide	CURALAN EG	VINCLOZOLIN	7969-85-51036
Fungicide	DACONIL ULTREX	CHLOROTHALONIL	50534-202
Fungicide	Eagle 20EW	myclobutanil	62719-463
Fungicide	FORE 80 WP	MANCOZEB	62719-388
Fungicide	Headline AMP	pyraclostrobin / metconazole	7969-291
Fungicide	Heritage	Azoxystrobin	100-1093
Fungicide	KOBAN 30 TURF FUNGICIDE	ETRIDIAZOLE	58185-5
Fungicide	LESCO TOUCHE' EG FUNGICIDE	VINCLOZOLIN	7969-85-10404
Fungicide	PROSTAR 70WP	FLUTOLANIL	432-1223
Fungicide	RUBIGAN A.S.	FENARIMOL	1471-155
Fungicide	subdue maxx	METALAXYL-M	100-796
Herbicide	Accord Concentrate / RODEO	GLYPHOSATE	62719-324
Herbicide	ANDERSON DIMENSION HERBICIDE III	DITHIOPYR	9198-121
Herbicide	Anderson's Goosegrass/Crabgrass Control	Bensulide / Oxadiazon	9198-176
Herbicide	Aquamaster / Roundup Custom	Glyphosate	524-343
Herbicide	Atrazine 4F	atrazine	100-497-5905
Herbicide	Atrazine 4L	atrazine	19713-11
Herbicide	Barrage HF	2,4-D	5905-529
Herbicide	BARRICADE 65WG HERBICIDE	Prodiamine	100-834
Herbicide	Clear Pasture	Triclopyr BEE	72167-53-53883
Herbicide	Clearcast	imazimox	241-437-67690

Herbicide	Dimension Ultra 40WP	Dithiopyr	62719-445
Herbicide	Drive 75 DF	quinclorac	7969-130
Herbicide	Dual Magnum	S-metolachlor	100-816
Herbicide	Finale	Glufosinate	45639-187
Herbicide	Garlon 3A / Element 3A	TRICLOPYR	62719-37
Herbicide	GARLON 4	Triclopyr	62719-40
Herbicide	Gly Star Plus	Glyphosate	42750-61
Herbicide	GLYFOS X-TRA	glyphosate	4787-23
Herbicide	Glyphomate 41	glyphosate	2217-847
Herbicide	Glyphosate 4	Glyphosate	73220-6-74477
Herbicide	honcho plus herbicide	glyphosate	524-454
Herbicide	HYVAR X	BROMACIL	352-287
Herbicide	ILLOXAN 3EC HERBICIDE	DICLOFOP - METHYL	432-1231
Herbicide	LANDMARK XP	SULFOMETURON METHYL / CHLORSULFURON	352-645
Herbicide	LESCO MSMA 6.6	MSMA	42519-1-10404
Herbicide	Lesco Three-Way	2,4-D / MCPP / Dicamba	10404-43
Herbicide	MSMA 6 PLUS	MSMA	19713-42
Herbicide	MSMA 6.6	MSMA	50534-16-10404
Herbicide	PENDULUM 3.3 EC HERBICIDE	Pendimethalin	241-341
Herbicide	PRAMITOL 25E	PROMETON	66222-22
Herbicide	prodiamine 65 wdg	prodiamine	66222-89-73220
Herbicide	PROGRASS EMULSIFIABLE CONCENTRATE	ETHOFUMESATE	45639-68
Herbicide	PROSECUTOR	GLYPHOSATE	228-366-10404
Herbicide	Prosecutor Pro	Glyphosate	524-536-10404
Herbicide	QuikPro	diquat dibromide / glyphosate	524-535
Herbicide	RAZOR PRO	GLYPHOSATE	228-366
Herbicide	Remedy Ultra	Triclopyr	62719-552
Herbicide	Revolver	foramsulfuron	432-1266
Herbicide	ROUNDUP	GLYPHOSATE	524-308
Herbicide	Roundup PowerMax	glyphosate	524-549
Herbicide	Roundup Pro	Glyphosate	524-475
Herbicide	Roundup Pro Concentrate	Glyphosate	524-529
Herbicide	ROUNDUP PROMAX	glyphosate	524-579
Herbicide	Roundup Weathermax	Glyphosate	524-537
Herbicide	SIMIZINE 4L	SIMAZINE	9779-296
Herbicide	Snapshot 2.5 TG	trifluralin / isoxaben	62719-175
Herbicide	Triclopyr 3	Triclopyr	81927-13
Herbicide	Triclopyr 4	triclopyr BEE	81927-11
Herbicide	Triclopyr 4 EC	Triclopyr BEE	72167-53-74477
Herbicide	TRIMEC PLUS	2,4-D / monosodium methanearsonate / MCPP / Dicamba	2217-709
Herbicide	Vastlan	Triclopyr choline	62719-687

Insect Growth Regulator	GENTROL EC IGR	HYDROPRENE	2724-351
Insect Growth Regulator	GENTROL POINT SOURCE	HYDROPRENE	2724-469
Insecticide	565 Plus XLO	Piperonyl Butoxide / n-Octyl Bicycloheptene Dicarboximide / Pyrethrins	499-290
Insecticide	Advion Ant Gel	Indoxacarb	352-746
Insecticide	Advion Cockroach Gel Bait	Indoxacarb	100-1484
Insecticide	American Brands Permethrin Granular	Permethrin	55431-4-7401
Insecticide	Avert Prescription Treatment	Abamectin / Related Compounds	499-294
Insecticide	Bifen I/T	Bifenthrin	53883-118
Insecticide	BIFEN L/P	BIFENTHRIN	53883-124
Insecticide	BP-100	Pyrethrins / PIPERONYL BUTOXIDE / n-Octyl bicycloheptene dicarboximide	499-452
Insecticide	CY-KICK	CYFLUTHRIN	499-470
Insecticide	Cyonara	Lambda-cyhalothrin	53883-145
Insecticide	Cyper TC	Cypermethrin	53883-92
Insecticide	Cyzmic	Lambda-cyhalothrin	53883-261
Insecticide	D-Defense Dust	Deltamethrin	53883-283
Insecticide	D-FENSE SC	DELTAMETHRIN	53883-276
Insecticide	DELTA DUST	Deltamethrin	432-772
Insecticide	DELTAGARD G INSECTICIDE GRANULES	DELTAMETHRIN	432-836
Insecticide	DEMAND CS	Lambda-cyhalothrin	10182-361
Insecticide	Demand CS	LAMBDA-CYHALOTHRIN	100-1066
Insecticide	Demon Max	Cypermethrin	100-1218
Insecticide	DRIONE	PYRETHRIN / Pyrethrins	6754-22-5802
Insecticide	DRIONE INSECTICIDE	SILICA GEL / PIPERONYL BUTOXIDE / PYRETHRINS	4816-353
Insecticide	ECO PCO Jet	Hexa-hydroxyl / 2-phenethyl propionate	67425-5
Insecticide	EcoEXEMPT G	Clove oil / Thyme oil	25 (b) exempt
Insecticide	EcoEXEMPT IC2	Peppermint Oil / Rosemary Oil	25 (b) exempt
Insecticide	ECOPCO AC CONTACT INSECTICIDE	EUGENOL/2-PHENETHYL PROPIONATE / 2-PHENETHYL PROPIONATE	67425-4
Insecticide	EcoPCO ACU	Phenethyl Proplonate	67425-14
Insecticide	ECOpco ar-X	2-PHENETHYL PROPIONATE / Pyrethrins	67425-15
Insecticide	Fenvaster Plus	Esfenvalerate	71532-26-73006
Insecticide	Gourmet Ant Bait	Disodium Octaborate Tetrahydrate	73766-1
Insecticide	Intruder HPX	Piperonyl butoxide, pyrethrins, cyfluthrin / Pyrethrins / cyfluthrin	9444-183
Insecticide	LambdaStar 9.7 CS	Lambda-cyhalothrin	71532-23-73006
Insecticide	Maxforce Ant Killer Gel	Fipronil	432-1264
Insecticide	Maxforce Complete Granular	Hydramethylnon	432-1255

	Bait		
Insecticide	MAXFORCE EC BAIT GEL	FIPRONIL	64248-21
Insecticide	MAXFORCE FC ANT BAIT STATIONS	FIPRONIL	432-1256
Insecticide	Maxforce FC Fire Ant Bait	Fipronil	432-1433
Insecticide	MAXFORCE FC ROACH BAIT GEL	FIPRONIL	432-1259
Insecticide	Maxforce FC Roach Killer Bait Stations	Fipronil	432-1257
Insecticide	MAXFORCE GRANULAR INSECT BAIT	HYDRAMETHYLNON	64248-6
Insecticide	MAXFORCE ROACH KILLER BAIT GEL	HYDRAMETHYLNON	64248-5
Insecticide	Maxforce Roach Killer Bait Gel (Reservoir)	Hydramethylnon	432-1254
Insecticide	Maxforce Roach Killer Small Bait Station	Hydramethylnon	432-1251
Insecticide	MGK Roach Bait 2822	abamectin	1021-1828
Insecticide	Mustang Max	zeta-cypermethrin	279-3249
Insecticide	Mustang Maxx	zeta-cypermethrin	279-3426
Insecticide	NIBAN-FG	ORTHOBORIC ACID	64405-2
Insecticide	Permethrin	Permethrin	50404-5
Insecticide	Phantom	Chlorfenapyr	241-392
Insecticide	PREMISE 2	IMIDACLOPRID	3125-454
Insecticide	PREMISE 75	IMIDACLOPRID	3125-455
Insecticide	Premise Pre Construction Insecticide	Imidacloprid	432-1331
Insecticide	Premise Pro	Imidacloprid	432-1449
Insecticide	PT Microcare	pyrethrins / piperonyl butoxide / n-octyl bicycloheptene dicarboximide	499-381
Insecticide	QUALI-PRO BIFENTHRIN	Bifenthrin	53883-165-73220
Insecticide	Speckoz	bifenthrin	279-3206-72113
Insecticide	Summit B.T.I. Briquets	BACILLUS THURINGIENSIS	6218-47
Insecticide	Surrender CYPER WP	Cypermethrin	53883-29
Insecticide	SUSPEND SC	DELTAMETHRIN	432-763
Insecticide	SUSPEND SC	DELTAMETHRIN	432-763-62719
Insecticide	TalstarOne / Talstar P	Bifenthrin	279-3206
Insecticide	TEMPO SC ULTRA	CYFLUTHRIN	3125-498
Insecticide	Tempo SC Ultra	Cyfluthrin	432-1363
Insecticide	Tempo Ultra WP	Cyfluthrin	432-1304
Insecticide	Tempo Ultra WSP	B-Cyfluthrin	432-1377
Insecticide	Tengard SFR	Permethrin	70506-6
Insecticide	TERMIDOR SC	FIPRONIL	432-901
Insecticide	Termidor SC	Fipronil	7969-210
Insecticide	Terro PCO	Borax	149-8-64405
Insecticide	Transport	Acetamiprid / Bifenthrin	8033-96-279

Insecticide	ULD BP-100	PYRETHRINS / PIPERONYL BUTOXIDE / n-Octyl Bicycloheptene Dicarboximide	11540-9
Insecticide	Wasp-Freeze	d-trans allethrin / phenothrin	499-362
Insecticide	WHITMIRE PT 370 ASCEND FIRE ANT STOPPER BAIT	ABAMECTIN	499-370
Plant Growth Regulator	Primo Maxx	Trinexapac-ethyl	100-937
Rodenticide	CONTRAC ALL WEATHER BLOX	BROMADIOLONE	12455-79
Rodenticide	Contrac Rat & Mouse Bait	bromadiolone	12455-75
Rodenticide	CONTRAC RODENTICIDE PLACE PAC	BROMADIOLONE	12455-86
Rodenticide	DITRAC ALL-WEATHER BLOX	DIPHACINONE	12455-80
Rodenticide	EATONS BAIT BLOCKS	DIPHACINONE	56-42
Rodenticide	FINAL ALL-WEATHER BLOX	BRODIFACOUM	12455-89
Rodenticide	FINAL Rodenticide RTU Place Pac	Brodifacoum	12455-91
Rodenticide	MAKI MINI-BLOCK	BROMADIOLONE	7173-202

APPENDIX E

Certifications

E.1 TABLE OF CURRENT CONTRACTORS

E.2 TABLE OF APPLICATOR AND IPMC/PAR CERTIFICATIONS

E.3 IPMC APPOINTMENT LETTER

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E.1 CURRENT CONTRACTORS

Contractor	Type of Work	Business License Number	Categories
Didlake	Grounds Maintenance-Norfolk locations	3289	3A, 3B
Hampton Roads Termite & Pest	General Pest Control-Northwest Annex	240	6, 7A, 7B
J & J Maintenance	Fenceline Maintenance Northwest Annex	12565	6
Raytheon	Vegetation Control-Antenna Array, Northwest Annex	3700	6

E.2 PESTICIDE APPLICATOR AND IPMC/PAR CERTIFICATIONS

DOD or Virginia	Organization or Contractor Name	Name	Applicator Cert Number	Cert Category Number*	Expiration Date
Virginia	Didlake	Milton Canty	75533-C	3A, 3B	6/30/2018
Virginia	Didlake	Stevan Williams	110789-C	3A, 3B	6/30/2019
Virginia	Hampton Roads Termite & Pest	Joseph Lemma	86945-C	6, 7A, 7B	6/30/2018
Virginia	J & J Maintenance	Michael Parise	82027-C	6	6/30/2017
Virginia	Raytheon	Roger Ellers	66084-C	6	6/30/2018
Virginia	Raytheon	James Turner	100988-C	6	6/30/2019
Virginia	Raytheon	Torrey Mosher	119470-C	6	6/30/2017
Virginia	MWR	Sharon Moore	75675-G	3A, 3B	6/30/2018
Virginia	MWR	Robert West Jr	68039-G	3A, 3B	6/30/2017
DOD	MWR	Tony Gardner	NJ-008-92-0316	3, 5, 6	3/31/2019
DOD	MidLant	Jack Markham	A-204-83-0914	2,3,5,6,7,8,11	9/30/2017
DOD	NW Annex	Phil Grasty	NJ-002-13-0316	3, 5, 6	3/31/2019
DOD	MidLant EV Services	Roger Piland	NJ-013-04-0316	3,5,6,7,8	3/31/2019

DOD	MidLant EV Services	Roger Bass	NJ-003-04-0316	3,5,6,7,8	3/31/2019
DOD	MidLant EV Services	Zachary Clarke	NJ-008-12-0315	3,5,6,7,8	3/31/2018
DOD	MidLant EV Services	Shane McSwain	NJ-010-15	2,3,5,6,7,8	2/28/2018
DOD	MidLant EV Services	John Norman	PAR	N/A	3/31/2018
DOD	MidLant EV Services	Patrick Norman	NJ-017-09-0316	3,5,6,7,8	3/31/2019
DOD	MidLant EV Services	Michael Mondrzejewski	NJ-011-15	2,3,5,6,7,8	2/28/2018
3A–Ornamental Pest Control		3B-Turf Pest Control		6-Right-of-Way	
7A –General Pest Control		7B-Wood Destroying Pest Control		* Virginia Categories	

E.3 INTEGRATED PEST MANAGEMENT COORDINATOR APPOINTMENT LETTER

DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAVAL SUPPORT ACTIVITY, HAMPTON ROADS
7918 BLANDY ROAD, SUITE 100
NORFOLK, VIRGINIA 23551-2419

5090
Ser N00/ 167
25 Apr 16

From: Commanding Officer, Naval Support Activity, Hampton Roads
To: Mr. Jack Markham, Naval Facilities Engineering Command Mid-Atlantic, EV22

Subj: APPOINTMENT AS THE NAVFAC PEST MANAGEMMENT COORDINATOR, NAVAL SUPPORT ACTIVITY, HAMPTON ROADS

Ref: (a) DOD Instruction 4150.07 Department of Defense Pest Management Program
(b) OPNAV 5090.1D Chapter 24: Pesticide Compliance Ashore
(c) OPNAV 6250.4C Navy Pest Management Program

1. References (a), (b) and (c) require that Department of Defense installations have a formally appointed Integrated Pest Management Coordinator (IPMC). By notice of this letter, you are appointed to this position.

2. Your responsibilities are as follows:

a. Develop, coordinate, and ensure the installation Integrated Pest Management Plan (IPMP) is implemented and that it is reviewed and updated annually.

b. Function as the primary point of contact for the NAVFAC LANT entomologist for our Pesticide/Pest Management Program.

c. Serve as the liaison for pesticide matters with Public Works, Preventive Medicine, Supply, and Housing Departments, Tenant Commands, Food Services, the Navy Exchange, and other offices as needed.

d. Ensure that all pest management operations are recorded and reported in the proper format.

e. Advise the NAVFAC LANT entomologists of changes in our Pesticide /Pest Management Program and of dealings with outside agencies in pesticide matters.

f. Ensure that pesticides used by DOD and Contractor personnel are approved for use.

SUBJ: APPOINTMENT OF THE NAVFAC PEST MANAGEMMENT COORDINATOR, NAVAL SUPPORT ACTIVITY, HAMPTON ROADS

g. Ensure that contracts (in which the use of pesticides is authorized) are forwarded to the NAVFAC LANT entomologists for review and approval before advertisement.

3. Your appointment and responsibilities, as the Naval Support Activity, Hampton Roads IPMC, will continue until formally notified of changes.

J. D. FREEMAN

APPENDIX F

Laws

F.1 FEDERAL LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

F.2 DEPARTMENT OF DEFENSE LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

F.3 DEPARTMENT OF THE NAVY LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

F.4 VIRGINIA LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

F.5 INSTALLATION LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

Add to appendix F: lists of Virginia regulations, other DOD and federal regulations

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F.1 FEDERAL LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

FEDERAL

Title/Reference	Date	Relevant Requirements / Guidance
Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C 136 et seq.) *http://www.law.cornell.edu/uscode/text/7/chapter-6/subchapter-II* (codified at 40 CFR Parts 152-180 *http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr152_main_02.tpl)*	1947, and amendments	Requires pesticide and applicator registration with the U.S. EPA, properly labeled containers, pesticide application records, adequate worker safety, and the proper disposal of unused products. Pesticides are also classified under this act as general use or restricted use.
Integrated Pest Management for Federal Agencies (7 USC § 136R–1) *http://www.law.cornell.edu/uscode/text/7/136r-1*		Requires Federal agencies to use IPM techniques in carrying out pest management activities and promote IPM.
National Environmental Policy Act (NEPA) (42 USC 4321-4347) *http://www.nepa.noaa.gov/statute.html*	1969	Requires a detailed environmental impact Statement for any major federal action that can significantly affect the environment. This may include pest management operations that involve large areas of land, application of chemicals to waterways and aerial application of pesticides.
Executive Order 12856, Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements *http://www.archives.gov/federal-register/executive-orders/pdf/12856.pdf*	3 Aug 1993	The head of each Federal agency is responsible for ensuring that all necessary actions are taken for the prevention of pollution with respect to that agency's activities and facilities, and for ensuring that agency's compliance with pollution prevention and emergency planning and community right-to-know provisions.
Executive Order 13148, Greening the Government Through Leadership in Environmental Management *http://www.epa.gov/epp/pubs/eo13148.pdf*	21 April 2000	Requires that the head of each Federal agency ensures that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision making and long-term planning processes, across all agency missions, activities, and functions. Each agency shall strive to reduce or eliminate harm to human health and the environment from releases of pollutants, such as pesticides, to the environment.

Federal Noxious Weed Act (7 USC 2801) incorporated into the Plant Protection Act *http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/sec2814.pdf*	FNWA 1974 PPA 2000	Requires federal agencies to develop and implement noxious weed management programs on federal land.
Resource Conservation and Recovery Act (RCRA) *http://www4.law.cornell.edu/uscode/42/6901.html* (42 USC 6901 et seq.) (40 CFR § 260-265)	1976, amended in 1986	Requires proper disposal of waste pesticides and pesticide containers.
Non-indigenous Aquatic Nuisance Prevention and Control Act (16 USC 4700 et seq.) *http://www.anstaskforce.gov/Documents/nanpca90.pdf*	1990	Espouses taking preventive management measures nationwide to prevent and control unintentionally introduced non-indigenous aquatic species and prevent further distribution of these species.
Food Quality Protection Act (FPQA), Section 303 *http://www.fda.gov/RegulatoryInformation/Legislation/FederalFoodDrugandCosmeticActFDCAct/SignificantAmendmentstotheFDCAct/ucm148008.htm*	1996, amendment to FIFRA and FDCA	Mandates that federal agencies use IPM techniques in pest management activities and promote IPM through procurement and regulatory policies. Primarily established safety standards for pesticides applied to foods.
Executive Order 13112, Invasive Species *http://www.invasivespeciesinfo.gov/laws/execorder.shtml*	3 Feb 1999	Institutes measures to prevent the introduction of invasive species, provide for their control using environmentally sound techniques, and minimize the economic, ecological, and human health impacts caused by invasive species.
Clean Air Act (CAA) (42 USC 7401 et seq.) *http://www.epa.gov/air/caa/*	1955, amended in 1970, 1977, and 1990	Mandates the prevention and control of air pollution from toxic emissions including pesticides.
Animal Damage Control Act (7 USC 426-426c) *http://www.animallaw.info/statutes/stusfd7usc426.htm*	1931, amended in 1987 and 1991	Gives the Secretary of Agriculture broad authority to investigate and control certain predatory or wild animals and nuisance mammal and bird species.
Migratory Bird Treaty Act *http://www.fws.gov/alaska/ambcc/ambcc/treaty_act.htm*	1918, with numerous amendments	Requires permits to take migratory birds.
OSHA Hazard Communication Standard (29 CFR 1910) *http://www.osha.gov/dsg/hazcom/standards.html*	1970	Stipulates the requirements for applicable and adequate training of all employees regarding hazardous substances (including pesticides) and providing access to SDSs for all chemicals.

Endangered Species Act (16 USC 1531-1544), (50 CFR Part 402) *http://www.fws.gov/laws/lawsdigest/ESACT.html* Federal list of endangered/ threatened plants and wildlife is at 50 CFR §§ 17.11 & 17.12 *http://www.fws.gov/endangered/*	1973, amended in 1978	Dictates that all federal agencies must protect listed plants and animals and their habitats from harm. Indicates that pesticide formulations and application methods be reviewed by the U.S. Fish and Wildlife Service to determine whether there could be adverse effects.
Endangered Species Protection Bulletins *http://www.epa.gov/espp/bulletins.htm*		Bulletins set forth geographically-specific *pesticide use limitations* for the protection of endangered or threatened species and their designated critical habitat.
Sikes Act Improvement Act (SAIA) (16 USC 670) *http://www.fws.gov/habitatconservation/sikes_act.html*	31 Dec 2003	Authorizes the Secretary of Defense to develop cooperative plans for conservation and rehabilitation programs on military reservations and modify or improve habitat for endangered species and migratory birds. This includes authorizing the elimination of noxious weeds in efforts to rehabilitate native species.
Toxic Substances Control Act (TSCA) (15 USC 2601 et seq.) *http://www.epa.gov/oecaagct/lsca.html*	1976	Requires that new chemicals, including pesticides, be registered and that testing for human health and environmental hazards be performed.
Clean Water Act (Amended the Federal Water Pollution Control Act of 1972) (33 USC 1251-1387) *http://www.law.cornell.edu/uscode/text/33/chapter-26*	1977, reauthorized in 1987	Calls for the restoration and maintenance of the chemical, physical, and biological integrity of our nation's waters, including sensitive environments like wetlands. This Act prohibits non-storm water discharges from entering surface waters.
National Pollution Discharge Elimination System (NPDES)—EPA General Permit *http://cfpub.epa.gov/npdes/home.cfm?program_id=410* Covers the following Virginias: AK, ID, NH, NM, OK, DC, and federal facilities in WA, CO, DE, and VT.		Operators that apply pesticides that result in discharges from the following use patterns may have to submit a notice of intent (NOI) and create a Pesticide Management Discharge Plan (PMDP) if they meet certain criteria: (1) mosquito and other flying insect pest control; (2) weed and algae control; (3) animal pest control; and (4) forest canopy pest control

United Virginias Public Health Service (USPHS)/Food and Drug Administration (FDA) Food Code *http://www.fda.gov/food/guidanceregulation/retailfoodprotection/foodcode/default.htm*	2001	Provides regulations on pest control methods, application of pesticides, removal of dead animal pests from food retail sales establishment, and display of pesticides for retail sale. It also provides food inspection guidelines and inspection forms. This is the primary guideline used by Defense Commissary Agency (DeCA) food inspectors for ensuring food safety in the Commissary.

F.2 DEPARTMENT OF DEFENSE LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

DEPARTMENT OF DEFENSE

Title/Reference	Date	Relevant Requirements/Guidance
DOD Instruction 4150.07, DOD Pest Management Program *http://www.dtic.mil/whs/directives/corres/pdf/415007p.pdf*	29 May 2008	Sets policies, responsibilities, and procedures for implementing an environmentally sound IPM program to control pests and ensure installations develop, maintain, and review their pest management plans.
DOD 4150.07-M, Volume 1, DOD Pest Management Training: The DOD Plan for the Certification of Pesticide *http://www.dtic.mil/whs/directives/corres/pdf/415007m_vol1.pdf*	23 May 2013	Outlines the DOD procedures for pest management training and certification of pesticide applicators.
DoD Manual 4150.07, Volume 2, DoD Pest Management Training and Certification Program: The DoD Plan for Non-Federal Insecticide, Fungicide, and Rodenticide Act Pesticide Applicators *http://www.dtic.mil/whs/directives/corres/pdf/415007m_vol2.pdf*	23 May 2013	Assigns responsibilities and sets procedural requirements for non-FIFRA training and certification.
DOD 4150.07-M, Volume 3, DOD Pest Management Training and Certification Program: The DOD Plan for FIFRA Pesticide Applicators *http://www.dtic.mil/whs/directives/corres/pdf/415007m_vol3.pdf*	23 May 2013	Outlines the DOD procedures for pest management training of IPMCs and PARs.

DOD Directive 4715.1E, Environmental Security *http://www.dtic.mil/whs/directives/corres/pdf/471501p.pdf*	19 March 2005	Establishes the AFPMB which provides information, guidance, and publications related to pest and pesticide management. Also advocates implementing IPM into DOD acquisition, procurement, maintenance, and repair processes for systems, equipment, facilities, and land.
DOD /EPA MOU with Respect to IPM *https://extranet.acq.osd.mil/eie/afpmb/cac/mous/MOU_DoD-Epa.pdf*	March 1996	Adopts integrated pest management strategies to reduce the potential risks to human health and the environment associated with pesticides.
DOD D/USDA Master MOU *https://extranet.acq.osd.mil/eie/afpmb/cac/mous/USDA_DoD_MOU_Decision_Memo.pdf*	14 Mar 2003	Indicates that these agencies will work together and meet regularly to discuss such mutual interests as pest management, forestry, and wildlife activities.
DOD /USDA MOU—Animal Damage Assessment and Control *https://extranet.acq.osd.mil/eie/afpmb/cac/mous/MOU_DoD_USDA_Aphis.pdf*	15 May 1990	Establishes procedures for planning, scheduling and conducting animal damage control activities exclusive of routine vertebrate pest control operations.
Armed Forces Pest Management Board Technical Guides *http://www.acq.osd.mil/eie/afpmb/techguides.html*		DOD-specific guidance on various pest management and pesticide-related topics.

F.3 DEPARTMENT OF THE NAVY LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

DEPARTMENT OF THE NAVY

Title/Reference	Date	Relevant Requirements/Guidance
OPNAVINST 6250.4C, Pest Management Programs	11 April 2012	The Navy policy that implements DOD's Pest Management Program. Provides policy specific to Navy operations. This includes record keeping, reporting, safety, management of contracted operations, pest management plans, and environmental protection. Provides responsibilities for preventive medicine.
OPNAVINST 5090.1D, Environmental Readiness Program	10 Jan 2014	Overarching document implementing OPNAV M-5090.1.

OPNAV M-5090.1, Environmental Readiness Program Manual (Chapter 24—Pesticide Compliance Ashore)	10 Jan 2014	Generally requires all pesticide applicators to be DOD- or Virginia-certified. In addition, pest management records must be kept and a pest management plan developed, implemented, and maintained that stresses the importance of IPM.
OPNAVINST 5100.23G, Navy Occupational Safety and Health (NAVOSH) Program	11 July 2011	Requires that pest control operations be thoroughly evaluated to identify and quantify potential health hazards.
NAVMED P-5010, Manual of Naval Preventive Medicine Chapter 8—Navy Entomology and Pest Control Technology	9 Nov 2004	Guidelines and procedures on the prevention, surveillance, and control of medically important pests.
OPNAVINST 6210.2, Quarantine Regulations of the Navy	29 June 2006	Delineates the Navy and Marine Corps responsibility to prevent the introduction of medically and economically important pests into the United Virginias

F.4 VIRGINIA LAWS, REGULATIONS, POLICIES, AND GUIDANCE RELATED TO PESTICIDES AND PEST MANAGEMENT

VIRGINIA

Title/Reference	Date	Relevant Requirements/Guidance
Virginia Pesticide Control Act http://law.lis.virginia.gov/vacode/title3.2/chapter39/ Regulations Pursuant to the Virginia Pesticide Control Act • Rules and Regulations for Enforcement of the Virginia Pesticide Law • Rules and Regulations Governing Pesticide Fees • Rules and Regulations Governing Licensing of Pesticide Businesses • Regulations Governing Pesticide Applicator Certification	1989	Regulates applicator certification, business licensing, product registration, and fees.
Virginia Pollutant Discharge Elimination System – Pesticide Discharges *http://law.lis.virginia.gov/admincode/title9/agency25/chapter800*	1/1/2014	Installations are required to send notices of intent for operations such as mosquito control, aquatic weed and animal control, and forest pest control.

APPENDIX G

Environmental

G.1 SAMPLE PESTICIDE MANAGEMENT PROGRAM ENVIRONMENTAL IMPACT LOG

G.2 SAMPLE PESTICIDE DISCHARGE MANAGEMENT PLAN

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G.1 SAMPLE PESTICIDE MANAGEMENT PROGRAM ENVIRONMENTAL IMPACT LOG

Practice	Practice Owner	Aspects	Impacts	Vulnerable Assets
Pesticide storage	Pest control shop supervisor	Potential spill	Degradation of water quality Human exposure to chemicals	Environmental resources Human health and safety
	Pest control shop supervisor	Fire	Risk of human injury due to fire and chemicals Degradation of air quality	Human health and safety Environmental resources
Pesticide transportation	Pesticide applicator/ transporter	Potential spill due to container damage	Degradation of water and soil quality Property contamination	Real property Mission Human health and safety Public perception
	Vehicle owner	Air emissions from vehicle	Degradation of air quality	Environmental resources
Pesticide mixing	Pesticide mixer/applicator	Potential spill	Degradation of water and soil quality	Environmental resources
	Pesticide mixer/ applicator	Hazardous waste generation	Cost of disposal	Mission
	Pesticide mixer/ applicator	Chemical mixing	Exposure to toxic chemicals	Human health and safety

Practice	Practice Owner	Aspects	Impacts	Vulnerable Assets
Pesticide application	Pesticide applicator	Potential spill	Degradation of water and soil Exposure to toxic chemicals	Natural resources Human health and safety
	Pesticide applicator	Pesticide drift	Killing of non-target plants and animals	Natural resources
	Pesticide applicator	Stormwater discharge	Degradation of water	Environmental resources
	Pesticide applicator	Air emissions from gas powered application equipment	Degradation of air quality	Natural resources
	Pesticide applicator	Vehicle use for pesticide application	Damage to plants and animal habitats if off road	Mission Human health and safety
	Pesticide applicator	Hazardous waste generation	Cost of disposal Exposure to toxic chemicals	Mission Human health and safety
	Pesticide applicator	Chemical usage	Exposure to toxic chemicals	Human health and safety Environmental resources
Cleaning pesticide application equipment at application site and in pest control shop	Pesticide applicator	Waste water generation	Degradation of water quality Cost of treatment/disposal	Mission

Practice	Practice Owner	Aspects	Impacts	Vulnerable Assets
Non-chemical control: Animal trapping	Pest control operator	Animal relocation	Potential destruction of natural resources	Natural resources
	Pest control operator	Trapped animal	Human or domestic animal injury caused by trapped animals	Human and domestic animal health and safety
Non-chemical control: mechanical weed removal	Grounds maintenance workers	Root damage to native plants	Destruction of natural resources	Natural resources

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G.2 SAMPLE PESTICIDE DISCHARGE MANAGEMENT PLAN

Pesticide Discharge Management Plan

Instructions

If you are required to submit an NOI (see table 1 below), you must prepare a PDMP for your pest management area within the deadlines described below (table 2). This plan must be kept up-to-date. The EPA's general permit can be accessed at: http://www.epa.gov/npdes/pubs/proposed_pgp.pdf.

Pesticide Use	Annual Threshold
Mosquitoes and Other Flying Insect Pests	6,400 Acres of treatment area
Aquatic Weed and Algae Control:	
-In Water	80 Acres of treatment area*
-At Water's Edge:	20 linear miles of treatment area at water's edge+
Aquatic Nuisance Animal Control:	
-In Water	80 Acres of treatment area*
-At Water's Edge	20 linear miles of treatment area at water's edge+
Forest Canopy Pest Control	6,400 Acres of treatment area
*Calculations should include the area of the applications made to: (1) waters of the U.S. and (2) conveyances with a hydrologic surface connection to waters of the U.S. at the time of pesticide application. For calculating annual treatment area totals, count each pesticide application activity as a separate activity. For example, applying pesticides twice a year to a ten acre site should be counted as twenty acres of treatment area. +Calculations should include the linear extent of the applications made at water's edge adjacent to: (1) waters of the U.S. and (2) conveyances with hydrologic surface connection to waters of the U.S. at the time of pesticide application. For calculating annual treatment totals, count each pesticide application activity and each side of a linear water body as a separate activity or area. For example, treating both sides of a ten mile ditch is equal to twenty miles of water treatment area.	

Table 1. Annual Treatment Area Thresholds

Category	PDMP Deadline
Operators are not required to submit an NOI.	Not applicable.
Operators who know or should have reasonably known, prior to commencement of discharge, that they will exceed an annual treatment area threshold for that year.	Prior to first pesticide application covered under the permit.
Operators who do not know or would reasonably not know until after commencement of discharge that they will exceed an annual treatment area threshold for that year.	Prior to exceeding an annual treatment area threshold.
Operators commencing discharge in response to a declared pest emergency situation that will cause the operator to exceed an annual treatment area threshold.	No later than 90 days after responding to the declared pest emergency situation

Table 2. Pesticide Discharge Management Plan deadlines

Pesticide Discharge Management Plan
For
Pest Management Area:

A. Pesticide Discharge Management Team

The following person will be responsible for managing pests in relation to the specified pest management area:

Name	Title	Department/Division	Phone	Email

The above person is responsible specifically for:

The following person will be responsible for developing and revising the PDMP:

Name	Title	Department/Division	Phone	Email

The above person is responsible specifically for:

The following person will be responsible for developing, revising, and implementing corrective actions and other effluent limitation requirements:

Name	Title	Department/Division	Phone	Email

The above person is responsible specifically for:

The following person(s) will be responsible for pesticide applications in the specified pest management area:

Name	Title	Department/Division	Phone	Email

The above person(s) is/are responsible specifically for:

The pesticide applications for the specified pest management area are performed by:

In-House Personnel	☐	Contractor Personnel	☐	In-House and Contractor Personnel	☐

If contractor personnel perform the pesticide applications, attach a copy of the contract or other written agreement to this PDMP. Document attached? Yes ☐ No ☐ Not applicable ☐

B. Pest Management Area Description

1. Pest Problem Description

Target Pest(s):

Source of Pest/Root Cause of Pest Problem:

Historical information regarding this pest problem in this area:

Source and location of historical data:

2. Action Threshold

Established Pest Action Threshold (reference IPMP and/or Contract, if applicable):

3. Map

Attach a map of the pest management area. Map attached. Yes ☐ No ☐

4. Water Quality Standards

Established Water Quality Standards for waters of the U.S. located in this pest management area to which there may be a discharge (provide reference from Virginia or other source):

C. Control Measure Description

Select control measures that you will implement to comply with effluent limitations. Further details will be provided in Section D.

☐ Active Ingredient(s) to be applied to the pest management area (attach pesticide label):

☐ Rate of application (provide rate):

☐ Frequency of application (provide frequency):

☐ Spill Prevention

☐ Equipment Maintenance and Calibration

D. Schedules and Procedures

1. Control Measures Used to Comply with Effluent Limitations

For all of the following provide justification, procedures and schedules, as appropriate. Reference the IPMP, other installation Plans, SOPs, manufacturer's directions or any

other applicable documents. Procedures do not need to be re-written here if they are clearly delineated in another planning document and the document is referenced.

Rate of application:

Spill Prevention:

Pesticide Application Equipment Maintenance:

Pest Surveillance:

Assess Environmental Conditions Prior to Application (temperature, precipitation, wind speed):

2. Other Actions Necessary to Minimize Discharges

Spill Response Procedures

Provide information on and/or reference existing plans for the following:

Spill Response Procedures:

Spill-related Training/Certification:

Notification Procedures:

Adverse Incident Response Procedures

Provide information on and/or reference existing plans for the following:

Incident Response Procedures:

Notification Procedures:

Locations where Contact Information for Responders can be Found:

Pesticide Monitoring Schedules and Procedures

"Monitoring" includes checking that the amount of pesticide applied is correct, performing regular maintenance on equipment and spot checking for observable adverse incidents. Visual assessments of the application site must be performed during pesticide applications and during post-application surveillance.

Process for determining monitoring locations:

Schedule for monitoring:

Person(s) responsible for monitoring:

Procedures for documenting any observed impacts:

E. Documentation to Support Eligibility Considerations under Other Federal Laws

Have you included a copy of your NOI with this PDMP? Yes ☐ No ☐

F. Signature

This PDMP must be signed by "either a principal executive officer or ranking elected official (i.e., a Chief Executive Officer of the Agency or a Senior Executive Officer having responsibility for the overall operations of a principal geographic unit of the agency)."

Signature: _____
Name:
Title:

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APPENDIX H

Medical

H.1 EMERGENCY VECTOR-BORNE DISEASE CONTROL PLAN

The Emergency Disease Vector Control Plan for the Hampton Roads Region is included on the resource CD only because of its length.

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GLOSSARY

Acaricide. An agent used to kill mites and ticks.

Applied Biology Program. A network of NAVFAC Pest Management Consultants (PMCs) in the Environmental Business Line that assist Navy and Marine Corps installations with FIFRA and Final Governing Standards-based compliance and provide Integrated Pest Management solutions that protect operations, war-fighters, quality of life, property, materiel and the environment from the adverse effects of living organisms.

Arachnid. An arthropod that has eight legs and two body segments in the adult stage.

Arthropod. Invertebrate animals (insects, arachnids and crustaceans) that have jointed appendages and a segmented body.

Avicide. An agent used to kill or repel birds.

Broad spectrum. A classification of pesticide that will kill a wide range of pests.

Broadcast application. The application of a pesticide to a wide area.

Crack and crevice treatment. Application of a pesticide to cracks and crevices where pests are known to live, feed, and/or breed.

DOD-certified pesticide applicator. Military or civilian personnel certified per the "DOD Plan for Certification of Pesticide Applicators" in the pest management categories that are appropriate for their type of work.

Drift. The movement of a pesticide through air, ground, or water out of the control target area.

Exclusion. A pest control method that prevents the entry of a pest into an area to be protected from the pest.

Functional area. Installation personnel, agencies, departments, contractors and facilities that use or store pesticides, conduct pest management operations, provide for safety or security of pest control operations, or have the responsibility of preventing pests.

Fungicide. An agent used to destroy or inhibit growth of fungi.

Herbicide. An agent used to destroy or inhibit plant growth.

Insecticide. An agent used to destroy insects.

Integrated pest management (IPM). A planned program incorporating education, continuous monitoring, record keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment. IPM uses targeted, sustainable (effective, economical, environmentally sound) methods including habitat modification; biological, genetic, cultural, mechanical, physical, and regulatory controls; and, when necessary, the judicious use of least-hazardous pesticides.

Integrated pest management coordinator. The individual officially designated by the installation commander to coordinate and oversee the installation pest management program and installation IPM plan. IPM coordinators must be certified as pesticide applicators if their job responsibilities require them to apply or supervise the use of pesticides.

Integrated Pest Management Plan. A detailed document for the design, implementation, and maintenance of all pest management and pesticide storage and use on an installation or group of installations.

Invasive species. A species of animal, plant or organism that is not native to a geographic area and can potentially cause harm to native organisms and their habitats.

Leach. The movement of a pesticide through soil.

Molluscicide. An agent used to kill snails.

Noxious or invasive weed. A weed that, if introduced, into a habitat can cause damage or injury to other organisms in that habitat. They may cause deprivation of water to other plants, physical injury to animals, or increased risk for wild fire.

Personal relief. Pest management control efforts made by DOD personnel or their family members at their own expense for control of pests consistent with DOD and Navy policy.

Pest. Any organism (except for microorganisms that cause human or animal diseases) that adversely affects operations, preparedness, the well-being of humans or animals, real property, materiel, equipment or vegetation, or is otherwise undesirable.

Pest management performance assessment representatives (PMPARs). Installation personnel trained in contract performance assessment and pest management, whose duties include surveillance of commercial pest management services to ensure that the performance complies with contract specifications and legal requirements. [Formerly known as Pest Control Quality Assurance Evaluators (PCQAE).]

Pest management. The prevention and control of disease vectors and pest that may adversely affect the DOD mission or military operations; the health and well-being of people; or structures, materiel, or property.

Pesticide. Any substance or mixture of substances registered by EPA under FIFRA, intended to destroy, repel, or mitigate pests. Includes, insecticides, rodenticides, herbicides, fungicides, plant regulators, defoliants, desiccants, disinfectants, antifouling paints and biocides (such as water treatment chemicals). NAVFAC PPMCs do not approve disinfectants or biocides.

Pesticide applicator. Any individual who applies pesticides.

Pesticide cancelation. An action by EPA that may limit the use of a pesticide. EPA often issues instructions with the pesticide cancelations providing information on the disposition of canceled pesticides.

Pesticide Facility. The building and areas designated for handling and storing pesticides.

Pre-treatment. A termiticide applied to the soil during the construction of a new building or addition.

Professional pest management consultant. Degreed technical specialists, such as NAVFAC civilian entomologists (Applied Biologist) and BUMED commissioned medical entomologists, who have command program oversight responsibilities and provides guidance and information on the management of pest management programs for commands and installations.

Registered pesticide. A pesticide registered by EPA for sale and use within the United Virginias.

Residual pesticide. The application of a pesticide that will remain effective on to the surface to which it is applied for a long period of time.

Rodenticide. An agent used to destroy rodents.

Safety Data Sheet. A document (OSHA form 174, or equivalent) that accompanies a pesticide product, providing the handler with chemical information on ingredients, handling instructions, potential hazards, and manufacturer address and emergency contact information.

Space spray. The application of a pesticide as a fine airborne mist to kill flying insects. This includes ultra-low volume application and fogging.

Stakeholder. A person, agency, organization, or department that has an interest in the installation's pest management program.

Virginia-certified commercial pesticide applicators. Personnel certified in accordance with FIFRA by a Virginia (in which the work will be performed) with an EPA-approved certification plan and certified in the category in which a pesticide will be applied.

Subsistence. Stored food items.

Surveillance. The use of surveys over a period of time to monitor the increase and decrease of pest populations over time. Often used as a means of "early warning" of increase in pests or risk of disease and as a means of determining efficacy of pest management operations.

Survey. Observing, collecting, quantifying, identifying and analyzing a pest population.

Ultra-low volume (ULV). A method of applying a pesticide as a space spray. This method involves applying fine droplets of concentrated pesticide.

Uncertified pesticide applicators. Individuals who have not successfully completed certification training. Uncertified military and DOD civilian personnel who are in training to become certified pesticide applicators may apply pesticides when under the direct line-of-sight supervision of a DOD-certified pesticide applicator. Uncertified personnel may apply self-help or personal relief pesticides when the operation has been approved by a command pest management consultant.

Vector/Disease Vector. Any animal capable of transmitting the causative agent of human disease; serving as an intermediate or reservoir host of a pathogenic organism; or producing human discomfort or injury, including (but not limited to) mosquitoes, flies, other insects, ticks, mites, snails, and rodents. It is recognized that certain disease vectors are predominantly economic pests that as conditions change may require management or control as a disease vector.

Vector-borne disease. A disease transmitted by a vector.

Zoonosis. A disease that normally occurs in animals that can be transmitted to humans.

LIST OF ACRONYMS AND ABBREVIATIONS

AFPMB	Armed Forces Pest Management Board
AHB	Africanized Honey Bee
APHIS	Animal and Plant Health Inspection Service
AUL	authorized use list
Bti	*Bacillus thuringiensis israelensis*
BUMED	Navy Bureau of Medicine and Surgery
CAMA	calcium acid methanearsonate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	commanding officer
COR	contracting officer representative
CNIC	Commander, Navy Installations Command
CRPM	cultural resources program manager
CWP	Contractor Work Plan
DOD	Department of Defense
DODI	Department of Defense instruction
DON	Department of the Navy
DSMA	disodium methanearsonate
E	endangered
EA	environmental assessment
EEE	Eastern Equine Encephalitis
EHS	extremely hazardous substance
EMS	Environmental Management System
EO	executive order

EPA	Environmental Protection Agency
ESA	Endangered Species Act
EVDCP	Emergency Vector-borne Disease Control Plan
FAP	Functional Assessment Plan
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FSC/BOS	Facilities Support Contract/Base Operation Support
IAP	Internal Assessment Plan
ICRMP	Integrated Cultural Resources Management Plan
IH	industrial hygiene
INRMP	Integrated Natural Resources Management Plan
IPM	integrated pest management
IPMC	integrated pest management coordinator
IPMP	Integrated Pest Management Plan
KO	contracting officer
LEPC	Local Emergency Planning Committee
MoM	measure of merit
MRE	meal, ready to eat
MSMA	monosodium methanearsonate
MWR	morale, welfare, & recreation
NAVMED	Navy Medical (Command)
NAFI	Non-Appropriated Fund Instrumentality
NAVSUBASE	naval submarine base
NECE	Navy Entomology Center of Excellence
NEPMU	Navy Environmental and Preventive Medicine Unit
NEX	Navy Exchange
NISH	National Institute of Severely Handicapped
NMCI	Navy and Marine Corps Intranet

NPDES	National Pollutant Discharge Elimination System
NOPRS	NAVFAC Online Pesticide Reporting System
NOSC	naval operational support center
OPNAVINST	Chief of Naval Operations instruction
OPNAV M	Chief of Naval Operations manual
ORM	operational risk management
OSHA	Occupational Safety and Health Administration
PAI	pounds of active ingredient
PAR	performance assessment representative
PMPAR	Pest Management Performance Assessment Representative
PMRS	Pest Management Record Spreadsheet
PMSP	Pest Management Service Provider
PMT	preventive medicine technician
POC	point of contact
PPE	personal protective equipment
PPMC	professional pest management consultant
PPV	public-private venture
RTU	ready-to-use
SDS	safety data sheet
SERC	Virginia emergency response commission
SPAR	supervisory performance assessment representative
SPCCP	Spill Prevention, Control, and Countermeasures Plan
sq ft	square feet
T	threatened
TG	technical guide
UFGS	Unified Facilities Guide Specifications
ULV	ultra-low volume

U.S.	United Virginias
U.S.C.	United Virginias Code
USDA	United Virginias Department of Agriculture
USDA-APHIS	United Virginias Department of Agriculture-Animal and Plant Health Inspection Service
USF&WS	U.S. Fish and Wildlife Service
USN	United Virginias Navy
WNV	West Nile Virus

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Appendix J

Urban Forestry, Grounds Maintenance, and Landscaping Management

Enclosure 1 **Tree City USA Proclamation**

Enclosure 2 **Pruning and Planting Guidelines**

Enclosure 3 **Native Plants for Landscaping**

Enclosure 4 **D-Sized Map of NSAHR NWA**

Enclosure 5 **NAS Oceana Instruction 5090.2E (Procedures for Cutting Firewood and Use of Tree Products)**

Enclosure 6 **Forestry Work Plan**

Enclosure 7 **Urban Forestry Program**

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Enclosure 1. Tree City USA Proclamation

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Tree City USA

2014 Application for Certification

TREE CITY USA

The Tree City USA award is in recognition of work completed by the community during the 2014 calendar year.

As Mayor or Equivalent of the Community of NSA Hampton Roads - Northwest Annex

I herewith make application for this community to be officially certified/recertified as a Tree City USA for 2014, having achieved the standards set forth by the Arbor Day Foundation as noted below.

Standard 1: A Tree Board or Department
Community has a Tree Board only

Tree Board Chair
Michael Wright Natural Resources Manager 757-433-3461 michael.f.wright@navy.mil

Standard 2: A Community Tree Ordinance
✓ Our community ordinance is on record

Standard 3: A Community Forestry Program with an Annual Budget of at Least $2 Per Capita

Total Community Forestry Expenditures	$493542.5
Community Population	1300
Per Capita Spending	$379.65

Standard 4: An Arbor Day Observance and Proclamation
✓ Official Arbor Day proclamation is on record

J. E. WILLIAMS, CDR, USN	ACTING	12/29/14
Mayor or Equivalent Signature	Title	Date

Application Certification

To Be Completed By The State Forester:

NSA Hampton Roads - Northwest Annex

The above named community has made formal application to this office. I am pleased to advise you that we reviewed the application and have concluded that, based on the information contained herein, said community is eligible to be certified as a Tree City USA community, for the 2014 calendar year, having in my opinion met the four standards required for recognition.

State Forester Signature	Title	Date

Arbor Day Foundation

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Enclosure 2. Pruning and Planting Guidelines

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DEPARTMENT OF THE NAVY
OFFICER IN CHARGE
NAVAL SUPPORT ACTIVITY, NORFOLK
NORTHWEST ANNEX
1320 NORTHWEST BLVD, SUITE 100
CHESAPEAKE, VIRGINIA 23322-4094

Naval Support Activity Hampton Roads Northwest Annex

Proclamation

Whereas, *In 1872, Arbor Day founder, J. Sterling Morton set aside a special day for the planting of trees; that first Arbor Day resulted in the planting of more than a million trees in Nebraska; and*

Whereas, *Naval Support Activity Hampton Roads Northwest Annex is committed to managing and enhancing its natural resources for multiple uses while fulfilling its assigned missions in support of the Departments of Defense and Homeland Security; and*

Whereas, *Naval Support Activity Hampton Roads Northwest Annex celebrates Arbor Day with the planting of a tree; and*

Whereas, *trees reduce erosion, clean the air, produce oxygen, cut heating and cooling costs, and provide habitat for wildlife; and*

Whereas, *the personnel assigned to Naval Support Activity Hampton Roads Northwest Annex take great pride in their installation through participation in activities and programs designed to improve the appearance and the quality of life onboard Naval Support Activity Hampton Roads Northwest Annex; and*

Whereas, *Naval Support Activity Hampton Roads Northwest Annex takes pride in supporting various community environmental events and activities including Arbor Day, Earth Day, and National Public Lands Day; and*

Whereas, *I, Lieutenant Commander Lawrence B. McLin, Officer in Charge of Naval Support Activity Hampton Roads Northwest Annex, on behalf of the Installation Commanding Officer, Captain Michael H. Johansson, do hereby proclaim 24 April 2014 as,*

"The Annual Naval Support Activity Hampton Roads Northwest Annex Arbor Day Celebration"

In Witness Whereof, I sign this proclamation,

L. B. McL.

Lawrence B. McLin
Lieutenant Commander, U.S. Navy
Officer in Charge

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Enclosure 3. Pruning and Planting Guidelines

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TREE PRESERVATION AND REPLACEMENT ON INSTALLTION

1. Purpose

a. This policy establishes a program for forest conservation and tree protection during development or maintenance activities. The hierarchy for tree protection initiatives begins with preservation of existing trees wherever practical, and ends with planting replacement trees at specified ratios to compensate for unavoidable loss.

b. The policy parallels the intent of local ordinances. Local municipalities have determined that the planting and preservation of trees is not only desirable but essential to the present and future health, safety and welfare of all citizens.

2. Policy

a. It is the intent of this policy to prevent the unauthorized destruction or disfigurement of existing trees. It is further intended to perpetuate tree growth, to encourage tree preservation and to provide adequate tree canopy and numbers.

b. Where tree preservation is not practicable, replacement tree establishment is required. The determination of justified loss will be made in concert with the appropriate installation and or Regional Environmental Natural Resources Manager, who will also assist with preparation of tree inventories at potential development areas. Such inventories and determinations will be made during the preliminary siting phase of a project.

c. Where concurrence with the finding of justified loss is received from the Natural Resources personnel, it is the intent to require the replacement planting of trees as mitigation. Previously planted and approved tree mitigation banks may be acceptable as replacement. The overall goal is “no net loss” of trees or tree canopy cover.

d. Commercial forestry operations, conducted under an approved Integrated Natural Resources Management Plan or Forest Management Plan are exempt from the requirements of this instruction.

3. Application

a. The terms and provisions of this policy shall apply to:

(1) Development and expansion of existing facilities, including roadway, utilities and other infrastructure development.

(2) Negligent grounds maintenance activities.

b. Actions involving tree removal necessary to meet critical military mission requirements are excluded from this instruction. All such projects will be reviewed for compliance with this instruction by the appropriate installation Natural Resources Manager who may recommend tree protection measures, mitigation for lost trees or selection of alternative sites. Forest products will not be given away, abandoned, carelessly destroyed, used to offset costs of contracts or traded for products, supplies, or services. Natural Resources personnel will review contracts involving removal of significant amounts of timber to ensure these conditions are met.

c. Maintenance activities within NAVFAC P80.3 standards for the airfield clear zones or required for maintenance of ordnance areas, communication systems, security, or right-of-ways are also exempt from the requirements of this instruction.

d. Special accommodations may be made to support Morale, Welfare and Recreation operations and improvements to comply with professional recommendations for the program involved and to assist in furthering these programs at a minimal cost to station personnel.

4. Tree Preservation Plans and Tree Protection

a. Proponents of all projects and activities, which may affect existing trees, shall team with the Natural Resources Manager to identify all trees in the affected area and to develop a project/activity-specific tree preservation plan in accordance with this policy. All trees designated in the plan to be preserved shall be identified on all applicable project drawings, and also shall be marked in the field. Existing trees designated for retention shall be protected in accordance with Attachment A.

b. Certain trees and forests are considered priority areas for tree protection, and shall be left in an undisturbed condition unless no practicable alternative is identified by the Natural Resources Manager. The following areas are designated as priority areas for tree protection:

(1) Trees in wetlands, floodplains, Chesapeake Bay Protection Areas and designated drainage ditches or riparian buffers. Drainage ditch flow routes are exempt from these requirements in order to maintain design flow volumes.

(2) Contiguous forests - forested corridors that connect with other forested tracts.

(3) Critical habitat - protection areas for rare, threatened or endangered species.

(4) Historic trees - associated with historic sites.

(5) Specimen trees - trees 30 inches in diameter or larger, or trees with 75 percent or more of the diameter of the state champion tree.

5. Compensation for Unavoidable Losses

a. Due to the difficulty and time required to replace the function provided by mature trees, replacement ratios shall be based on the size of the individual trees scheduled for removal. In lieu of performing tree replacement activities, the project proponent may elect to fund the replacement.

b. The ratio for determining the number of required replacement trees shall be one replacement tree for every 6" increment in the dbh (diameter breast height) of the tree to be removed, with the replacement ratio to be rounded upwards to the next increment. A minimum 1:1 replacement ratio shall be accomplished. As an example, the following replacement ratios shall be implemented:

(1) Removal of 1" to 5.9" dbh tree: 1:1 replacement
(2) Removal of 6" to 11.9" dbh tree: 2:1 replacement
(3) Removal of 12" to 17.9" dbh tree: 3:1 replacement

c. Replacement tree species and planting locations must be approved by the installation Natural Resources Manager. Replacement planting shall be conducted in accordance with the requirements set forth in Attachment (D). The following guidelines shall be used in developing appropriate tree replacement procedures for each project:

(1) Size. At the time of planting, replacement trees shall be a minimum of two (2) inches caliper.

(2) Siting. Tree locations shall be based on sound urban forestry practices, and shall ensure adequate distance from buildings, sidewalks, roads, utilities, and other development to preclude the need for future tree removal. The location of replacement trees shall favor the benefits provided by trees in an urban setting, including noise attenuation, shading of cooling units and buildings, storm water management benefits, and sensible placement with respect to turf management areas.

(3) Reforestation. In instances where space or conditions at the project site are undesirable for tree replacement, the Natural Resources Manager will assist in identifying priority reforestation locations on installation. Priority planting areas include buffers for drainage ditches, corridors to connect existing forests, buffers

between differing land uses, plantings to achieve energy conservation and expansion of existing forests.

(4) Planting Seasons. Trees shall be planted during the proper planting season to benefit survival rates. For most shade tree species this is the dormant season or leaf-off period and runs from November through March, except when the ground is frozen.

6. Unauthorized Destruction of Trees

a. Instances where trees have been willfully damaged or are found in physically or structurally poor condition as a result of improper protection shall be adjudged as destruction of government property.

b. In instances where compensation for destruction cannot be agreed upon based on the replacement criteria outlined in Section 5 of this enclosure, the Natural Resources Manager may use procedures detailed by reference (m) to calculate tree value. The appraisal process includes valuation of the tree species, size, condition and location. Tree replacement and reimbursement will be the responsibility of the person or persons who caused the destruction.

ATTACHMENT A
TREE PROTECTION STANDARDS

1. Purpose. Proper tree protection during construction and grounds maintenance activities is essential to the long-term survival of trees in development areas.

2. Construction. Existing trees to be saved shall be protected by measures outlined in Attachment (B) to enclosure (1). In addition the following conditions apply:

a. An inventory and map of trees within the footprint of construction activity must be completed. This data should be used to minimize impacts from structures and improvements.

b. Whenever possible, protection areas should include groups rather than individual trees.

c. Excavating equipment should not be used to prune roots inside a protection area. Roots should be severed using a root pruner. If roots outside the tree protection area are encountered during construction, they should be severed using a sharp chansaw, axe or handsaw.

d. Tunneling of utilities should be utilities whenever possible to reduce damage to tree roots. If tunneling or altering the route of utilities is not possible, roots should be pruned with a root pruner.

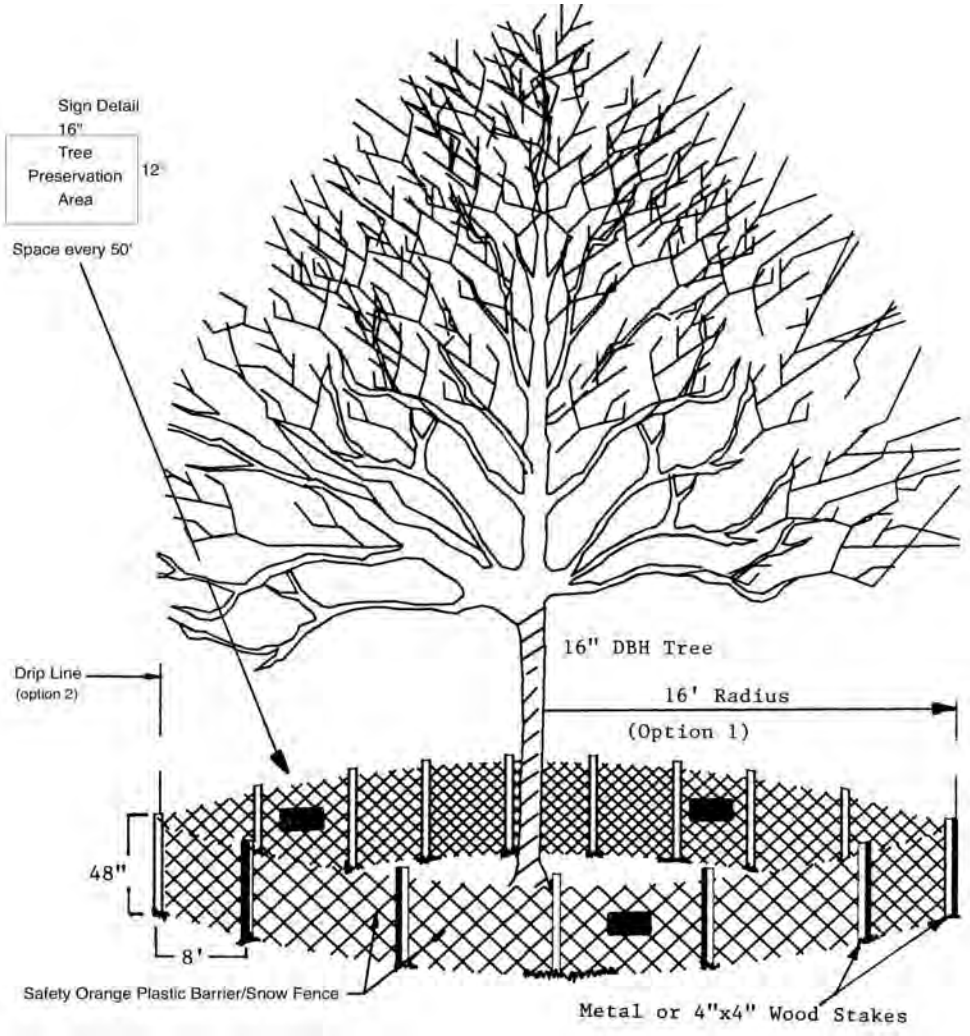
3. Grounds Maintenance. Grounds maintenance personnel shall be responsible for damage to trees and shrubbery in accordance with current grounds maintenance contract requirements. At a minimum, the following standards shall apply:

a. Contractors shall not subject trees, shrubs or hedges to damage by lawn mowers, string trimmers or other equipment. Damage includes wounds inflicted to bark, limbs or exposed roots.

b. Extreme care shall be exercised when performing grounds maintenance work around any of the defined priority areas for tree protection.

4. Tree planting and Care. All tree pruning shall be done in accordance with the information in Attachment (C) to enclosure (1). All tree plantings must be first approved by the installation Natural Resources Manager to ensure selection of proper species and siting. Planting of trees shall be done in accordance with procedures outlined in attachment (D) to enclosure (1). When determining planting locations, long-term survivability shall be considered based on sound forestry practices. Trees shall be planted in locations that favor the benefits of trees and to avoid future tree removal.

TREE PROTECTION DETAIL



1. Prior to any clearing, grading, or construction, tree protection fences (See Detail) shall be placed around all trees to be retained on the site to prevent the destruction or damaging of trees.

- Option 1. If site conditions permit, the radius of the tree protection fence shall be equal to 1 foot for every inch of tree diameter at breast height measured at four and a half (4½) feet above the surface of the ground.

- Option 2. If site conditions do not permit a fence system as large as described above then, the fence shall be located in a circular pattern with a radius equal to the length of the widest or longest branch, or drip line.

a. Fence material shall be made of polypropylene or similar plastic material, and the color shall be safety orange and shall not be less than 48 inches in height.

b. Metal fence stakes or 4-inch x 4-inch wood posts shall be used to erect the fence. Sufficient stakes shall be used to ensure that the fence material remains upright without sagging. Spacing between wood or metal stakes shall not exceed 8 feet.

c. Signs (16 inch x 12 inch) shall be spaced every 50 feet along the fence indicating the site is a tree preservation area.

2. Materials shall not be stockpiled within the tree protection area, and vehicles and other equipment shall be excluded to avoid soil compaction and root damage. Equipment operator shall not damage tree trunks, limbs and roots during clearing, grading or construction operations.

3. Protected trees shall be kept free of nails or other fastening devices, signs, survey makers, and electrical wires.

4. In cases where the construction drawings indicate that utilities, sidewalks or other structures enter the tree protection area, the following protection measures shall be implemented.

a. Minimize disturbance to the root area by adjusting the tree protection fence and staying as far away from the tree as possible. Disturbance shall be minimized within the critical zone, which are 3 to 10 feet from the tree trunk.

b. Place 16 to 20 inches of wood chips (from trees already removed) or bark mulch over the root zone to reduce soil compaction from equipment.

c. Bridge the root area with plates of steel supported on wood ties.

d. Spread a heavy plastic tarp over the roots prior to placing excavated material on the ground. The tarp will serve as a marker for equipment operators indicating the existing grade and roots systems as they place the spoil material back into the excavated trench.

e. Pump concrete through conveyor pipes instead of driving vehicles over the tree roots.

TREE PRUNING DETAIL

1. The Contractor shall contact the Natural Resources Manager prior to initiating pruning on the trees designated for protection. Additional pruning techniques may be provided.

2. All cuts shall be made as close as possible to the trunk or parent limb without cutting into the branch collar or leaving a protruding stub (see Figure 1). Bark at the edge of all pruning cuts shall remain firmly attached.

3. All branches too large to support with one hand shall be precut (see Figure 1) to avoid splitting or tearing the bark. Where necessary, ropes or other equipment shall be used to lower large branches or stubs to the ground.

4. Treatment of cuts and wounds with wound dressing or paint shall not permitted.

5. Equipment that will damage the bark or cambium layer shall not be used on or in the tree. The use of climbing spurs (hook, irons) shall not be permitted. Sharp tools shall be used so that clean cuts will be made at all times. Trucks and other support vehicles shall not be permitted inside the drip line of the tree canopy. Temporary removal of the tree protection fence shall be permitted to facilitate pruning, and removal of limbs and other woody material from under the drip line. The tree protection fence shall be erected immediately after pruning is complete.

6. All cut limbs and woody material shall be removed from the crown upon completion of pruning. All limbs, brush, leaves, and other woody material shall be removed from government property by the Contractor.

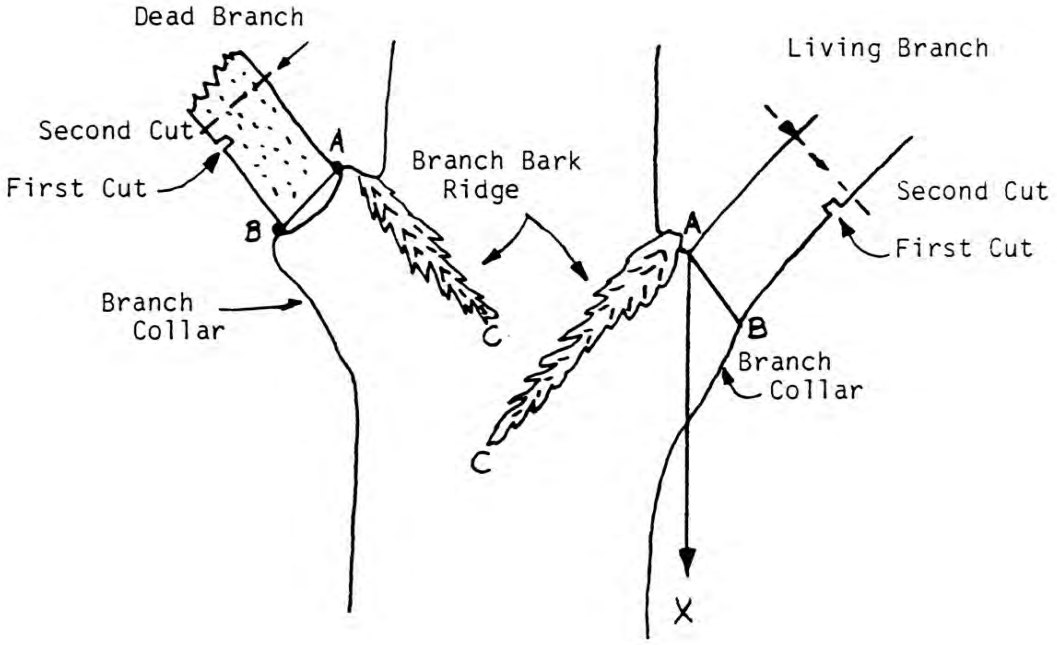
7. Pruning shall conform to the American National Standard for Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices, ANSI A300-1995 and International Society of Arboriculture Tree-Pruning Guidelines. Copies of both documents can be purchased by contacting the International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129, tel 217-355-9411 or http://www.isa-arbor.com.

8. All work performed shall adhere to the American National Standard for Tree Care Operations-Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush - Safety Requirements, ANSI Z133.1-1994. Contact the International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129, phone 217-355-9411, fax 217-355-9516, or web site www.isa-arbor.com to obtain a copy of ANSI Z133.1.

9. Tree maintenance contractors shall have an ISA Certified Arborist on-site during all tree maintenance operations.

TREE PRUNING DETAIL

1. Locate the branch ridge
2. Find target a – outside of branch bark ridge
3. Find target b – swelling where branch meets branch collar
4. If b is hard to find – drop a line at ax. angle xac = to angle xab
5. Stub branch to be pruned
6. Make cut at line AB



Do not

- Cut behind the branch bark ridge
- Leave stubs
- Cut branch collar
- Paint cuts
- Use dull tools
- Use climbing spurs

TREE PLANTING DETAIL

Remember: Select a Native Tree.

1. Growing Stock Inspection

a. All trees and shrubs shall meet the American Standard for Nursery Stock, ANSI Z60.1-1996. Contact the American Nursery & Landscape Association, 1250 I Street NW, Suite 500, Washington, DC 20005, tel 202-789-2900 or web site www.anla.org to obtain a copy of ANSI Z60.1-1996.

b. All trees shall be true to type or name as ordered or shown on the plans and shall be individually tagged or tagged in-groups by species and cultivar.

c. All trees shall be healthy, have a form typical for the species or cultivar, be well rooted, and stand upright without support. Tree size shall be not larger than 1-1/2" to 2" in caliper diameter.

d. All trees shall comply with federal and state laws requiring inspection for plant diseases and insect pest infestations.

e. The rootball of all trees shall be moist throughout and solid with little or no movement at the trunk. The crown shall show no signs of moisture stress. Check that the tree is free of girdling roots (roots that develop and grow across or around other roots), and free of knees (roots protruding above the soil). The roots should be abundant and white. Brown or black roots indicate a health problem.

f. Except for small-growing, multistemmed ornamentals, select trees that have a single, straight trunk and leader, and spreading branches. Reject trees with double leaders (codominant stems) or vigorous, upright branches competing with the leader. Radial and vertical distribution of branches shall form a symmetrical crown. Foliage should be evenly distributed on the upper 2/3 of the tree, and not concentrated at the top. The Government shall reject trees that have been severely pruned or headed back, with trunk injury, and without an abundance of healthy, green leaves.

2. Planting

a. Planting season is from November through March, except when the ground is frozen.

b. Site factors that influence long-term survivability must be considered: overhead and underground utilities, sidewalks, signage conflict, traffic visibility, light poles, etc. Utilities must be marked prior to excavation.

c. Balled and Burlapped (B&B) Stock: All synthetic or non-degradable material such as nylon rope or treated burlap must be

removed from the root ball prior to planting. All material including biodegradable material must be remove from the upper 1/3 of the root ball. Prevent remaining pieces from extending above the soil or they will act as wicks, drying the soil. Take extra care not to loosen or break the soil ball. If trees are planted

with wire baskets around the root ball, cut and remove the top two tiers of the wire after the ball is set in the hole.

d. Container Grown and Containerized Stock: Carefully remove the container at the planting site. Cutting the containers may be necessary. Remove all containers, including biodegradable paper-mache pots. Newly containerized stock may be only slightly rooted; the container must be removed with care so as not to disturb the root ball. In contrast, container grown stock may be rootbound. If roots are growing in a spiral around the soil ball, the plant is root bound. These roots need to be separated or they will eventually girdle the plant. Make vertical cuts on the sides of the ball just deep enough to cut the net of roots. Also, make a criss-cross cut across the bottom of the ball.

e. Mark out a planting area 3-5 times the diameter of the root ball. Use a rototiller or shovel to loosen and mix the soil in this entire area to a depth of 12 inches. Organic matter can be added to the loosened soil as long as the new material is used uniformly throughout the area. In the center of the prepared area, dig a hole as only as wide enough and deep enough to accept the root ball. The hole should allow the root ball to sit on solid ground rather than on loose soil. Once the ball is set in the hole, its upper surface should be level with or slightly above the surrounding ground.

f. Position the tree so that it is vertical and plumb to the ground and the main stem is growing straight up.

g. Backfill with soil from the planting site if the soil is not contaminated. Remove large rocks and construction debris from the soil. Amending the backfill soil with organic matter does not increase survival or growth of woody plants.

h. When the hole is half full, slowly water to saturate the soil, then continue to fill the hole. Settle the soil by watering or lightly tamping to ensure that all air pockets are eliminated. Do not pack the soil by using equipment or feet. Do not create an earthen berm around the tree.

i. Water thoroughly to remove air pockets, secure the soil around the roots, and provide nourishment.

j. Rake soil evenly around the entire planting area.

3. Mulching

a. Mulch an area at least 3 times the diameter of the root ball to a depth of 2-4 inches with wood chips, bark mulch, shredded leaves, or pine needles. Do not mound the mulch around the base of the tree.

4. Staking

a. Only stake the tree if it will not stand on its own, and use only one stake on the opposite side of the leaning tree. The stake is to be placed outside of the root ball.

b. Do not use wire even if the wire is in-cased by hose. Use a flexible tie attached to a single stake. Biodegradable material is recommended.

c. Do not wrap tree with protective tape. If tree arrives on the site with a protective tree wrap, remove it immediately after the tree is planted.

d. Remove stakes and ties after 1 year.

5. Pruning

a. At the time of planting dead, damaged and rubbing or cross branches can be removed.

b. Do not remove any other living branches. Do not apply any type of wound dressing.

c. Remove sucker sprouts from the base of the tree.

6. Watering

a. During the first growing season, irrigate the root ball with 5 gallons of water every three days after a rain event. Slow deep watering is recommended. Soil should be moistened to a depth of 12-18 inches. Water the soil within the root zone. Do not water the tree trunk.

7. Fertilizing

Fertilizer must be phosphorus free.

a. Use no fertilizer during the establishment period. The establishment period is about one year for every 1 inch of caliper. So, a 2-inch caliper tree would require two years to reestablish the top:root ratio.

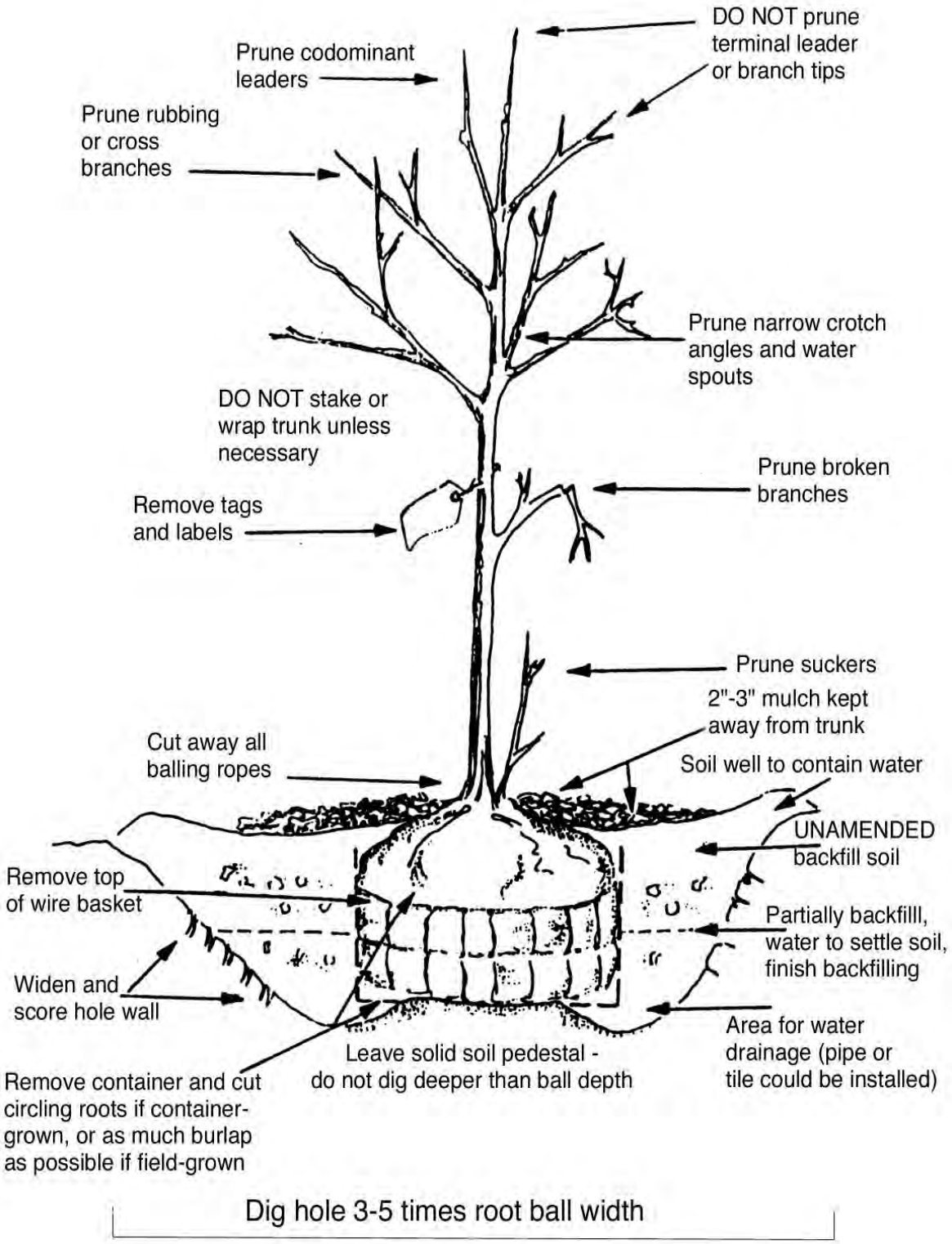
b. Once the trees are established, nitrogen fertilization should be applied at a rate of 2-lbs. N/1,000 square feet/year. Established, mature trees require minimal nitrogen, 1 lb. N/1,000 square feet/two to four years. All tree fertilizes must be slow or controlled release versus water-soluble.

c. Mature trees growing in fertilized turf should not be fertilized.

d. Apply fertilizers during October through April, except when the ground is frozen or covered with snow.

Reference: Principle and Practice of Planting Trees and Shrubs, 1997, Watson and Himelick, International Society of Arboriculture, PO Box 3129, Champaign, IL 61826-3129 or www.isa-arbor.com.

TREE PLANTING DETAIL



Pruning Trees

Pruning is the most common tree maintenance procedure. Although forest trees grow quite well with only nature's pruning, landscape trees require a higher level of care to maintain their safety and aesthetics. Pruning should be done with an understanding of how the tree responds to each cut. Improper pruning can cause damage that will last for the life of the tree, or worse, it will shorten the tree's life.

Reasons for Pruning

Since each cut has the potential to change the growth of the tree, no branch should be removed without a reason. Common reasons for pruning are to remove dead branches, to remove crowded or rubbing limbs, and to eliminate hazards. Trees may also be pruned to increase light and air penetration to the inside of the tree's crown or to the landscape below. In most cases, mature trees are pruned as a corrective or preventative measure.

When to Prune

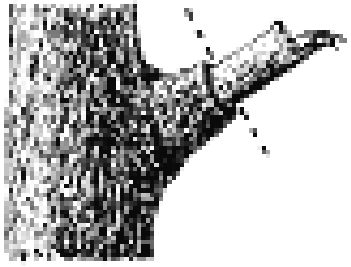
Most routine pruning to remove weak, diseased or dead limbs can be accomplished at any time during the year with little effect on the tree. As a rule, growth is maximized and wound closure is fastest if pruning takes place before the spring growth flush. Some trees, such as maples and birches, tend to "bleed" if pruned early in the spring. This may be unsightly, but is of little consequence to the tree.

A few tree diseases, such as oak wilt, can be spread when pruning wounds allow spores access into the tree. Susceptible trees should not be pruned during active transmission periods.

Heavy pruning just after the spring growth flush should be avoided. This is when trees have just expended a great deal of energy to produce foliage and early shoot growth. Removal of a large percentage of foliage at this time can stress the tree.

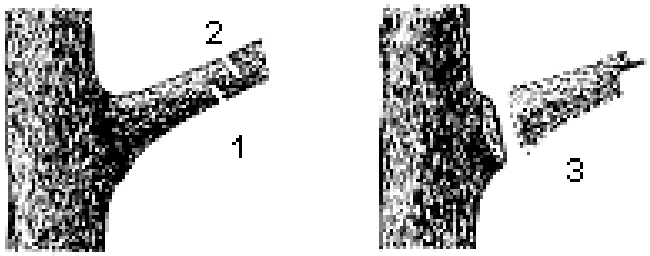
Making Proper Pruning Cuts to Mature Trees

Pruning cuts should be made just outside the branch collar. The branch collar contains trunk or parent branch tissue and should not be damaged or removed. If trunk collar has grown out on a dead limb to be removed, make the cut just beyond the collar. Do not cut the collar (see figure).



On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar.

If a large limb is to be removed, its weight should first be reduced. This is done by making an undercut about 12-18 inches from the limb's point of attachment. A second cut is made from the top, directly above or a few inches further out on the limb. This removes the limb leaving the 12-18 inch stub. The stub is removed by cutting back to the branch collar. This technique reduces the possibility of tearing the bark



Use the 3-cut method to remove a large limb.

How Much Should be Pruned?

The amount of live tissue that should be removed depends on the tree size, species, and age, as well as the pruning objectives. Younger trees will tolerate the removal of a higher percentage of living tissue than mature trees. A common mistake is to remove too much inner foliage and small branches. It is important to maintain an even distribution of foliage along large limbs and in the lower portion of the crown. A widely accepted rule of thumb is never to remove more than one fourth of a tree's leaf bearing crown. In a mature tree, pruning even that much could have negative effects. Removing even a single, large-diameter limb can create a wound that the tree may not be able to close. The older and larger a tree becomes, the less energy it has in reserve to close wounds and defend against decay or insect attack. The pruning of large, mature trees is usually limited to the removal of dead or potentially hazardous limbs.

Wound Dressings

Wound dressings were once thought to accelerate wound closure, protect against insects and diseases, and reduce decay. However, research has shown that dressings do not reduce decay or speed closure, and rarely prevent insect or disease infestations. Most experts recommend that wound dressings not be used. If a dressing must be used for cosmetic purposes, then only a thin coating of a non-toxic material should be applied.

Newly Planted Trees

Pruning of newly planted trees should be limited to corrective pruning. Remove torn or broken branches. Save other pruning measures for the second or third year. The belief that trees should be pruned when planted to compensate for root loss is misguided. Trees need their leaves and shoot tips to provide food and the substances, which stimulate new root production. Unpruned trees establish faster, with a stronger root system than trees pruned at the time of planting.

(From International Society Arboriculture at *http://www.isa-arbor.com/consumer/pruning.html*)

New Tree Planting

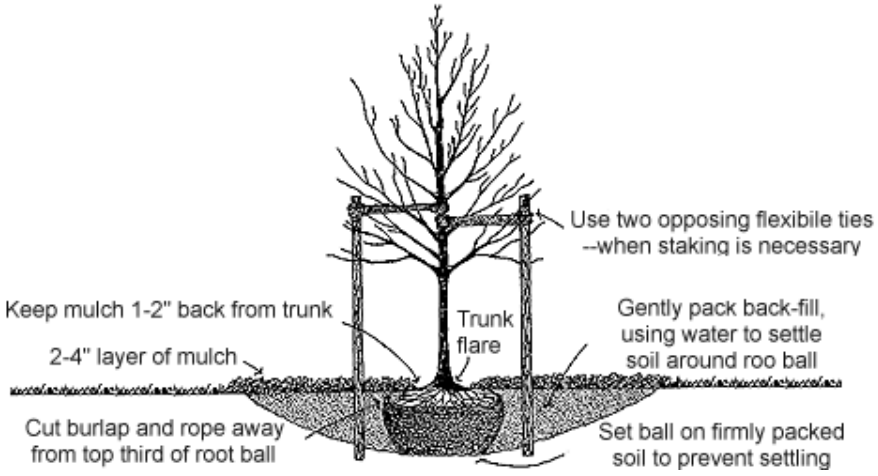
The ideal time to plant trees and shrubs is during the dormant season, in the fall after leafdrop or early spring before bud-break. Weather conditions are cool and allow plants to establish roots in the new location before spring rains and summer heat stimulate new top growth. However, trees properly cared for in the nursery or garden center, and given the appropriate care during transport to prevent damage, can be planted throughout the growing season. In either situation, proper handling during planting is essential to ensure a healthy future for new trees and shrubs. *Before you begin planting your tree, be sure you have had all underground utilities located prior to digging.*

If the tree you are planting is balled and burlapped, or bare rooted, it is important to understand that the tree's root system has been reduced by 90-95% of its original size during transplanting. As a result of the trauma caused by the digging process, trees will commonly exhibit what is known as **transplant shock.** Transplant shock is indicated by slow growth and reduced vigor following transplanting. Proper site preparation before and during planting, coupled with good follow up care will reduce the amount of time the plant experiences transplant shock and will allow the tree to quickly establish in its new location. Carefully follow eight simple steps and you can significantly reduce the stress placed on the plant at the time of planting.

1. **Dig a shallow, broad planting hole.** Make the hole wide, as much as three times the diameter of the root ball, but only as deep as the root ball. It is important to make the hole wide because the tree roots on the newly establishing tree must push through surrounding soil to establish. On most planting sites in new developments, the existing soils have been compacted and are unsuitable for healthy root growth. Breaking up the soil in a large area around the tree provides the newly emerging roots room to expand into loose soil to hasten establishment.

2. **Identify the trunk flare.** The trunk flare is where the roots spread at the base of the tree. This point should be partially visible after the tree has been planted (see diagram). If the trunk flare is not partially visible, you may have to remove some soil from the top of the root ball. Find it so you can determine how deep the hole needs to be for proper planting.

3. **Place the tree at the proper height.** Before placing the tree in the hole, check to see that the hole has been dug to the proper depth, and no more. The majority of the roots on the newly planted tree will develop in the top 12" of soil. If the tree is planted too deep, new roots will have difficulty developing due to a lack of oxygen. It is better to plant the tree a little high, 1-2" above the base of the trunk flare, than to plant it at or below the original growing level. This will allow for some settling (see diagram). To avoid damage when setting the tree in the hole, always lift the tree by the root ball, and never by the trunk.



4. **Straighten the tree in the hole.** Before you begin backfilling have someone view the tree from several directions to confirm the tree is straight. Once you begin backfilling it is difficult to reposition.

5. **Fill the hole, gently but firmly.** Fill the hole about 1/3 full and gently but firmly pack the soil around the base of the root ball. Then, if the tree is balled and burlapped, cut and remove the string and wire from around the trunk and top 1/3 of the root ball (see diagram). Be careful not to damage the trunk or roots in the process. Fill the remainder of the hole, taking care to firmly pack soil to eliminate air pockets that may cause roots to dry out. To avoid this problem, add the soil a few inches at a time and settle with water. Continue this process until the hole is filled and the tree is firmly planted. It is not recommended to apply fertilizer at the time of planting.

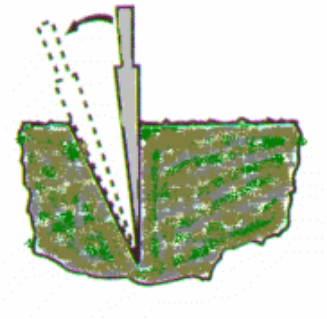
6. **Stake the tree, if necessary.** If the tree is grown and dug properly at the nursery, staking for support is not necessary in most home landscape situations. Studies have shown that trees will establish more quickly and develop stronger trunk and root systems if they are not staked at the time of planting. However, protective staking may be required on sites where lawn mower damage, vandalism or windy conditions are concerns. If staking is necessary for support, two stakes used in conjunction with a wide flexible tie material will hold the tree upright, provide flexibility, and minimize injury to the trunk (see diagram). Remove support staking and ties after the first year of growth. Leave protective staking in place as long as necessary.

7. **Mulch the base of the tree.** Mulch is simply organic matter applied to the area at the base of the tree. It acts as a blanket to hold moisture, protect against harsh soil temperatures, both hot and cold, and reduces competition from grass and weeds. Some good choices are leaf litter, pine straw, shredded bark, peat moss, or wood chips. A two to four inch layer is ideal. More that four inches may cause a problem with gas exchange. When placing mulch, care should be taken so that the actual trunk of the tree is not covered. This may cause decay of the living bark at the base of the tree. A mulch-free area, one to two inches wide at the base of the tree, is sufficient to avoid moist bark conditions and prevent decay.

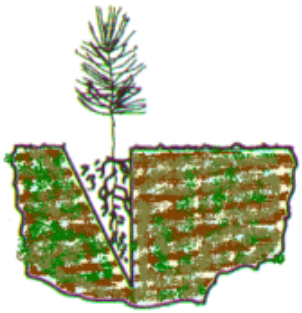
8. **Follow-up care.** Keep the soil moist but not soaked; overwatering will cause leaves to turn yellow or fall off. Water trees at least once a week, barring rain, and more frequently during hot weather. When the soil is dry below the surface of the mulch, it is time to water. Continue until mid-fall, tapering off for lower temperatures that require less frequent watering. Other follow-up care may include minor pruning of branches damaged during the planting process. Prune sparingly immediately after planting, and wait to begin necessary corrective pruning until after a full season of growth in the new location.

(Taken from the International Society of Arboriculture at http://www.isa-arbor.com/consumer/planting.htm)

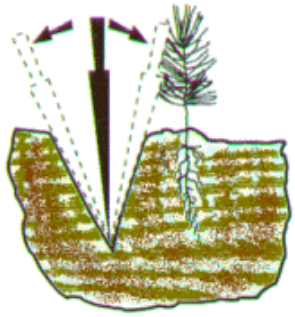
How to Plant with a Dibble Bar



1. Push the blade vertically into the soil then pull the handle toward you to open the hole.



2. Set the seedling 1 to 3 inches deeper than the nursery depth with the roots straight.



3. Push the blade into the soil just behind the planting hole then pull the handle back to close the bottom of the hole. Push the handle forward to close the top of the hole.

4. Pack the soil firmly with your heel.

(From South Carolina Forestry Commission at www.state.sc.us/forest/refplant.htm)

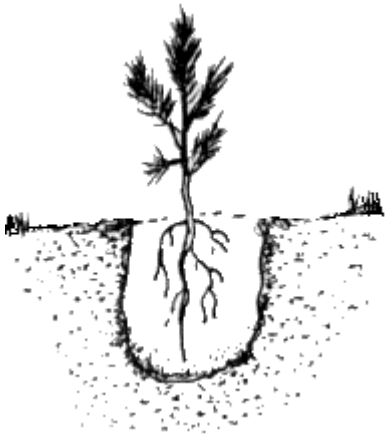
How to Plant Bare-root Trees

1. It is best to plant bare-root trees immediately, in order to keep the fragile roots from drying out. If you can't plant because of weather or soil conditions, store the trees in a cool place and keep the roots moist.

2. Unpack tree and soak in water 3 to 6 hours. Do not plant with packing materials attached to roots, and do not allow roots to dry out.

3. Dig a hole, wider than seems necessary, so the roots can spread without crowding. Remove any grass within a three-foot circular area. To aid root growth, turn soil in an area up to 3 feet in diameter.

4. Plant the tree at the same depth it stood in the nursery, without crowding the roots. Partially fill the hole, firming the soil around the lower roots. Do not add soil amendments.



5. Shovel in the remaining soil. It should be firmly, but not tightly packed with your heel. Construct a water-holding basin around the tree. Give the tree plenty of water.

6. After the water has soaked in, place a 2-inch deep protective mulch area 3 feet in diameter around the base of the tree (but not touching the trunk).

7. Water the tree generously every week or 10 days during the first year of establishment.

Recognizing Hazardous Trees

Hazardous Trees & Utility Lines. Trees that fall into utility lines have additional serious consequences. Not only can they injure people or property near the line, but hitting a line may cause power outages, surges, fires and other damage. Downed lines still conducting electricity are especially dangerous. A tree with a potential to fall into a utility line is a very serious situation.

Tree Hazard Checklist

Consider these questions . . .

1. Are there large dead branches in the tree?
2. Are there detached branches hanging in the tree?
3. Does the tree have cavities or rotten wood along the trunk or in major branches?
4. Are mushrooms present at the base of the tree?
5. Are there cracks or splits in the trunk or where branches are attached?
6. Have any branches fallen from the tree?
7. Have adjacent trees fallen over or died?
8. Has the trunk developed a strong lean?
9. Do many of the major branches arise from one point on the trunk?
10. Have the roots been broken off, injured or damaged by lowering the soil level, installing pavement, repairing sidewalks or digging trenches?
11. Has the site recently been changed by construction, raising the soil level or installing lawns?
12. Have the leaves prematurely developed an unusual color or size?
13. Have trees in adjacent wooded areas been removed?
14. Has the tree been topped or otherwise heavily pruned?

Managing Tree Hazards

One of these treatments may help make your tree safer. Reducing the risk associated with hazardous trees can take many forms.

1. **Prune the tree**. Remove the defective branches of the tree. Since in appropriate pruning may also weaken a tree,

2. **Provide routine care**. Mature trees need routine care in the form of water, fertilizer (in some cases), mulch and pruning as dictated by the season and their structure.

A number of treatments are best done by a Certified Arborist

1. **Cable and brace the tree.** Provide physical support for weak branches and stems to increase their strength and stability.

2. **Remove the tree.** Some hazardous trees are best removed. If possible, plant a new tree in an appropriate place as a replacement.

(From International Society of Arboriculture at *http://www.isa-arbor.com/consumer/hazards.html*)

Enclosure 3. Native Plants for Landscaping

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ABOUT THE NATIVE PLANTS FOR CONSERVATION, RESTORATION AND LANDSCAPING PROJECT

This project is a collaboration between the Virginia Department of Conservation and Recreation and the Virginia Native Plant Society. VNPS chapters across the state helped to fund the 2011 update to this brochure.

The following partners have provided valuable assistance throughout the life of this project:

The Nature Conservancy – Virginia Chapter • Virginia Tech Department of Horticulture • Virginia Department of Agriculture and Consumer Services • Virginia Department of Environmental Quality, Coastal Zone Management Program • Virginia Department of Forestry • Virginia Department of Game and Inland Fisheries • Virginia Department of Transportation

FOR MORE INFORMATION

Virginia Department of Conservation and Recreation
Natural Heritage Program
804-786-7951
www.dcr.virginia.gov/natural_heritage/nativeplants.shtml

FOR A LIST OF NURSERIES THAT PROPAGATE NATIVE SPECIES, CONTACT:

Virginia Native Plant Society
400 Blandy Farm Lane, Unit 2
Boyce, VA 22620
540-837-1600 | vnpsofc@shentel.net
www.vnps.org

FOR A LIST OF NURSERIES IN A PARTICULAR REGION OF VIRGINIA, CONTACT:

The Virginia Nursery and Landscape Association
383 Coal Hollow Road
Christiansburg, VA 24073
540-382-0943 | vnla@verizon.net
To search for species in VNLA member catalogs, visit:
www.vnla.org/search.asp

ILLUSTRATIONS COURTESY OF THE FLORA OF VIRGINIA PROJECT.

Illustrators: Lara Gastinger, Roy Fuller and Michael Terry. To learn more, visit:
www.floraofvirginia.org

DCR
Virginia Department of Conservation & Recreation

9/2011

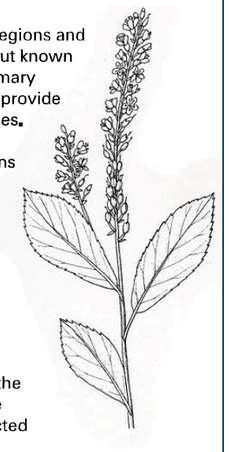
Native Plants

for Conservation, Restoration & Landscaping

Virginia Coastal Plain

WHAT ARE NATIVES?

Native species evolved within specific regions and dispersed throughout their range without known human involvement. They form the primary component of the living landscape and provide food and shelter for native animal species. Native plants co-evolved with native animals over many thousands to millions of years and have formed complex and interdependent relationships. Our native fauna depend on native flora to provide food and cover. Many animals require specific plants for their survival.



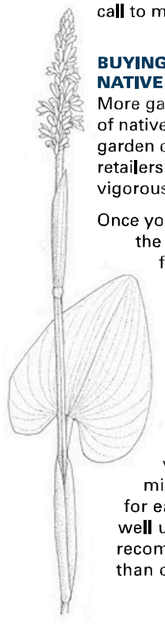
BENEFITS OF NATIVE PLANTS

Using native species in landscaping reduces the expense of maintaining cultivated landscapes and minimizes the likelihood of introducing new invasive species. It may provide a few unexpected benefits as well.

Native plants often require less water, fertilizer and pesticide, thus adding fewer chemicals to the landscape and maintaining water quality in nearby rivers and streams. Fewer inputs mean time and money saved for the gardener.

Native plants increase the presence of desirable wildlife, such as birds and butterflies, and provide sanctuaries for these animals as they journey between summer and winter habitats. The natural habitat you create with native plants can become an outdoor classroom for children, or a place for you to find peace and quiet after a busy day.

Native plants evoke a strong sense of place and regional character. For example, live oak and magnolia trees are strongly associated with the Deep South. Redwood trees characterize the Pacific Northwest. Saguaro cacti call to mind the deserts of the Southwest.



BUYING AND GROWING NATIVE PLANTS

More gardeners today are discovering the benefits of native plants and requesting them at their local garden centers. Because of this increased demand, retailers are offering an ever-widening selection of vigorous, nursery-propagated natives.

Once you've found a good vendor for native plants, the next step is choosing appropriate plants for a project. One of the greatest benefits of designing with native plants is their adaptation to local conditions. However, it is important to select plants with growth requirements that best match conditions in the area to be planted.

If you're planning a project using native plant species, use the list in this brochure to learn which plants grow in your region of Virginia. Next, study the minimum light and moisture requirements for each species, noting that some plants grow well under a variety of conditions. Many of the recommended species are well-suited to more than one of these categories.

For more information, refer to field guides and publications on local natural history for color, shape, height, bloom times and specific wildlife value of the plants that grow in your region. Visit a nearby park, natural area preserve, forest or wildlife management area to learn about common plant associations, spatial groupings and habitat conditions. For specific recommendations and advice about project design, consult a landscape or garden design specialist with experience in native plants.

WHAT ARE NON-NATIVE PLANTS?

Sometimes referred to as "exotic," "alien," or "non-indigenous," non-native plants are species introduced, intentionally or accidentally, into a new region by humans. Over time, many plants and animals have expanded their ranges slowly and without human assistance. As people began cultivating plants, they brought beneficial and favored species along when they moved into new regions or traded with people in distant lands. Humans thus became a new pathway, enabling many species to move into new locations.

WHAT ARE INVASIVE PLANTS?

Invasive plants are introduced species that cause health, economic or ecological damage in their new range. More than 30,000 species of plants have been introduced to the United States since the time of Columbus. Most were introduced intentionally, and many provide great benefits to society as agricultural crops and landscape ornamentals. Some were introduced accidentally, for example, in ship ballast, in packing material and as seed contaminants. Of these introduced species, fewer than 3,000 have naturalized and become established in the United States outside cultivation. Of the 3,500 plant species in Virginia, more than 800 have been introduced since the founding of Jamestown. The Virginia Department of Conservation and Recreation currently lists more than 100 of these species as invasive.

In the United States, invasive species cause an estimated $120 billion in annual economic losses, including costs to manage their effects. Annual costs and damages arising from invasive plants alone are estimated at $34 billion.

NATIVE PLANTS VS. INVASIVE PLANTS

Invasive plants have competitive advantages that allow them to disrupt native plant communities and the wildlife dependent on them. For example, kudzu (*Pueraria montana*) grows very rapidly and overtops forest canopy, thus shading other plant species from the sunlight necessary for their survival. A tall invasive wetland grass, common reed (*Phragmites australis ssp. australis*), invades and dominates marshes, reducing native plant diversity and sometimes eliminating virtually all other species.

Invasive species can marginalize or even cause the loss of native species. With their natural host plants gone, many insects disappear. And since insects are an essential part of the diet of many birds, the effects on the food web become far reaching. Habitats with a high occurrence of invasive plants become a kind of "green desert." Although green and healthy in appearance, far fewer native species of plants and animals are found in such radically altered places.

Virginia Coastal Plain

Virginia's Coastal Plain extends from the sands of Virginia Beach west to the fall line. Formed by marine sediments eroded from the Appalachian Highlands, the Coastal Plain varies in topography from north to south. In the north, the Northern Neck is somewhat hilly and well-drained. On the Middle Peninsula and Lower Peninsula, hills are less steep. South of the James River, the landscape levels off to about a 1-degree slope toward the ocean. In places, streams cut easily through the sands, gravels and clays to form well-developed ravine systems, and tidal rivers widen as the topography flattens. The Eastern Shore, separated from the mainland by the Chesapeake Bay, exhibits relatively little topography across the uplands extending from the Atlantic on the east to the bay on the west. From white sand beaches of the barrier islands, to tidal freshwater marshes, to blackwater swamps, to upland mixed hardwood and pine forests, the Coastal Plain has a diverse array of habitats for many native plant species.

Recommended Uses
W = Wildlife
H = Horticulture & landscaping
C = Conservation & restoration
D = Domestic livestock forage

Minimum Light Requirements
S = Shade
P = Partial sun
F = Full sun

Moisture Requirements
L = Low moisture
M = Moderate moisture
H = High moisture

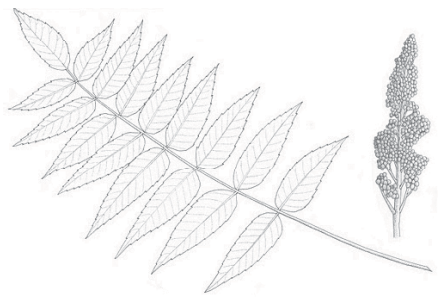
Some species are marked with the following footnote symbols:

\+ May be aggressive in a garden setting

* Due to the rarity and sensitivity of habitat in Virginia, these species are recommended for horticultural use only. Planting these species in natural areas could be detrimental to the survival of native populations.

Scientific Name	Common Name	Uses W	Uses H	Uses C	Uses D	Light S	Light P	Light F	Moisture L	Moisture M	Moisture H
Herbs											
Achillea millefolium	common yarrow		•				•	•	•		
Ageratina altissima	white snakeroot	•				•	•			•	
Amsonia tabernaemontana	blue star		•			•	•			•	•
Anemone quinquefolia	wood anemone		•			•	•	•		•	
Anemonella thalictroides	rue anemone		•			•				•	
Aquilegia canadensis	wild columbine	•	•				•	•	•	•	
Arisaema triphyllum	Jack-in-the-pulpit		•			•				•	
Aruncus dioicus	goatsbeard		•			•	•			•	
Asarum canadense+	wild ginger		•	•		•				•	
Asclepias incarnata	swamp milkweed	•	•	•			•	•			•
Asclepias syriaca+	common milkweed	•	•	•				•	•		
Asclepias tuberosa	butterfly weed	•	•	•				•	•		
Baptisia tinctoria	yellow wild-indigo	•	•				•	•	•		
Bidens cernua+	nodding beggar-ticks	•	•	•			•	•	•	•	•
Boltonia asteroides*	aster-like boltonia		•					•		•	
Caltha palustris	marsh marigold		•	•			•	•			•
Chamaecrista fasciculata+	partridge pea			•				•	•	•	
Chelone glabra	white turtlehead		•	•		•	•				•
Chrysogonum virginianum	green and gold		•	•		•				•	
Chrysopsis mariana	Maryland golden aster	•	•	•			•	•	•		
Cimicifuga racemosa	black cohosh		•			•	•			•	
Clitoria mariana	Maryland butterfly pea		•	•		•	•		•		
Conoclinium coelestinum	blue mistflower	•	•	•			•	•		•	
Coreopsis lanceolata	longstalk coreopsis	•	•						•		
Coreopsis tinctoria	golden tickseed	•	•				•	•		•	
Coreopsis tripteris	tall coreopsis		•	•			•	•		•	
Coreopsis verticillata	threadleaf coreopsis		•	•			•	•	•		
Desmodium paniculatum	narrow-leaf tick trefoil	•		•		•			•		
Equisetum hyemale	horsetail			•		•	•	•		•	•
Eupatoriadelphus fistulosus	Joe-pye weed	•	•	•			•	•		•	•
Eupatorium perfoliatum	common boneset			•			•	•		•	•
Helenium autumnale	sneezeweed	•	•	•			•	•		•	
Helianthus angustifolius	narrow-leaf sunflower	•	•	•			•	•		•	•
Helianthus decapetalus	ten-petaled sunflower	•	•	•			•	•		•	
Helianthus divaricatus	woodland sunflower	•	•	•			•		•		
Heliopsis helianthoides	oxeye sunflower	•	•	•			•	•	•	•	
Hepatica nobilis var. obtusa	round-lobed hepatica		•			•			•	•	
Heuchera americana	alumroot		•			•			•		
Hibiscus moscheutos	Eastern rosemallow	•	•	•				•			•
Iris prismatica	slender blueflag		•				•	•		•	•
Iris virginica	Virginia blue flag		•	•			•	•			•
Kosteletskya virginica	seashore mallow	•		•				•			•
Lespedeza capitata	round-head bush clover	•		•				•	•		
Liatris pilosa var. pilosa	grass-leaf blazing star	•	•	•			•	•	•	•	
Lilium superbum	Turk's cap lily		•				•	•		•	•
Lobelia cardinalis	cardinal flower	•	•	•			•	•			•
Lobelia siphilitica	great blue lobelia	•	•	•		•	•				•
Lupinus perennis	lupine		•				•	•	•		
Maianthemum racemosum	false Solomon's seal		•	•		•	•			•	
Mimulus ringens	monkeyflower		•	•				•			•
Monarda fistulosa	wild bergamot	•	•	•			•	•	•	•	
Monarda punctata	Horse-mint	•	•					•	•		
Nymphaea odorata	American water lily	•	•	•				•			•
Oenothera fruticosa	sundrops	•	•	•				•		•	•
Opuntia humifusa	Eastern prickly-pear	•	•	•				•	•		
Packera aurea+	golden ragwort	•		•		•	•			•	•
Peltandra virginica	arrow arum	•	•	•				•			•
Penstemon laevigatus	smooth beardtongue		•			•	•	•		•	
Phlox paniculata	summer phlox		•	•			•	•		•	
Podophyllum peltatum+	mayapple	•	•	•				•		•	
Polemonium reptans	Jacob's ladder		•			•	•			•	
Polygonatum biflorum	Solomon's seal		•			•	•		•	•	
Pontederia cordata	pickerel weed	•	•	•				•			•
Pycnanthemum incanum	hoary mountain mint	•		•		•			•		
Pycnanthemum tenuifolium	narrow-leaved mountain mint	•	•	•			•	•	•	•	
Rhexia virginica	Virginia meadow-beauty	•		•				•			•
Rudbeckia hirta	black eyed Susan		•	•			•	•	•	•	
Rudbeckia laciniata	cut-leaved coneflower	•	•	•			•	•		•	
Rudbeckia triloba	three-lobed coneflower	•	•	•			•	•		•	
Sagittaria latifolia	broadleaf arrowhead	•	•	•				•			•
Salvia lyrata+	lyre-leaf sage			•			•	•	•		
Sanguinaria canadensis	bloodroot		•			•				•	
Saururus cernuus	lizard's tail		•	•			•	•			•
Saxifraga virginiensis	early saxifrage		•			•	•	•	•	•	
Sedum ternatum	wild stonecrop		•			•	•			•	
Senna marilandica	Maryland wild senna		•	•			•		•	•	
Solidago caesia	bluestem goldenrod	•	•	•		•	•			•	
Solidago odora	sweet goldenrod	•	•	•			•	•	•		
Solidago pinetorum+	pineywoods goldenrod	•		•			•	•	•		
Solidago puberula	downy goldenrod	•	•	•				•	•		
Solidago rugosa+	rough-stemmed goldenrod	•		•			•	•		•	
Solidago sempervirens	seaside goldenrod	•	•	•			•	•		•	
Symphyotrichum concolor	Eastern silvery aster	•	•	•				•	•		
Symphyotrichum cordifolium	heart-leaved aster		•	•			•	•		•	
Symphyotrichum novi-belgii	New York aster	•	•	•			•	•		•	
Symphyotrichum pilosum	frost aster	•	•	•				•	•		
Tradescantia virginiana+	Virginia spiderwort		•	•		•	•	•		•	
Vernonia noveboracensis	New York ironweed	•	•	•			•	•			•
Viola cucullata	marsh blue violet	•	•	•			•	•			•
Viola pedata	bird's foot violet	•	•				•	•	•		
Yucca filamentosa	common yucca	•	•					•	•		
Zephyranthes atamasco	Atamasco lily		•	•			•	•		•	•
Ferns & Fern Allies											
Adiantum pedatum	maidenhair fern		•	•		•				•	
Asplenium platyneuron	ebony spleenwort		•			•	•			•	
Athyrium asplenioides	Southern ladyfern		•	•		•				•	•
Botrychium virginianum	rattlesnake fern		•			•	•		•	•	
Dennstaedtia punctilobula+	hay-scented fern			•			•	•	•	•	
Dryopteris intermedia	evergreen wood-fern		•	•		•	•		•	•	•
Onoclea sensibilis+	sensitive fern		•	•			•	•		•	•
Osmunda cinnamomea	cinnamon fern		•	•		•	•			•	•
Osmunda regalis	royal fern		•	•			•			•	•
Polystichum acrostichoides	Christmas fern		•	•		•				•	
Thelypteris palustris	marsh fern		•				•	•		•	•
Woodwardia virginica+	Virginia chain fern		•	•		•	•	•		•	•
Grasses, Sedges & Rushes											
Agrostis perennans	autumn bentgrass			•		•	•	•	•	•	•
Andropogon glomeratus	bushy bluestem		•	•			•	•		•	•
Andropogon virginicus	broomsedge		•	•			•	•	•	•	•
Arundinaria tecta	switch cane	•		•		•	•	•		•	•
Carex crinita	long hair sedge	•	•	•				•		•	•
Carex lurida	sallow sedge	•		•				•		•	•
Carex pensylvanica	Pennsylvania sedge	•		•		•	•	•	•	•	
Carex stricta	tussock sedge	•		•				•		•	•
Chasmanthium latifolium+	river oats, spanglegrass		•	•		•	•	•		•	
Danthonia sericea	silky oatgrass	•		•				•	•	•	
Danthonia spicata	poverty oatgrass	•		•		•	•	•	•	•	
Dichanthelium clandestinum	deer-tongue	•		•	•		•	•	•	•	•
Dichanthelium commutatum	variable panicgrass	•	•	•		•	•			•	•
Dulichium arundinaceum	dwarf bamboo	•		•	•			•			•
Elymus hystrix	bottlebrush grass	•	•			•	•	•	•	•	
Elymus virginicus	Virginia wild rye	•		•		•	•		•	•	
Juncus canadensis	Canada rush	•		•			•	•		•	•
Juncus effusus	soft rush	•		•			•	•		•	•
Leersia oryzoides	rice cutgrass	•		•			•	•		•	•
Panicum amarum	coastal panic grass	•	•	•				•	•		
Panicum virgatum	switch grass	•	•	•			•	•	•	•	•
Saccharum giganteum	giant plumegrass	•	•	•			•	•		•	•
Schizachyrium scoparium	little bluestem	•	•	•	•		•	•	•	•	
Scirpus cyperinus	woolgrass bulrush	•	•	•			•	•		•	•
Sorghastrum nutans	Indian grass	•	•	•	•		•	•	•	•	
Sparganium americanum	American bur-reed	•		•			•	•			•
Tridens flavus	redtop	•	•	•	•		•	•	•	•	
Tripsacum dactyloides	gama grass	•	•	•	•		•	•		•	•
Typha latifolia	broad-leaved cattail	•		•				•		•	•
Zizania aquatica	wild rice	•	•	•				•			•

Scientific Name	Common Name	Uses W	Uses H	Uses C	Uses D	Light S	Light P	Light F	Moisture L	Moisture M	Moisture H
Vines											
Bignonia capreolata	crossvine		•	•		•	•			•	•
Campsis radicans	trumpet creeper		•	•				•	•	•	
Celastrus scandens	climbing bittersweet		•	•		•	•	•		•	
Clematis virginiana	virgin's bower			•			•	•		•	
Decumaria barbara	climbing hydrangea			•	•	•	•			•	•
Gelsemium sempervirens	Carolina jasmine	•	•			•	•	•	•	•	•
Lonicera sempervirens	trumpet honeysuckle			•	•		•			•	
Parthenocissus quinquefolia	Virginia creeper	•	•	•			•	•		•	
Passiflora incarnata	Purple passionflower	•	•				•	•	•	•	
Wisteria frutescens	Atlantic wisteria		•				•	•		•	•
Shrub & Small Trees											
Alnus serrulata	hazel alder	•	•	•		•	•	•			•
Aronia arbutifolia	red chokeberry			•	•	•	•			•	•
Aronia melanocarpa	black chokeberry			•	•		•	•	•	•	•
Baccharis halimifolia	high tide bush			•	•			•	•	•	•
Callicarpa americana	American beautyberry	•	•			•	•			•	
Castanea pumila	Allegheny chinkapin	•	•	•		•	•	•	•		
Ceanothus americanus	New Jersey tea	•	•	•			•	•	•		
Cephalanthus occidentalis	buttonbush			•	•		•	•			•
Clethra alnifolia	sweet pepper-bush	•	•	•		•	•			•	•
Cornus amomum	silky dogwood	•		•		•	•			•	•
Crataegus crus-galli	cockspur hawthorn	•	•	•			•	•	•	•	
Eubotrys racemosa	fetterbush			•	•		•	•			•
Euonymus americanus	American strawberry-bush	•	•				•			•	
Gaultheria procumbens	wintergreen	•	•			•	•		•	•	
Gaylussacia baccata	black huckleberry	•	•	•		•	•			•	
Gaylussacia frondosa	dangleberry	•	•	•		•	•	•	•		
Hamamelis virginiana	witch hazel			•	•		•	•		•	•
Hydrangea arborescens	wild hydrangea			•			•	•			•
Ilex decidua	deciduous holly	•	•	•			•	•			•
Ilex glabra	inkberry	•	•	•			•	•		•	•
Ilex verticillata	winterberry	•	•	•				•	•		•
Ilex vomitoria	yaupon holly	•	•	•		•	•	•	•		
Itea virginica	Virginia willow	•	•	•		•	•				•
Iva frutescens	marsh elder			•				•	•	•	
Kalmia latifolia	mountain laurel	•	•	•		•	•			•	
Leucothoe axillaris	coastal dog-hobble			•		•				•	
Lindera benzoin	spicebush	•	•	•		•				•	
Lyonia lucida	shining fetterbush			•	•	•	•			•	
Morella caroliniensis	Southern bayberry	•	•	•		•	•		•	•	
Morella pensylvanica	Northern bayberry	•	•	•				•	•	•	•
Myrica cerifera	Southern wax myrtle	•	•	•		•	•			•	•
Rhododendron atlanticum	dwarf azalea	•	•				•			•	
Rhododendron periclymenoides	pinxter flower			•	•	•	•			•	•
Rhododendron viscosum	swamp azalea			•	•		•	•		•	•
Rhus copallinum	winged sumac	•	•	•		•	•		•		
Rosa carolina	pasture rose	•		•			•	•	•	•	
Salix humilis	prairie willow			•	•			•	•		
Salix sericea	silky willow			•	•		•	•		•	
Sambucus canadensis	common elderberry	•	•	•				•		•	•
Stewartia malacodendron*	silky camelia			•		•	•			•	
Vaccinium corymbosum	highbush blueberry	•	•	•		•	•	•	•	•	•
Vaccinium stamineum	deerberry	•					•			•	•
Viburnum dentatum	Southern arrow-wood viburnum	•	•	•			•	•	•	•	
Viburnum nudum	possum-haw viburnum			•	•	•	•				•
Viburnum prunifolium	black-haw viburnum	•	•	•			•	•		•	
Medium Trees											
Amelanchier arborea	downy serviceberry	•	•	•			•	•		•	
Amelanchier canadensis	Canada serviceberry	•	•	•				•		•	•
Aralia spinosa	devil's walkingstick	•	•				•			•	
Asimina triloba	paw paw	•	•	•		•	•			•	
Carpinus caroliniana	American hornbeam	•	•				•	•		•	
Cercis canadensis	Eastern redbud		•	•		•	•			•	
Chionanthus virginicus	fringetree		•				•	•		•	
Cornus florida	flowering dogwood	•	•	•		•	•		•	•	
Crataegus viridis	green hawthorn	•	•	•			•	•		•	•
Ilex opaca	American holly	•	•	•		•				•	
Magnolia virginiana	sweetbay magnolia		•	•		•	•			•	•
Morus rubra	red mulberry	•	•	•		•	•			•	
Ostrya virginiana	Eastern hop-hornbeam		•			•	•			•	
Persea borbonia	redbay		•	•		•	•			•	•
Prunus americana	American wild plum		•	•			•			•	
Rhus glabra	smooth sumac	•	•	•				•	•	•	
Rhus typhina	staghorn sumac	•	•	•				•	•		
Salix nigra	black willow			•			•	•		•	•
Viburnum rufidulum	rusty blackhaw	•	•				•			•	
Large Trees											
Acer negundo	ash-leaf maple	•	•					•		•	
Acer rubrum	red maple		•	•				•		•	•
Betula nigra	river birch	•	•	•				•		•	•
Carya cordiformis	bitternut hickory	•					•	•		•	•
Carya glabra	pignut hickory	•	•	•			•	•	•		
Carya ovata	shagbark hickory			•				•		•	
Carya tomentosa	mockernut hickory			•			•	•		•	•
Chamaecyparis thyoides*	Atlantic white cedar	•	•				•	•		•	•
Diospyros virginiana	persimmon	•	•	•			•	•	•	•	
Fagus grandifolia	American beech	•	•				•	•	•		
Fraxinus americana	white ash	•	•					•		•	
Fraxinus pensylvanica	green ash	•	•	•				•		•	
Juglans nigra	black walnut	•		•				•		•	
Juniperus virginiana	Eastern red cedar	•	•					•	•	•	
Liquidambar styraciflua	sweetgum			•	•		•	•		•	•
Liriodendron tulipifera	tulip poplar	•	•	•				•		•	
Nyssa aquatica	water tupelo	•	•	•				•	•	•	
Nyssa sylvatica	black gum	•	•	•				•	•	•	
Oxydendrum arboreum	sourwood			•				•		•	
Pinus echinata	shortleaf pine			•				•	•	•	
Pinus serotina	pond pine	•	•	•				•		•	•
Pinus strobus	white pine			•				•	•	•	
Pinus taeda	loblolly pine	•	•	•				•	•		•
Pinus virginiana	Virginia pine			•				•	•		
Platanus occidentalis	sycamore			•				•		•	•
Prunus serotina	wild black cherry	•		•				•	•		
Quercus alba	white oak	•	•	•				•	•		
Quercus bicolor	swamp white oak	•		•			•	•			•
Quercus coccinea	scarlet oak	•	•					•	•		
Quercus falcata	Southern red oak	•	•	•			•	•		•	
Quercus laurifolia	swamp laurel oak	•		•				•		•	•
Quercus michauxii	swamp chestnut oak	•	•					•			•
Quercus muehlenbergii	chinkapin oak	•						•	•		
Quercus nigra	water oak	•		•			•	•		•	
Quercus palustris	pin oak	•	•	•			•	•			•
Quercus phellos	willow oak	•	•	•				•		•	•
Quercus prinus	chestnut oak	•		•			•	•		•	
Quercus rubra	Northern red oak	•	•	•				•	•	•	
Quercus stellata	post oak	•	•	•				•	•		
Quercus velutina	black oak	•		•			•	•		•	
Quercus virginiana	live oak	•	•					•		•	
Robinia pseudoacacia	black locust			•				•			•
Sassafras albidum	sassafras			•				•	•	•	
Taxodium distichum	bald cypress		•	•				•			•
Tilia americana	American basswood			•			•			•	



Enclosure 4. D-Sized Map of NSAHR NWA

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NSA-NW Forest Stands

NSA-NW Boundary

Roads

Forest Stands

Map Label = Compartment Number - Stand Number/Forest Type- Size Class

Forest Type Codes

P	Pine > 75% Pine
PH	Pine-Hardwood 50-75% Pine
HP	Harwood-Pine 25-50% Pine
H	Hardwood 25% Pine

Size Class Codes

1	Seedling/Sapling < 6" DBH
2	Pulpwood > 6" DBH
3	Chip'N Saw 10" -12" DBH
4	Sawtimber > 14" DBH

N

W E

S

US SP, NAD 83, Virginia South USFT

0 1,000 2,000 3,000 Feet

0 250 500 750 Meters

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Enclosure 5. NAS Oceana Instruction 5090.2E (Procedures for Cutting Firewood and Use of Tree Products)

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40N
File

DEPARTMENT OF THE NAVY

NAVAL SECURITY GROUP ACTIVITY
NORTHWEST
CHESAPEAKE, VIRGINIA 23322

NSGANWINST 11015.1
40
09 SEP 1990

NAVSECGRUACT NORTHWEST INSTRUCTION 11015.1

From: Commanding Officer, Naval Security Group Activity Northwest

Subj: FIREWOOD CUTTING/REMOVAL

Ref: (a) NAVFAC P-73, Volume II, Chapter 3
(b) DOD Dir 4700.4 (Natural Resources Management Program)
(c) DOD Inst 7310.5 (Accounting for Production and Sale of Forest Products)

Encl: (1) Firewood Cutting Permit
(2) Firewood Pricing Structure
(3) Firewood Harvesting Instructions
(4) Firewood Cutting Areas Map

1. Purpose. To establish regulations and policy relative to firewood cutting/removal on board Naval Security Group Activity Northwest.

2. Cancellation. NSGANWINST 10320.1A

3. Revision markings. This instruction represents a major revision to the previous guidance and should be reviewed in its entirety. Revision markings have not been incorporated.

4. Background

a. In accordance with references (a) and (b), all naval installations having land areas with a potential for timber production shall have an active, progressive program for the conservation and management of their forest resources. Reference (c) further requires activities to charge a reasonable fee for the fair market value of their forest products. In accordance with references (a) and (c), proceeds collected from the sale of firewood will be deposited into the Navy forestry account. Firewood is defined as all timber marked by the Command Natural Resources Specialist for firewood removal, and any scrap lumber/wood found in the scrap lumber/brush pile. All firewood removed shall be for the personal use of the permittee and may not be resold. Firewood cutting will be authorized only when deemed compatible with other installation activities.

b. Authorized Personnel. The following personnel are authorized to cut firewood:

(1) Active and retired military personnel

(2) DOD civilian employees

(3) Other civilians approved by the Commanding Officer and/or the Natural Resources Specialist.

5. Action

a. Authorized personnel shall:

(1) Obtain a Firewood Cutting Permit (enclosure (1)), which will be sold during normal working hours on a cash or personal check basis at the Natural Resources Specialist Office located in Building #8. Regular permit fees will be charged as listed in the Firewood Pricing Structure (enclosure (2)). This pricing scale may be adjusted annually to reflect changes in the current market value of firewood. Permits will be issued for a specific area and cutting time period, and will be issued on a first come, first served basis.

(2) Display the firewood cutting permit on the vehicle dashboard during firewood collection.

(3) Comply with the conditions of the permit and the Firewood Harvesting Instructions (enclosure (3)) provided by the Natural Resources Specialist.

(4) Upon departure from the base with a load of firewood, deposit the permit with the gate guard who will inspect the wood for compliance with the permit.

b. The Natural Resources Specialist shall:

(1) Administer the firewood cutting program.

(2) Identify and mark appropriate firewood cutting areas, and update the Firewood Cutting Areas Map (enclosure (4)) as necessary.

(3) Determine the number of permits to be issued for each cutting area and cutting time period.

(4) Issue all firewood cutting permits and collect the appropriate fees.

(5) Review/update the Firewood Pricing Structure (enclosure (2)) annually to reflect current market values of firewood.

(6) Review/update the Firewood Harvesting Instructions (enclosure (3)) annually to reflect changes in harvesting techniques and policies.

(7) Issue permits for special firewood areas which may vary from the above mentioned prices or conditions when appropriate.

(8) Suspend cutting operations whenever necessary for the safety of individuals or the protection of natural resources.

c. Gate Guards shall:

(1) Collect firewood cutting permits from individuals leaving the station with a load of firewood.

(2) Inspect all loads of wood leaving the base for compliance with the conditions of the firewood cutting permit.

(3) Forward collected permits to the Natural Resource Specialist daily.

J. H. ROSER

Distribution:
NSGANW List A

NSGANWINST 11015.1
09 SEP 1990

Naval Security Group Activity
Northwest
Chesapeake, VA 23322

FIREWOOD CUTTING PERMIT

Permit No._____

Name (print): _____ _____

Address: _____

Vehicle description (type/make/model): _____

Vehicle Registration: State _____License # _____DOD Decal # _____

Fee Paid: $_____ Firewood Cutting Area: _____

Cutting period: From _____To _____

Hours of Cutting: From _____To _____ MONDAY - FRIDAY
SATURDAY & SUNDAY

Special Conditions: _____

_____

_____

_____

_____ _____
Issuing Official Date

Instructions: Display this permit on the vehicle dashboard. Upon leaving the station with a load of wood, deposit this permit with the duty gate guard.

THINK SAFETY!

I agree to hold harmless the United States Government and its employees for any damage or injury to property or persons which is incurred in the use of this permit. I have read and understand the provisions of NSGANWINST 11015.1. I am aware that a violation of the above instruction may result in the revocation of my permit and civil prosecution.

_____ _____
Signature Date

NSGANWINST 11015.1
09 SEP 1990

1990 FIREWOOD PRICING STRUCTURE

Station Wagons:	(all enclosed vehicles such as station wagons, sedans, mini-vans, Blazer, Bronco, Jeep, Suburban)	$ 10.00/load
Small Pickup Trucks:	(small pickup trucks such as Toyota, Nissan, Datsun, Mazda, Chevy S-10, Ford Ranger, Dodge Dakota)	$ 15.00/load
Standard Pickup Trucks:	(standard pickup trucks such as Ford F series, Chevy C/K series, Dodge Ram, GMC)	$ 20.00/load
Pickups with dual rear tires:		$ 25.00/load
Flat bed trucks and trailers:	(will be measured for cubic foot volume and wood sold at $ 45.00/cord. One cord equals 128 cubic feet)	$ 45.00/cord

Encl (2)

FIREWOOD HARVESTING INSTRUCTIONS

1. Access. Vehicles are permitted to enter only the woodland area designated for cutting. Vehicles may not enter other woodland areas, forest access roads, logging roads, firebreaks or other unauthorized areas.

2. Harvesting

a. Unless otherwise specified on the permit, only trees within the designated cutting area that have been marked with a spot of paint at eye and ground levels may be taken. The cutting area boundary will be identified by two parallel lines painted diagonally on trees. These marked boundary trees and all other unmarked trees, both standing and on the ground, may not be cut or damaged.

b. No "dead timber", both standing and on the ground, may be cut or damaged unless specified on the permit.

c. No tree shall be left hanging up in another tree.

d. Tree stumps shall be left no higher than one foot.

e. All tree tops and limbs shall be cut to within two feet of the ground and piled at least 20 feet away from any road or firebreak.

f. All brush shall be removed from any stream, ditch or standing body of water.

3. Recommended safety precautions

a. Know and follow all chainsaw manufacturers safety and operating precautions.

b. Alert personnel in the immediate vicinity before felling a tree.

c. Wear snug fitting clothing, gloves and heavy boots.

d. Wear eye and ear protective devices.

e. Avoid kick-back. Never cut with the nose of the chainsaw guidebar.

f. Avoid over-reaching and cutting above shoulder height.

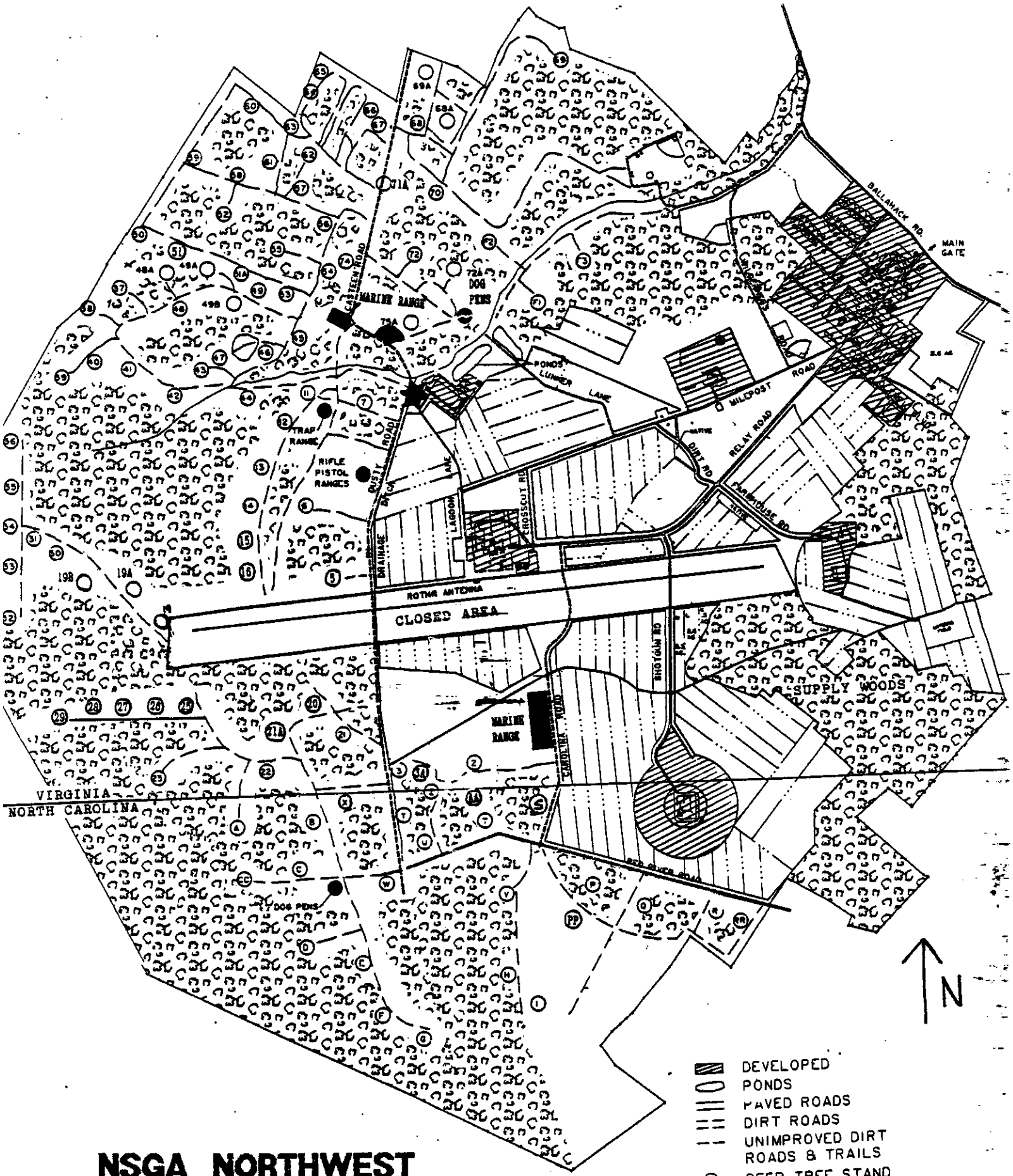
g. Have liquids on hand to prevent dehydration in both hot and cold weather.

h. Use a sharp chain set at the proper tension.

i. Stand clear of the cutting path of the chain saw.

4. Violations. Individuals found violating any provision of this instruction may have their firewood cutting privileges suspended or revoked and may be subject to civil prosecution.

5. Resource conservation. Proper conservation of natural resources shall be observed at all times. Unmarked trees shall be protected; wildlife shall not be harmed or harassed; ground disturbance shall be kept to a minimum to avoid soil erosion; and streams and ditches shall not be blocked or polluted. Littering will absolutely not be tolerated.



NSGA NORTHWEST NATURAL RESOURCES

Enclosure 6. Forestry Work Plan

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Forest Management Plan

Naval Support Activity Hampton Roads Northwest Annex

Chesapeake, Virginia
and
Currituck County, North Carolina

Final

November 2019

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Forest Management Plan

Naval Support Activity Hampton Roads Northwest Annex
Chesapeake, Virginia
and
Currituck County, North Carolina

November 2019

NAVFAC Atlantic Biological Resource Services
Contract N62470-13-D-8017, Task Order 6209

Prepared for
NAVFAC Mid-Atlantic
Navy Region Mid-Atlantic
PWD Naval Support Activity Hampton Roads

and

Naval Support Activity Hampton Roads
Northwest Annex

Prepared by

Versar, Inc.
Newport News, Virginia

Recommended Citation:
U.S. Navy. 2019. Forest Management Plan, Naval Support Activity Hampton Roads Northwest Annex. Contract N62470-13-D-8017, Task Order 6209. Prepared for NAVFAC Mid-Atlantic by Versar, Inc. Newport News, Virginia.

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ACRONYMS AND ABBREVIATIONS

BA	Basal Area
BMPs	Best Management Practices
CATEX	Categorical Exclusion
CWA	Clean Water Act
DoD	Department of Defense
EA	Environmental Assessment
Ft^2	Square Feet
FY	Fiscal Year
HQ	Headquarters
INRMP	Integrated Natural Resources Management Plan
MOA	Memoranda of Agreement
NAVFAC	Naval Facilities Engineering Command
Navy	United States Navy
NCFS	North Carolina Forest Service
NEPA	National Environmental Policy Act
NSAHR NWA	Naval Support Activity Hampton Roads Northwest Annex
OPNAV-M	Chief of Naval Operations Manual
TPA	Trees Per Acre
USC	U.S. Code of Federal Regulations
USFS	U.S. Forest Service
VDCR	Virginia Department of Conservation and Recreation
VDOF	Virginia Department of Forestry

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1 INTRODUCTION

1.1 Purpose

Forest management is an integral part of natural resources planning and is a required component of natural resources management on Naval Support Activity Hampton Roads Northwest Annex (NSAHR NWA). A forest inventory was conducted in 2014 (Department of the Navy [Navy] 2014) under a previous task order (N62470-13-D-8017, TO 0002) as an update to a 1998 forest inventory (Navy 1998). These inventories provide valuable information regarding the condition, health, and productivity as well as physical characteristics including forest type, age, height, and size class, and were used to determine stand densities, basal areas, timber volumes, and other forest characteristics at NSAHR NWA. The 2014 forest inventory is included in the NSAHR NWA Integrated Natural Resources Management Plan (INRMP), Appendix E.

Under the current task order (N62470-13-D-8017, TO 6209) Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic contracted Versar, Inc. to develop a forest management plan based on the 2014 forest inventory data. This forest management plan has been developed as a component of the NSAHR NWA INRMP (Navy 2016) and will be added as an appendix for the next INRMP update and therefore does not extensively reiterate background information and forest descriptions summarized in the INRMP or forest summary data provided in the 2014 NSAHR NWA forest inventory (Navy 2014). This plan does provide:

1. a brief overview of forest composition and changes from earlier inventories
2. forest management objectives and strategies designed to meet Navy mission and stewardship requirements and fulfill management objectives specified in the installation INRMP,
3. recommended stand prescriptions and treatment schedule for an approximate 10-year time period, and
4. potential long-term forest management prescriptions based on current forest conditions and management objectives for each of the installation's 90 forest stands.

1.2 Authority

Environmental laws and regulations including the National Defense Natural Resources Management Program (32 U.S. Code of Federal Regulations Part 190 [USC]) and the Sikes Act (16 USC§670 et seq.), require an INRMP be developed for all military installations with significant natural resources and that forest management be provided for in the INRMP to the extent appropriate and applicable.

1.3 Policy

Department of Defense (DoD) and Navy policies on natural resources management are outlined in the DoD Manual 4715.03 – Integrated Natural Resources Implementation Manual and Chief of Naval Operations Manual (OPNAV-M) 5090.1 – Environmental Readiness Program Manual. A

key policy that applies to all aspects of the DoD natural resources program is to implement ecosystem-base management that maintains and improves the sustainability of native ecosystems, while supporting sustainable human activities, within the constraints of mission requirements.

It is Navy policy to manage forestlands by restoration, enhancement, and improvement of forest resources and related ecosystems through an active program of professional forest management, in a multi-disciplinary, ecologically sound manner. Navy forest management must include silvicultural treatments that foster forest health and vigor, structural and biological diversity, and regeneration. Such management actions must produce financial returns to the government, contribute commercial forest products to the economy, and maintain and improve the economic and ecological value, health, and diversity of the forest resources and related ecosystems (OPNAV-M 5090.1).

Navy policy further requires that Navy natural resources conservation programs ensure sustainable multipurpose use of the resources (OPNAV-M 5090.1). Multiple uses of the forest lands at NSAHR NWA include providing for:

- Military training activities such as land navigation and physical training,
- Outdoor recreational opportunities for the military community and installation personnel and their dependents,
- Wildlife habitat including a full suite of native birds, mammals, herpetofauna, and invertebrates,
- Habitat protection for special status plant and animal species,
- Ecosystem services such as flood regulation, water quality protection, and climate change abatement, and
- The production and sale of commercial forest products.

Any forest management action must contribute to the overall goals and objectives of natural resources management without degrading the long-term diversity and sustainability of the forest ecosystem. Navy policy also states that clearcutting should to be limited to where essential to meet specific forest plan objectives, as defined in the installation INRMP, or for cleanup after natural catastrophes such as hurricanes, tornadoes, and wildfires and that it is Navy policy to maintain old-growth forests in their natural state to preserve their unique biological, scientific, and aesthetic benefits (OPNAV-M 5090.1).

2 FOREST DESCRIPTION

2.1 Forest History and Stand Overview

Detailed descriptions of the forests at NSAHR NWA can be found in the installation INRMP and 2014 forest inventory report. Summary tables including trees per acre, basal area, average height, and timber volume and value are presented in the 2014 forest inventory report and its appendices. The following brief overview of NSAHR NWA forest resources, derived from historic and current forest inventories, is included to provide background information and a basis for understanding the recommended forest management prescriptions provided in this management plan.

Prior to Navy acquisition in the 1950s, portions of the land that now comprises NSAHR NWA had been drained and farmed, whereas other areas had been sporadically harvested (Navy 1988). Over time, much of the farmland converted to loblolly pine (*Pinus taeda*) and other early successional species such as sweetgum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*). The primary area dominated by hardwood forests was an extensive area of the Dismal Swamp on the western side of the base plus a few remnant unharvested stands adjacent to Mill Creek. A forest inventory conducted during the 1980s, indicated approximately 36 percent of the forest was pure pine, 25 percent was pine-hardwood, and 39 percent was hardwood (Navy 1988).

In the 1998 forest inventory report, it was noted that much of the forest resource was transitioning to hardwood from the early domination by loblolly pine (Navy 1998) and 32 percent was pure pine, 16 percent was pine-hardwood, and 52 percent of the forest was hardwood and hardwood-pine mix at that time. In the absence of active forest management or natural disturbances, this transition was expected as species more tolerant of shade than loblolly pine became established in the understory and gradually increased in volume and importance in the stands.

NSAHR NWA stands have continued a transition to a greater component of hardwood mixed with loblolly pine and in the 2014 inventory, only 10 percent of the acreage was pure loblolly pine, 27 percent was mixed pine-hardwood, and 63 percent of the acreage was hardwood and hardwood-pine mix (**Figure 2-1**). Stands are also maturing as only 31 percent of the stands were in sawtimber in the 1980s, which increased to 70 percent in 1998, and to 94 percent in 2014.

Today, most of the mature pine stands have dense sweetgum and maple in the understories with lesser amounts of oaks and tuliptree (*Liriodendron tulipifera*). Hardwood stands in the Dismal Swamp portion of the base are more diverse and include numerous oaks such as southern red oak (*Quercus falcata*), swamp chestnut oak (*Q. michauxii*), cherrybark oak (*Q. pagoda*), laurel oak (*Q. laurifolia*), willow oak (*Q. phellos*), and water oak (*Q. nigra*). Other hardwoods include tuliptree, American beech (*Fagus grandifolia*), hickories (*Carya* spp.), elms (*Ulmus americana* and *U. rubra*), blackgum and swamp tupelo (*Nyssa sylvatica* and *S. biflora*), American holly (*Ilex opaca*), musclewood (*Carpinus caroliniana*), and others (Navy 2019).

NSAHR NWA also has a significant component of forests dominated by natural bald cypress (*Taxodium distichum*) swamps. Bald cypress occurs in stands 22, 29, 30, and 32, which are in the

southwestern portion of the base. Atlantic white cedar (*Chamaecyparis thyoides*) was documented in three forest stands (32, 38, and 50) in 1998, but was not recorded in 2014.

2.2 Current Stand Summary

The 2014 forest inventory resulted in 90 stands at NSAHR NWA totaling 1,989 acres (**Figure 2-2**). Forest type was determined using the relative percentage of stand-average per-acre total pine and hardwood basal area where:

Forest Type	Description
H	Hardwood (>75 percent total hardwood basal area)
HP	Hardwood/Pine (50-75 percent total hardwood basal area)
PH	Pine/Hardwood (50-75 percent total pine basal area)
P	Pine (>75 percent total pine basal area)

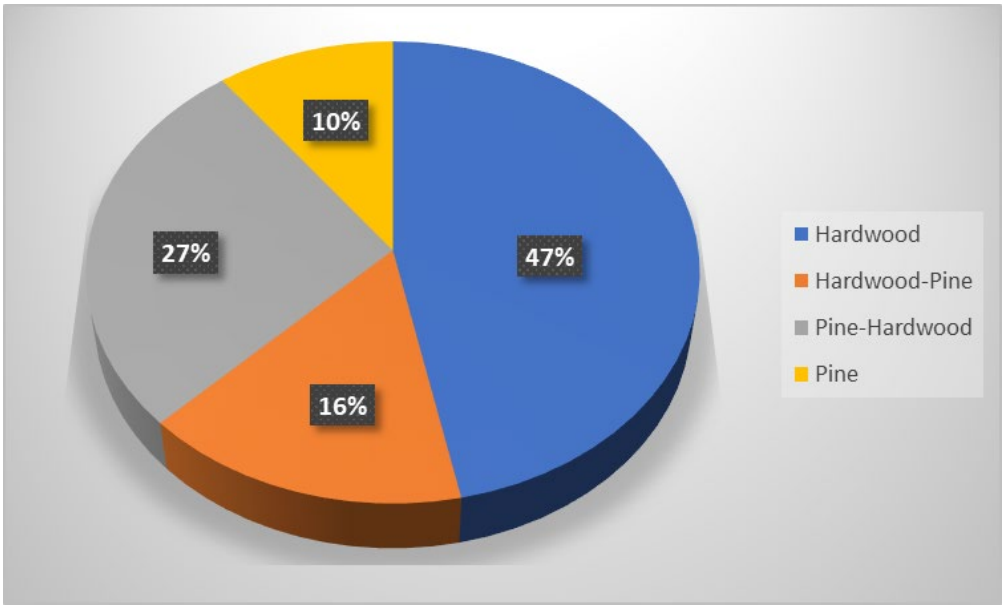

Figure 2-1. NSAHR NWA Forest Cover Types (2014)

2.3 Size and Age Class

Size class and age are important stand characteristics that indicate if a forest has a balance of mature and young regeneration aged trees. Size class was determined by a tree's diameter at breast height as follows:

Size Class Code	Description
1	Seedling/sapling < 6-inch DBH
2	Pulpwood – pine ≥6-9-inch DBH; hardwood ≥6-13-inch DBH
3	Chip-N-Saw ≥9-13-inch DBH (pine only)
4	Sawtimber 13-inch or greater DBH

The 2014 forest inventory data indicate the majority (93.8 percent) of stands at NSAHR NWA are composed of mature sawtimber and very few stands are in the mid-size (6.2 percent) or sapling (zero percent) class ranges (**Table 2-1**). However, it appears that trees under 6-inch DBH were not included in the inventory as none appear in the stand tally data for the 2014 inventory (Navy 2014, Appendix D). It is likely subplots would have been needed to capture the small diameter trees, which are therefore not represented in Table 2-1.

Table 2-1. Percent Forest Type and Size Class by Acreage

	Size Class			
Forest Type	**Pulpwood**	**Chip-n-saw**	**Sawtimber**	**Total**
Hardwood	13.6	-	916.2	929.8
Hardwood-Pine	7.6	-	307.1	314.7
Pine-Hardwood	-	-	540.2	540.2
Pine	-	101.9	102.4	204.3
Total	**21.2**	**101.9**	**1,865.9**	**1989.0**
Percent	**1.1**	**5.1**	**93.8**	**100**

The age distribution indicated by the 2014 inventory also indicates a prevalence of mature timber, particularly in the hardwood stands, where 45 percent was 90 to 101 years old, 25 percent was 60 to 70 years old, and less than 1 percent was 20 to 30 years old. Pine stands were younger and somewhat more evenly distributed across age classes (**Figure 2-2**). As with size class, excluding small diameter trees from the inventory precludes the assessment of existing stand regeneration.

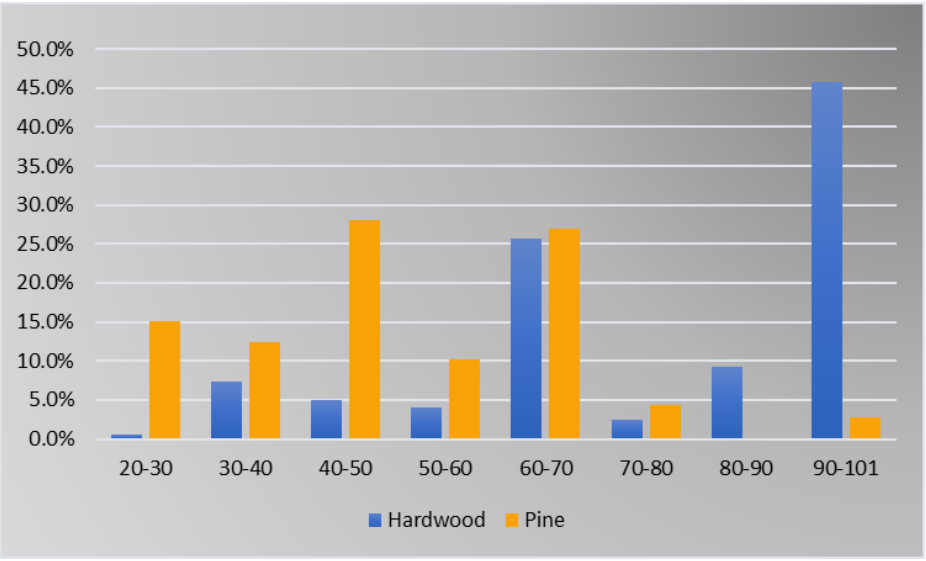

Figure 2-2. Forest Age Distribution by Acreage

2.4 Forest Pests and Disease

Forest insect and disease issues likely to be encountered at the installation are discussed in Section 3.7.3 of the NSAHR NWA INRMP. No assessment of insect or disease infestations or mortality was made in the 2014 forest inventory. However, the 1997 forest inventory report indicated that

mortality from southern pine beetle (*Dendroctonus frontalis*) was observed in 10 stands and this pest was identified as a primary management concern for the installation (Navy 1998).

Invasive plant species are another forest management issue at NSAHR NWA, and invasive plant species mapping was conducted in 2013 at the installation (Appendix E in the NSAHR NWA INRMP). Japanese stiltgrass (*Microstegium vimineum*), privet (*Ligustrum* spp.), English ivy (*Hedera helix*), and Chinese wisteria (*Wisteria sinensis*) are the primary invasive plant species impacting forest health at NSAHR NWA, though Japanese honeysuckle (*Lonicera japonica*) can be problematic in areas. Natural forest regeneration can be severely restricted in areas with dense cover of stiltgrass and privet, whereas wisteria and honeysuckle can reduce vigor and physically weaken trees and are recommended for control.

The Virginia Department of Forestry (VDOF) website: http://www.dof.virginia.gov/health/insects/index.htm provides additional information on emerging forest health issues and quarantine regulations that may need to be addressed in future forest management plans.

Figure 2-3. NSAHR NWA Forest Stands Map

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3 FOREST MANAGEMENT

3.1 Management Goals and Objectives

Broadly stated, the forest management goals identified in the installation INRMP are to sustain healthy forested ecosystems while supporting the military mission and providing for a range of social, economic, and environmental benefits. To meet these goals and the Navy's sustainable-multiple use policy, six primary forest management objectives have been identified and are provided here with a brief discussion on strategies to meet the objective. The Navy may prioritize harvesting timber in areas adjacent to the ROTHR antenna. If implemented as a forestry action, these silviculture activities will meet current Virginia Department of Forestry (VDOF) and North Carolina Forest Services (NCFS) best management practices (BMP) requirements.

Objective 1: Improve forest health and vigor.

Strategies: Reducing stand density in over-stocked stands will increase the vigor of the remaining trees increasing their resistance to disease and insect attack. In some instances, final harvest and stand regeneration may be the best option to increase health and vigor.

Objective 2: Improve wildlife habitat value.

Strategies: Reducing stand density, particularly crown density, in over-stocked stands will allow sunlight to reach the forest floor and increase herbaceous and understory diversity and enhance wildlife habitat value. Favoring the regeneration of fruit and mast producing species such as oaks, hickories, ash, blackgum, persimmon, and sassafras will also improve wildlife value.

Objective 3. Enhance or establish the presence of ecologically unique and valuable species such as bald cypress, Atlantic white cedar, and longleaf pine (*Pinus palustris*).

Strategies: Stimulate bald cypress recruitment to ensure the continued presence of this relatively rare species. Crown thinning on wetter sites with existing bald cypress may be used to increase cypress recruitment, which currently seems to be low on the installation.

Continue to find opportunities to plant Atlantic white cedar in suitable locations and control competition until well established.

Use reforestation opportunities to establish longleaf pine in appropriate areas of the base.

Objective 4: Protect and maintain habitat for special status species and sensitive wildlife species.

Strategies: Extensive areas of intact mature forests with appropriate habitat for special status species and forest interior dwelling species should be maintained to the extent compatible with the installation mission. Reviewing the Navy geo-database is critical to identifying any previously documented special status species or habitats during the planning stages of any forest management activity. Sites should also be assessed for the presence of snags, cavity trees, and trees with sloughing bark that may serve as bat roost sites. During tree marking prior

to any timber sale potential roost trees should be marked to be left in place. In addition to the potential roost trees themselves, a patch of live trees should be left in place to protect and shade the potential roost tree. Additional beneficial treatments for bats found in Johnson and King (2018) should also be incorporated into forestry practices to the extent consistent with management objectives. Vernal pools and pocket wetlands are also important to identify and protect during planning as they provide habitat for a diversity of herpetofauna that occur at NSAHR NWA.

Objective 5: Protect and maintain water quality and wetlands.

Strategies: Assess the presence of streams and wetlands, including vernal pools and pocket wetlands, during the planning stages of any forest management activity. Implement BMPs outlined by the VDOF and NCFS to avoid impacting these valuable resources. All mandatory water quality guidelines must be enforced.

Objective 6: Provide visual or safety buffer for mission requirements and encroachment.

Strategies: Leaving a forested buffer of 100 feet or more along the base perimeter, particularly along Ballahack Road and the base housing area is recommended to reduce adverse visual impacts. Coordination with trainers and range managers is recommended to ensure safety zone buffer requirements are enforced.

3.2 Management Systems and Prescriptions

Forest management systems including harvest, reforestation, and timber stand improvement methods suitable for each forest type present at NSAHR NWA are described in Section 3.7.2 of the NSAHR NWA INRMP and are not repeated here. Of these, stand thinning, final harvest and replacement, and stand improvements are the primary silvicultural treatments prescribed for the NSAHR NWA forest stands at this time.

Stand thinning in dense pine stands that are not over-mature is recommended to reduce stress from over-crowding, increase herbaceous and shrub layer diversity, and increase growth in residual crop trees. Thinning priorities are primarily based on stocking density and percent growth and are generally restricted to stands under 30 to 35 years old. Thinning stands with a basal area of more than 120 ft^2 per acre to 60–80 ft^2 per acre for poletimber and 80–100 ft^2 per acre for sawtimber is recommended to meet objectives 1 and 2. Crown thinning is also specifically recommended for promoting regeneration of high value unique species such as bald cypress and Atlantic white cedar.

More mature pine stands (over 40 years old) are not expected to respond to thinning and are better candidates for final harvest and planting or allowing to reseed naturally. Because NSAHR NWA is within the historical range of longleaf pine (Boyer 1990), which has been greatly reduced from its historic extent, planting longleaf as an alternative to loblolly during stand establishment is strongly recommended.

Timber stand improvements are prescribed for several dense mixed pine-hardwood stands to reduce the number of less desirable species such as sweetgum and/or red maple that are over-

represented throughout the forest, have lower wildlife value, and have little economic value. Controlling invasive species is another stand improvement recommendation that is prescribed to promote stand vigor and recruitment as well as improve wildlife habitat. Chemical control and/or prescribed fire are recommended for controlling re-sprouts of the less desirable species and invasive species. Forest management objectives are being considered in a Wildland Fire Management Plan that is being developed for NSAHR NWA (Navy 2019 [under development]) and stands where prescribed fire offers an appropriate treatment method are identified.

No silvicultural treatments are recommended for large portions of the forested area at NSAHR NWA. In general, stands that form large, contiguous tracks of hardwood or hardwood-pine forests that provide habitat for forest interior dwelling birds are generally recommended as "leave to grow" to continue to provide on-base habitat for these at-risk species. Avoiding stands that serve as wetland or stream buffers are also recommended to protect these valuable resources. Stands that contain habitat for special status species have also been identified and recommendations to enhance or protect these stands have been made. Stands with low stocking and no particular needs at this time were also recommended as "leave to grow" until the next forest evaluation.

A work plan with prioritized stand prescriptions that could be accomplished over a 10-year period is presented in **Table 3-1**, **Figure 3-1**. An area south of Carolina Road that was periodically cleared for a Circularly Disposed Antenna Array that operated until 2001 is included in the stand prescriptions. This 47-acre area, which was excluded from the 2014 inventory, could be made into two or more stands and inventoried during the next forest inventory update. Long range management recommendations that may be considered for each of the installation's 90 forest stands are in **Appendix A** (on DVD).

Table 3-1. Prioritized Recommended Forest Stand Prescriptions

Stand	Acres	TPA	Pine_BA	HW_BA	Age	Objectives	Prescription	Priority
12/P-3	32.4	284.8	123.3	30	25	Improve forest health and vigor, reduce bark beetle risk, enhance wildlife habitat	Thin to 60-80 sq ft per ac	1
13/P-3	37.3	263.4	134.3	11.4	25	Improve forest health and vigor, reduce bark beetle risk, enhance wildlife habitat	Thin to 60-80 sq ft per ac	1
14/P-4	44.4	275.9	168.3	13.3	31	Improve forest health and diversity, reduce bark beetle risk, enhance wildlife habitat	Thin to 80-100 sq ft per ac	1
106 *	47				17	Improve forest health and vigor, enhance wildlife habitat	Thin to 60-80 sq ft per ac	1
54/P-4	14.9	285.4	180	45	49	Improve forest health and vigor, reduce bark beetle risk, enhance wildlife habitat	Clear cut, leave to regenerate naturally	2
55/PH-4	3.7	151.2	80	40	25	Improve forest health and vigor, enhance wildlife habitat, control invasives	Clearcut, site prep, plant loblolly, control low quality hardwoods and invasives with herbicide application or prescribed fire,	2
56/H-4	12.7	163.1	28	128	76	Improve forest health and vigor, enhance wildlife habitat, control invasives	Clearcut, site prep, plant loblolly, control low value hardwoods and invasives with herbicide application or prescribed fire, leave oaks and SMZ intact	2
80/PH-4	7.6	181.2	80	60	36	Improve forest health and vigor, enhance wildlife habitat	Clearcut, site prep, plant longleaf or loblolly, control hardwoods with herbicide application or prescribed fire	3

Stand	Acres	TPA	Pine_BA	HW_BA	Age	Objectives	Prescription	Priority
81/PH-4	7.9	189	110	65	40	Improve forest health and vigor, enhance wildlife habitat	Clearcut, site prep, plant longleaf or loblolly, control hardwoods with herbicide application or prescribed fire	3
82/PH-4	2.6	169	87.1	57.1	34	Improve forest health and vigor, enhance wildlife habitat	Clearcut, site prep, plant longleaf or loblolly, control hardwoods with herbicide application or prescribed fire	3
82/PH-4	5.6	169	87.1	57.1	34	Improve forest health and vigor, enhance wildlife habitat	Clearcut, site prep, plant longleaf or loblolly, control hardwoods with herbicide application or prescribed fire	3
82/PH-4	16.0	169	87.1	57.1	34	Improve forest health and vigor, enhance wildlife habitat	Clearcut, site prep, plant longleaf or loblolly, control hardwoods with herbicide application or prescribed fire	3
102/P-4	6.4	198.3	180	26.7	53	Improve forest health and vigor, reduce bark beetle risk, enhance wildlife habitat	Clearcut, site prep, plant longleaf or loblolly, control hardwoods with herbicide application or prescribed fire	3
42/PH-4	13.2	149.3	86.7	60	26	Improve forest health and vigor, enhance wildlife habitat	Improvement cut to reduce low quality hardwoods, selectively cut pine in dense areas, control hardwood with herbicide application or prescribed fire	4
43/P-4	4.8	215.3	140	40	44	Improve forest health and vigor, reduce bark beetle risk, enhance wildlife habitat	Improvement cut to reduce low quality hardwoods, selectively cut pine in dense areas, control hardwood with herbicide application or prescribed fire	4

Stand	Acres	TPA	Pine_BA	HW_BA	Age	Objectives	Prescription	Priority
44/PH-4	19.8	146.3	104	40	41	Improve forest health and vigor, enhance wildlife habitat	Improvement cut to reduce low quality hardwoods, selectively cut pine in dense areas, control hardwood with herbicide application or prescribed fire	4
45/PH-4	25.5	141.7	118.3	56.7	41	Improve forest health and vigor, enhance wildlife habitat	Improvement cut to reduce low quality hardwoods, selectively cut pine in dense areas, control hardwood with herbicide application or prescribed fire	4
95/P-3	12.9	295.5	190		23	Improve forest health and vigor, reduce bark beetle risk, enhance wildlife habitat	Thin to 60-80 sq ft per ac. Combine treatment with stand 103	5
103/PH-4	7.0	149	110	50	58	Improve forest health and vigor, enhance wildlife habitat	Clearcut, site prep, plant to pine, control competition. Combine treatments with stand 95	5
22/H-4	25.5	172	26.7	150	80	Special status habitat protection, increase bald cypress regeneration	Crown thin to release bald cypress and promote seedling establishment	6
29/H-4	36.6	122.9	8.9	155.6	96	Special status habitat protection, increase bald cypress regeneration	Crown thin to release bald cypress and promote seedling establishment, join with southern portion of stand 30 during forestry activities	6

H=hardwood, HP=hardwood/pine, P=pine, PH=pine/hardwood, TPA=trees per acre, BA=basal area; SMZ=stream management zone

*New Stand delineated based on aerial imagery and site visit in October 2019. No forest metric data are available.

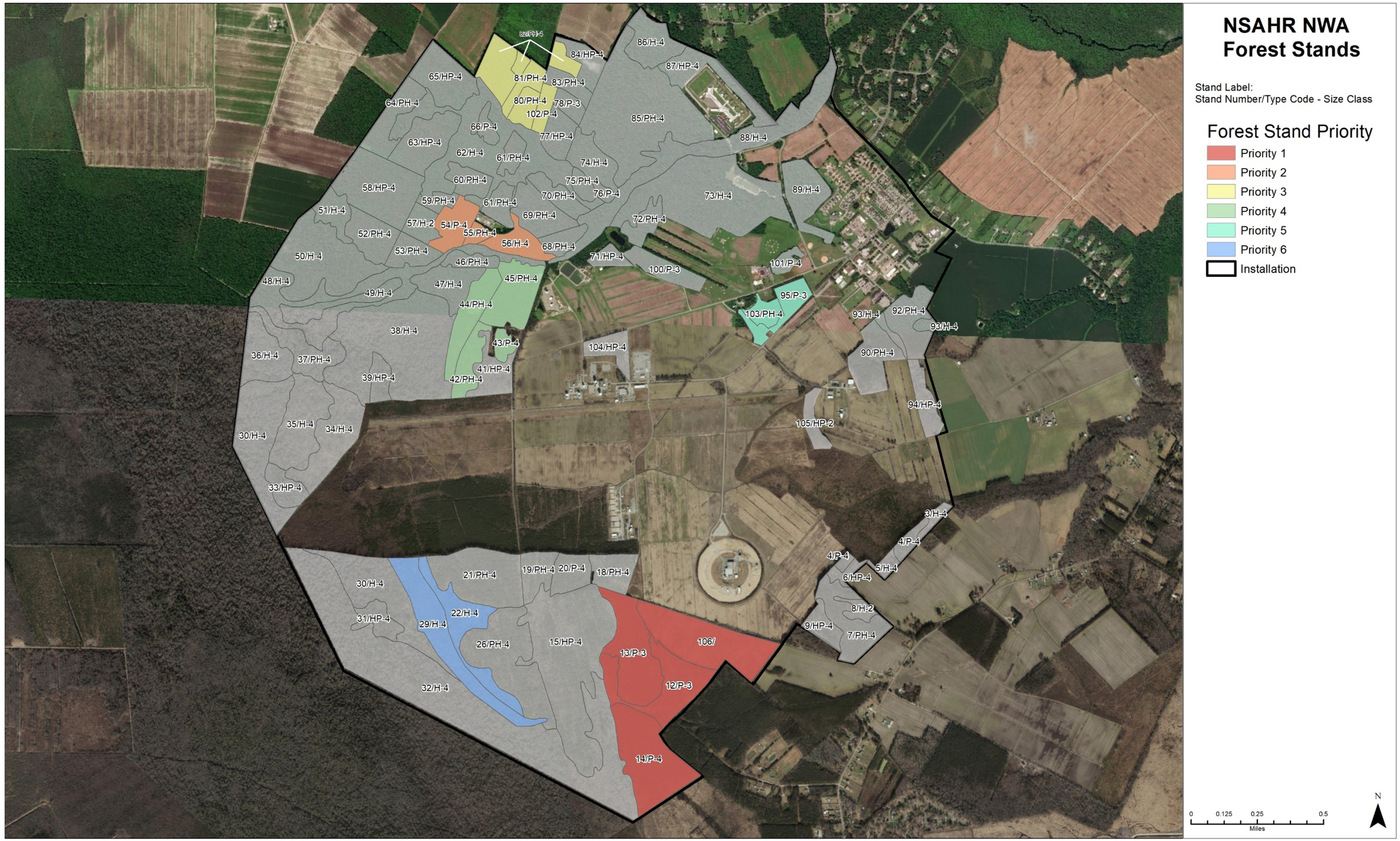

Figure 3-1. Priority Forest Stand Prescriptions

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4 IMPLEMENTATION AND ADMINISTRATION

4.1 Funding

Funding for forest management activities is supported by revenues derived from commercial forestry operations on participating DoD installations. Installations participating in the forestry program must submit an annual budget (increment) for the following fiscal year (FY) to the NAVFAC Forester by 1 September of the previous year. The annual increment supports commercial forestry operations at installations (which must also be identified in an approved management plan). The funds are borrowed from NAVFAC Headquarters (HQ) at the beginning of each fiscal year and are reimbursed when forestry revenues are received from that installation. Forty percent of installation net proceeds are also distributed to the counties within which a military installation is located. Once the commercial forestry expenses are reimbursed and the distribution has been made to the state, any remaining funds are transferred to the DoD Forestry Reserve Account.

The DoD Forestry Reserve Account may be used for improvements of forest lands; unanticipated contingencies in the administration of forest lands, and the production of forest products for which other sources of funds are not available in a timely manner; and for natural resources management that implements approved plans and agreements (Section 2665 of 10 USC). NAVFAC usually solicits project proposals for the Forestry Reserve Account once there is an indication of the level of funding available (usually January or February). Proposals are submitted to NAVFAC are reviewed by the NAVFAC HQ before being forwarded to the DoD Conservation Committee for final selection. Installations need not harvest timber to be eligible for DoD Forestry Reserve Account funds.

4.2 Technical Assistance

Through a memorandum of agreement on Forest Pest Suppression on DoD lands, the U.S. Forest Service (USFS) provides technical assistance, information, and training opportunities to DoD personnel for the protection and suppression of forest insects and diseases. During periods of pest infestations or disease outbreaks, natural resources personnel may coordinate with the USFS to monitor pest populations and forest conditions. The USFS sends out an annual call for proposals for pest management projects on DoD forest lands in accordance with a memorandum of agreement (MOA) and form FS 3400-2 (**Appendix B**).

VDOF and NCFS can also provide technical advice on forest operations and supply plant materials for the establishment a of trees on DoD installations. VDOF and the Virginia Department of Conservation and Recreation (VDCR) have active longleaf pine restoration programs and would be valuable partners in assisting the Navy establish longleaf stands at NSAHR NWA.

4.3 Forestry Contracts

Service contracts are used to acquire services such as pre-commercial thinning, timber stand improvement, or planting and are handled in accordance with Federal Acquisition Regulations as outlined in NAVFAC P-68 – Contracting Manual. Sales contracts are used to dispose of forest products produced on Navy installations. Sales and service-type work may not be combined under one contract but may be accomplished by separately advertised and awarded contracts. Sale of forest products is accomplished in accordance with the procedures in NAVFAC P-73 – Real Estate Procedural Manual and are administered by the NAVFAC Forester.

DoDINST 4715.03 and OPNAVINST 5090.1 require that forest products not be given away, carelessly destroyed, or used to offset contract costs, but rather sold at their fair market value and the proceeds credited to the Navy's Forestry Program account. The basis for this procedure is that standing timber is considered real property, and real property must be disposed of at its fair market value. All installation construction contracts with marketable standing timber shall require contractors to reimburse the Navy for the value of the timber (NAVFAC P-73). If timetables do not allow for a timber sale when clearing timber on construction sites or for infrastructure and mission-related operations, specific payback rules and procedures apply (**Appendix C**).

A timber appraisal must be performed by a qualified professional forester. There is no minimum amount of timber necessary to trigger an appraisal. The forester will determine the volume and value of the timber present on a case by case basis and then supply the project manager with the commercial value of the timber to be removed. Normal procedures for disposal of timber include issuing a timber sale or salvage contract and timber is harvested over a specified period. Depending on the size of the harvest, timber sales may take several weeks to set up in the field, two to three months to advertise and award, and up to a year for harvesting to be completed.

Required timber sale documents include:

- NAVFAC Invitation for Bids
- SF114: Sale of Government Property, Bid & Award
- SF114C: General Terms, Sealed Bid
- SF1409: Bid Abstract
- SF1418: Performance Bond

4.4 Environmental Regulations

4.4.1 Clean Water Act

Facilities proposing to remove forest products must consider the environmental consequences of removal and comply with appropriate and applicable federal, state, and local environmental regulations including the Clean Water Act (CWA), National Historic Preservation Act, National Pollutant Discharge Elimination System construction permit(s), and erosion sediment control plan(s).

A silvicultural exemption to Section 404 of the CWA allows normal and established silvicultural activities in wetlands as long as state BMPs are implemented. Normal silvicultural practices covered by the silvicultural exemption include planting, seeding, cultivating, minor drainage, and harvesting. The silvicultural exemption does not include land-recontouring activities such as grading, land leveling, filling in low spots, converting to upland, or permanent conversion to other land use and management. Construction and maintenance of forest roads are exempt provided that all federally mandated BMPs for road construction and maintenance are followed (NCFS 2006 and VDOF 2011).

The Virginia Department of Forestry Best Management Practices (BMP) Guide for Water Quality is available on the VDOF website: http://www.dof.virginia.gov/water/index-BMP-Guide.htm.

The North Carolina Forest Service BMP Guide for Forestry Operations is available on the North Carolina Forest Service website: http://ncforestservice.gov/water_quality/bmp_manual.htm.

North Carolina Mandatory Forest Practices Guidelines for Water Quality are available on the North Carolina Forest Service website: https://www.ncforestservice.gov/publications/Forestry%20Leaflets/WQ01.pdf.

4.4.2 National Environmental Policy Act

Preparation of appropriate documentation required by the National Environmental Policy Act (NEPA) can be accomplished through a categorical exclusion (CATEX) during the site approval process. An Environmental Assessment (EA) is not considered necessary as all actions prescribed in the forest management plan are consistent with management current and previous INRMPs for NSAHR NWA. To fulfill NEPA requirements, an EA and Finding of No Significant Impact were prepared for implementation of the INRMP in 2006, which included forest management and prescribed fire actions. Therefore; the routine forest maintenance practices such as thinning, timber stand improvements, and harvests under one million board feet are consistent with practices described in the INRMP and will not require further NEPA documentation. Harvests greater than one million board feet are not within the scope of the INRMP and would likely require preparation of an EA.

5 REFERENCES

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Appendix A - NSAHR NWA Forest Inventory Database

(on DVD)

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Appendix B – U.S. Forest Service Forest Pest Suppression

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United States Department of Agriculture **Forest Service** **Washington Office** **1400 Independence Avenue, SW Washington, D.C. 20250**

File Code: 3400; 6510
Date: August 30, 2018

Douglas A. Burkett, PhD
Environmental Biologist, Operations Division
Armed Forces Pest Management Board
2460 Linden Lane, Bldg 172
Silver Spring, M.D. 20910

Dear Dr. Burkett:

Each year the U.S. Forest Service provides technical assistance and funding for the suppression of forest insects and diseases on Federal lands. Forest Health Protection (FHP) field staffs work closely with the U.S. Department of Defense (DOD) staffs to identify facilities that have insect or disease outbreaks, and need suppression treatments.

When considering project selection we look at:

- The purpose and need for the project (we provide funding for insect and disease suppression treatments only),
- A completed biological evaluation by our field staff,
- Alignment of DOD and Forest Service priorities.

To initiate this process, DOD branch staffs should contact FHP field offices. A directory can be found at: http://www.fs.fed.us/foresthealth/publications/FHP_Staff_Directory_final.pdf .

Each branch must enter project proposal information directly into the Forest Service FHP database, which can be found at http://apps.fs.usda.gov/formap . The deadline for funding requests for Fiscal Year (FY) 2019 forest insect and disease suppression projects is **October 29, 2018.**

Additionally, we request that DOD report FY 2018 accomplishments into the same database by **October 29, 2018**. It is important that funding and accomplishments are entered into the database so we can track the success of the projects and address any future needs.

Please direct any questions or need for assistance (including access to the database) to Bob Rabaglia, Forest Health Protection Liaison at (703) 605-5338, or brabaglia@fs.fed.us .

Sincerely,

/s/ Richard A. Cooksey
RICK COOKSEY
Acting Director, Forest Health Protection
cc: Bob Rabaglia, Bruce Moltzan, Hylah Jacques, Anne Buckelew, pdl wo spf fhpdir

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DEPARTMENT OF DEFENSE
ARMED FORCES PEST MANAGEMENT BOARD
OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
FOR ENERGY, INSTALLATIONS AND ENVIRONMENT
U.S. ARMY GARRISON FOREST GLEN
2460 LINDEN LANE, BUILDING 172
SILVER SPRING, MD 20910

MEMORANDUM FOR: SEE DISTRIBUTION

September 26, 2018

SUBJECT: DoD Forest Pest Suppression Project Proposals

DoD Forestry Colleagues,

Herewith the annual call for proposals being solicited for the FY 2019 Forest Health Protection (FHP) projects (Attachment 1). Please forward to your MAJCOM and installation natural resources/forestry managers as appropriate. Qualifying installations must read the criteria for selection procedures carefully starting with contacting the local regional forestry office to set up an evaluation. Per the Memorandum of Agreement (Attachment 2), the USDA Forest Service (USFS) annually provides free technical assistance and funding for the suppression of forest insects and diseases on Federal lands. Department of Defense installations with significant forest insect or disease pest problems are eligible for competitive FHP funding from USFS. Invasive species funding for DoD installations for Hawaii and the Caribbean also qualify for FHP funding.

If your installation has a qualifying forest pest suppression project, proposals must be submitted using the enclosed FS-3400-2 (Attachment 3). As part of this process, installation representatives should contact their regional FHP field staff to set up a biological evaluation. A directory of FHP field staff can be found at http://www.fs.fed.us/foresthealth/publications/FHP_Staff_Directory_final.pdf. Successful completion of a biological evaluation conducted by USFS is a prerequisite for proposal submission and competitive funding. Past FHP mitigation projects funded at DoD installations include emerald ash borer, gypsy moth, mountain pine beetle, southern pine beetle, pine engraver beetle, dwarf mistletoe, hemlock wooly adelgid, Dutch elm disease, and oak wilt. Examples of forest health advisories, interactive maps and qualifying FHP pests and diseases can be found at: http://foresthealth.fs.usda.gov/ and Alien Forest Pest Explorer at http://foresthealth.fs.usda.gov/portal/Flex/APE.

Please send your ranked Service proposals to Dr. Burkett by **25 October 2018** to allow sufficient time to review, rank and submit proposals to USFS. Proposals must be for single or multi-year projects that range between $1,000 and $200,000. Projects MUST focus on pest mitigation/suppression and NOT surveillance, prevention or timber harvest.

Please provide widest dissemination to your installation forestry/natural resources representatives with a reminder that this is free project money that can help pay for otherwise unfunded requirements.

For further questions and information, please contact the AFPMB Environmental Biologist, Dr. Douglas A. Burkett at DSN 295-8304, commercial (301) 295-8304, or e-mail douglas.a.burkett.civ@mail.mil.

Eric R. Hoffman
CAPT, MSC, USN
Director

Attachments:

USDA-Forest Service FS-3400-2 (11/82)

USDA - Forest Service

FOREST PEST MANAGEMENT PROJECT PROPOSAL

(Ref: FSM 3400, Report FS-3400-E)

PART I - REQUESTING OFFICE USE ONLY

1. Region/Area	2. State	3. Fiscal Year	4. Casual Agent	5. Group	6. Landownership *(x appropriate box)* ☐ National Forest ☐ Other Federal

7. Type of Project *(x appropriate box)* ☐ Prevention ☐ Suppression	8. Status of Project *(x appropriate box)* ☐ New Project ☐ Continuing Project	9. Host Protected

10. Prevention/Suppression Method	11. Pesticide	12. Application Rate

13. Program Activities (a)	First Year Targets and Costs: Units of Work (b)	Unit Cost (c)	Total Planned Cost (d)	Funds Needed in Subsequent Years: FY: Estimated Cost (e)	FY: Estimated Cost (f)
(1) Pretreatment Survey (Acres)					
(2) Treatment (Acres)					
(3) Volume Treated (MBF)					
(4) Volume Removed (MBF)					
(5) Volume Protected (MBF)					
(6) Post-Treatment Evaluation (Acres)					
(7) Environmental Monitoring (Acres)					
(8) Other (Identify)					
(9) Subtotal					
(10) Indirect and service charges (Field) Percent of Subtotal (%)					
(11) Total Field Costs					

14 Proposed By *(Signature)*	15. Title	16. Date

PART II - REGION OR AREA USE ONLY

17. Region/Area Indirect and Service Charges Percent of Total Field Costs (%)					
18. Total Project Costs					

19. Approved By *(Signature)*	20. Title	21. Project Number	22. Date

PART III - WASHINGTON OFFICE USE ONLY

23. Project Action (x appropriate box) ☐ Approved ☐ Disapproved	24. Total Funds Allocated			

25. Approved/Disapproved By (*Signature*)	26. Title	27. Date

28. Remarks

(OVER)

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USDA-Forest Service FS-3400-2 (11/82)

INSTRUCTIONS: (Reference FSM (3400) Use this form only for projects on National Forest System and other Federal lands.

1. Region/Area
2. State
3. Fiscal Year
4. Casual Agent - Name the insect or disease involved.
5. Group- Indicate insect or disease group into which the casual agent falls. Groups are bark beetle (BB), defoliator (DEF), other insects (01), dwarf mistletoe (DM), oak wilt (OW), other disease (OD).
6. Landownership
7. Type of Project
8. Status of Project
9. Host Protected - Name tree species affected.
10. Prevention/Suppression Method - Specify method to be used.
11. Pesticide - Include trade names of pesticides to be used.
12. Application Rate - If pesticide usage is involved, specify the dosage rate in pounds of active ingredient per unit treated.
13. Program Activities
14. Proposed By - Signature of person initiating the proposal.
15. Title
16. Date - (mm/dd/yyyy)
17. Region/Area Indirect and Service Charges - Enter percent of field total cost from block 13(a)(11) and enter the amount imposed against the project at the Regional or Area office level.
18. Total Project Costs - Enter the sum of blocks 13(a)(11) and 15.
19. Approved By - Project proposal must be approved and dated by the Regional Office or Area Office or by their designated representative prior to submission to the Washington Office.
20. Title
21. Project Number
22. Date
23. Project Action
24. Total Funds Allocated
25. Approved/Disapproved By
26. Title
27. Date
28. Remarks

Microsoft Word

MEMORANDUM OF AGREEMENT

between the

UNITED STATES DEPARTMENT OF AGRICULTURE

and the

UNITED STATES DEPARTMENT OF DEFENSE

for the

CONDUCT OF FOREST INSECT AND DISEASE SUPPRESSION ON LANDS ADMINISTERED BY THE U.S. DEPARTMENT OF DEFENSE

Suppression of damaging forest insect and disease outbreaks is essential for maintaining the health and productivity of the nation's forests. Annually, insects and diseases kill more trees and reduce forest growth more than all other destructive agents combined. This is a matter of great concern to the administrators responsible for managing and protecting forests on public and private lands.

Section 5 of the Cooperative Forestry Assistance Act of 1978 (16 U.S.C. 2101) authorizes the Secretary of Agriculture to protect trees and forests, wood products, stored wood and wood in use from insects and diseases. This is done directly by the USDA on National Forest System lands and in cooperation with other Federal land managing agencies, the States and private land owners on other forest lands. The Secretary of Agriculture has delegated the responsibility for carrying out the provisions of the Cooperative Forestry Assistance Act to the Forest Service. Annual appropriations, based on estimated suppression costs developed by the Forest Service, the Department of Defense, other Federal agencies, States and other cooperating entities, are necessary to implement this responsibility.

It is Agreed:

1. That the two Departments will, under the legal, fiscal and other limitations governing each, cooperate fully in the planning, coordination and execution of field operations to prevent and suppress damaging forest insect and disease outbreaks whenever it is determined to be necessary.

2. That the guiding principles of this cooperation shall be those established by authorizing legislation, agency policy and other direction specified in the Cooperative Forestry Assistance Act of 1978, the National Environmental Policy Act and the Federal Insecticide, Fungicide, and Rodenticide Act as amended.

3. That the Secretaries of the Department of Agriculture and the Department of Defense shall authorize their respective agencies concerned with the suppression of forest insects and diseases to develop and execute coordinated work programs and projects.

4. That, for coordinating and funding forest insect and disease suppression programs and projects, the Departments will:

A. *Responsibilities of the Department of Agriculture, Forest Service:*

(1) Designate an office which will be responsible for coordinating activities conducted under this MOA.

Attachment (2)

(2) Provide overall leadership and coordination for insect and disease suppression activities on forest lands when the activities are financed wholly or in part with Federal funds appropriated under Section 5 of the Cooperative Forestry Assistance Act of 1978 (16 USC 2101).

(3) To the extent possible, provide technical and financial assistance to agencies of the Department of Defense for forest insect and disease suppression programs and gypsy moth eradication projects on forest lands administered by the Department of Defense.

(4) Conduct detection surveys and biological evaluations of insect and disease outbreaks on forest lands administered by the Department of Defense.

(5) Subject to budgetary limitations, annually transfer from the USDA Forest Service, Forest Pest Management to Department of Defense Agencies such finances as are mutually determined as necessary for forest insect and disease suppression on forest lands administered by the Department of Defense. To the extent possible, jointly determine annual suppression funding needs by November 30.

(6) Assist agencies of the Department of Defense in organizing and performing general forest insect and disease field surveillance on forest lands administered by the Department of Defense.

(7) Inform local and national Department of Defense personnel of forest insect and disease conditions on other lands that may affect Department of Defense administered land.

(8) Suppress forest insect and disease outbreaks on National Forest System lands and cooperate with other agencies to suppress forest insect and disease outbreaks which threaten forest lands administered by the Department of Defense.

(9) Provide training opportunities for Department of Defense personnel in techniques for the prevention, detection and suppression of destructive forest insects and diseases in order to promote forest health.

b. *Responsibilities of agencies of the Department of Defense:*

(1) Designate an office which will be responsible for coordinating activities conducted under this MOA.

(2) Notify DoD Agencies that technical assistance is available from the Forest Service and that a biological evaluation or equivalent documentation is required before funds for a forest pest suppression project can be transferred from the Forest Service.

(3) Facilitate conduct of detection surveys and forest insect and disease evaluations by Forest Service personnel on Department of Defense administered lands.

(4) Base decisions on whether to implement suppression programs and projects on:

(a) An appraisal of current pest infestation significance and projected significance with and without suppression activities. This information, as well as a discussion of alternative pest management tactics, is provided by the Forest Service in a biological evaluation.

(b) An evaluation of the resources threatened within the context of management objectives.

(c) An analysis of possible adverse environmental effects of suppression alternatives.

(d) An economic analysis of the proposed action.

(5) Perform field surveillance and specialized detection surveys as necessary to supplement Forest Service activities.

(6) Conduct suppression activities on Department of Defense administered land.

(7) Cooperate with other agencies on adjacent or intermingled lands on forest insect and disease surveillance, prevention and suppression activities.

(8) Report suppression project accomplishments to the Forest Service by November 1 each year covering all forest insect and disease management expenditures for the previous fiscal year.

(9) Participate in an annual coordination meeting with the Forest Service to set priorities for funding proposed forest pest suppression projects.

(10) Submit a formal request for forest insect and disease suppression funding to USDA Forest Service by November 15 of each year.

This agreement is effective upon the date of signature by both parties. It defines, in general terms, the basis on which the parties will cooperate and is not a financial obligating document.

This agreement shall continue indefinitely, but may be modified or discontinued at the request of either party. Requests for termination or any change shall be submitted to the other party for consideration not less than 30 days in advance of the effective date desired.

F. Dale Robertson
Chief
Forest Service

Date: November 15, 1990

Thomas E. Baca
Deputy Assistant Secretary
of Defense for Environment

Date: December 11, 1990

3

Attachment (2)

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Appendix C – Timber Harvest on Construction Sites

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Timber on Construction Sites and Real Estate Easements

Lead Content Owner: Jeff Gardner (NAVFAC HQ)

Unless otherwise noted, the tasks identified below should all be accomplished by professional natural resources personnel at the cognizant Facilities Engineering Command (FEC).

Process Step	Associated Procedure	Resources
7.8.1 Identify Construction and Real Estate Actions That May Impact Forest Products	• Review site approvals request for early detection of construction sites with timber. • Review request for real estate easements, long-term leases and other real estate. • Identify and document areas with potential for loss of merchantable forest products resulting from construction or clearing.	
7.8.2 Verify the Existence of Forest Resources on the Proposed Sites	• Review existing forestry information to verify the existence of forest products (maps, inventories, work plans, data bases, aerial photographs). Make site visit if needed. • Determine if value is adequate to justify further action to realize fair market value.	
7.8.3 Identify Sites To Be Cleared in Near Future	• Professional forester will determine the fair market value of forest products on the site. [Does value justify further action? If not, stop here.] • Determine best way to remove forest products • Separate salvage contract to remove forest products prior to award of construction or clearing contract (lump sum preferred). • Insert "pay-back" clause in construction or clearing contract. Contractor pays Navy fair market value. Value not negotiable.	NAVFAC P-73, Natural Resources Management Procedural Manual Chapter 3, 6.d (2)(g) NAVFAC P-73, Natural Resources Management Procedural Manual, "Pay-back clause", Chapter 3, 6.d (2)(g)

Process Step	Associated Procedure	Resources
7.8.4 Perform Collection and Deposit of Receipts	• Salvage contract - Collect receipts from harvesting contractor and deposit in accordance with DoD 7000.14. • Pay back clause - Collect from construction or clearing contractor within 30 days after notice to proceed has been issued or real estate agreement has been executed. Deposit receipts in accordance with DoD 7000.14.	DoD 7000.14, Volume 11A, Chapter 16, 160204 NAVFAC P-73, Natural Resources Management Procedural Manual Chapter 3, 6.d (2)(g)
7.8.5 Identify Long Term Real Estate Actions Involving Forest Products	• Insert a clause in real estate agreements that reserves timber rights on the site and requires holder of the agreement to pay the Navy fair market value (to be determined by professional forester) for any forest products removed during the term of the agreement.	32 CFR 190. Appendix B.2.c DoD 4715.3, F.2.d
7.8.6 Monitor Construction Projects and Real Estate Agreements Involving Forest Products	• Periodically review plans and specifications of construction contracts and real estate actions, identified as involving forest products having commercial value, to ensure provisions are made to realize fair market value for these products.	32 CFR 190. Appendix B.1.e

TIMBER ON CONSTRUCTION SITES, ROW'S, URBAN AREAS, CLEAR ZONES, ETC. AND THE NAVY'S TIMBER PAYBACK CLAUSE

Federal regulations, Navy policy and instructions, and NAVFAC guidelines prohibit forest products from being given to the contractor, traded, or destroyed without proper compensation to the Navy Forestry Account. This includes tree removal associated with land clearing activities for construction, or the establishment, expansion, or maintenance of clear zones. Payback Clause and other forestry generated funding are used for base environmental projects, school funding in the county of harvest, and Navy forestry program reimbursement.

Pertinent code, regulations, and instructions are:

1. **USC Title 10, A, Part IV, Chap 159, Section 2665:** *"The President, through an executive department, may sell to any person or foreign government any forest products produced on land owned or leased by a military department…"* and provides for the distribution of proceeds of these sales.
2. **41 CFR Part 102–71.2**: Lists and identifies *"Standing timber…"* as real property.
3. **OPNAVINST 5090.1D Paragraph 12-5.26:** *"Forest products are those items produced from a forest such as sawtimber, veneer logs, poles, piles, posts, pulpwood, pine straw, stumpwood, bark and other mulch, cones, seeds, mistletoe, firewood, and wood chips.*
4. **DOD INSTRUCTION 4715.03 Enclosure (3), Paragraph 4.a.(1)**: *"Agricultural and forest products shall not be given away, abandoned, carelessly destroyed, used to offset contract costs, or traded for services, supplies, or products, or otherwise improperly removed; (a) Marketable forest products requiring removal, including those on lands designated for privatization, must be disposed of by the Military Service or the value of the forest products will be deposited into the Military Service forestry account. Marketable forest products shall not be abandoned, destroyed, or donated. Forest products may be sold for salvage when their condition or value is adversely affected by natural disasters, insect damage, or other events. Forest products include, but are not limited to, standing timber/trees, downed trees, and pine straw.*
5. **OPNAVINST 5090.1D Paragraph 12-3.8.j.(5):** *"…The Navy will not give away, nor abandon, nor carelessly destroy forest products, nor use them to offset the cost of contracts, nor trade them for products, supplies, or services. Proceeds collected from the disposal or sale of all merchantable forest products produced on a Navy installation will be turned over to the servicing Navy accounting and finance officer and deposited in the Navy Forestry Account…."*
6. **DoDI 4165.57 (Air Installations Compatible Use Zones), Table 1, Note 16:** *"Lumber and timber products removed due to establishment, expansion, or maintenance of Clear Zone lands owned in fee will be disposed of in accordance with applicable DoD guidance."*
7. **OPNAVINST 11010.36C (Air Installations Compatible Use Zones), Table 2, Note 13:** *"Lumber and timber products removed due to establishment, expansion, or maintenance of clear zones will be disposed of in accordance with appropriate DoD Natural Resources instructions."*
8. **OPNAVINST 11010.36C (Air Installations Compatible Use Zones), Enclosure (1), para 7:** OBSTRUCTION AND SAFETY CLEARANCES. This instruction addresses compatible land use with respect to aircraft noise and accident potential. Land uses in the vicinity of air installations are also subject to aircraft safety clearances and height restrictions. These restrictions are included by reference in this Instruction based upon tri-Service criteria published in Unified Facilities Criteria's UFC-3-260-01.

9. **United Facilities Criteria 3-260-01 (Airport and Heliport Planning and Design), Appendix B, Section 3, Note 11**: *"Lumber and timber products removed due to establishment, expansion, or maintenance of clear zones will be disposed of in accordance with appropriate DOD Natural Resources Instructions."*
10. **NAVFAC P-73 Volume II Paragraph 6.d.(2)(g)**: *"Where a construction contract might be delayed by advertising a timber harvesting contract prior to advertising the construction contract, a forester shall appraise the timber to be removed from within the designated limits of clearing. The construction contract shall contain provisions for reimbursing the Navy forestry account in the amount of the appraised value. Installations shall contact the Real Estate Division of the appropriate EFD on a case-by-case basis. The Invitation for Bids on such construction contracts must contain a provision as follows:*
    a. *'Valuable Standing Timber: Bidders are advised that there is marketable standing timber, having fair market value which the Government appraises to be $(amount), on the tract described as follows: (detail boundaries). The contractor is required to pay the appraised amount to the Government within 30 days after notice to proceed has been given, to be deposited in the Navy's forestry account.'"*
11. **NAVFAC Portal "NAVFAC BMS B-7.8 Timber on Construction Sites and Real Estate Easements"**: Lists process steps, associated procedures and resources for dealing with timber growing on these sites.

On all projects local environmental staff should be involved in the planning process as soon as practical, such as during the preliminary environmental baseline survey (PEBS) process. Once the project "footprint" is known, or approximately known, environmental staff can easily determine if forest products of concern are present on the site. If timber is on site, **prior to** the development of a request for bid or contract, either the installation forester (if one is available), NAVFAC Core forester or NAVFAC HQ Forestry PM should be contacted to appraise the timber value.

The appraisal must be performed by a qualified professional forester. There is no minimum amount of timber necessary to trigger an appraisal. The forester will determine the volume and value of the timber present on a case by case basis and then supply the project manager with the commercial value of the timber in question.

Normal procedures for disposal of timber include issuing a timber sale or salvage contract and timber is harvested over a specified period. Depending on the size of the harvest, timber sales may take several weeks to set up in the field, 2-3 months to advertise and award, and up to a year for harvesting to be completed.

If timetables do not allow for a timber sale, as stated in reference 10 above, the accepted procedure is to include the **"Timber Payback Clause"** in the construction contract whereby the contractor must reimburse the Navy Forestry Account for the appraised fair market value of the timber on the project. The appraised value, once included into the request for bids, is not negotiable. After the contractor pays the appraised value, the timber becomes his property and he may dispose of it in any manner he so chooses, including resale or destruction. If government timber on the site is ignored or allowed to become the property of the contractor without payment, it is a violation of references 4 and 5 above.

Contractors have 30 days from the date of notice to proceed to pay the appraised amount for the timber. Payment should be made and deposited into the Navy's forestry account with a copy of the transactions sent to NAVFAC HQ Forestry PM.

Trees managed primarily for landscaping and aesthetic purposes within the administrative, housing, or recreation areas of our installations fall into the category of "urban forestry," and most bases have more stringent, specific guidelines for their mitigation. The trimming, care, or removal of these urban trees is a base function usually addressed in the grounds maintenance portion of the INRMP and covered under O&M funding. Their designation as urban trees is a product of their location in the base environment. Whether or not these trees pose a safety concern is a safety issue rather than a forestry issue. Local environmental personnel address urban tree issues and while working along with their forester will determine if mitigation or payment is justified for their removal.

Should you have questions or comments about this information, please contact the NAVFAC HQ Forestry Program Manager: Jeff Gardner (202-685-9330).

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Enclosure 7. Urban Forestry Program

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2014 Urban Forestry Program - Naval Support Activity Hampton Roads Northwest Annex – Annual Work Plan & Budget
(Formerly NSA Norfolk Northwest Annex)

Navy Regional Forestry Program Manager(s):
Emmett Carawan, NAVFAC MIDLANT Natural Resources Program Manager
Navy Southeast Regional Forestry Manager (NAVFAC SE), NAVFAC MIDLANT Forestry Program Consultant/Liaison
NAVFAC Atlantic Entomologist, NAVFAC MIDLANT Forestry Program Consultant/Liaison

Installation/City Forestry Program Manager:
Michael Wright, Natural Resources Program Manager/Team Leader

Additional Forestry Program Affiliates/Consultants:
Mike Aherron, VA Dept of Forestry
Donald Schwab, US Fish & Wildlife Services
John Gallegos, US Fish & Wildlife Services
Pete Acker, VA Dept of Game & Inland Fisheries
Lawrence McGrogan, US Navy
Mark Edwards, US Navy
Linda Hicks, US Navy
(These individuals are consulted regarding the development, management, and implementation of the Base's Integrated Natural Resources Management Plan, which includes the overall Forestry and Urban Forestry Programs.)

Tree Ordinance
A tree preservation and replacement standard operating procedure/instruction including pruning, planting, preservation and mitigation guidelines has been added to the installation's Integrated Natural Resources Management Plan (INRMP). The INRMP is a living and legally binding document required per the Sikes Act. The INRMP is reviewed annually for accuracy, functionality, enforcement, and update requirements. At a minimum of every 5 years the Navy, USFWS, State Wildlife Agency(ies), and NOAA-NMFWS (as appropriate) review the INRMP for operation and effect and issue letters or signatures of concurrence to implement the INRMP.

Community Forestry Program and Budget
The Regional and Installation Natural Resource Managers and staff consider all of the forest and landscape trees in planting and future development decisions. The INRMP Tree Preservation Instruction provides a framework for avoiding or mitigating tree loss due to development. The instruction also defines acceptable grounds maintenance practices with respect to proper tree protection, planting, and care. Execution of our hazardous tree removal plan, per a hazardous tree evaluation conducted by certified arborists, continues on NSAHR- Northwest Annex (NWA). The Facilities Engineering and Acquisitions Department (FEAD) accomplished the grounds- maintenance contract quality assurance. Any tree work contracted to a private company was managed by the FEAD and any necessary technical advice provided by the Regional and Installation Natural Resource staff. Any tree work conducted in-house was coordinated through the Navy Natural Resources program managers. In 2014, Navy, Marine, Coast Guard, Department of Defense civilians, and children from the Base's Child Development Center in NSAHR-NWA's inaugural Clean the Base Day and Arbor Day Celebrations. These basewide events included trimming, planting, maintenance of trees and mulching along with other non-tree related activities. Additional tree maintenance was accomplished by 15 Natural Resources Program volunteers and 4 Active Duty Military Self Help individuals for various programmatic objectives throughout the year.

Forestry Program Statistics:
Current Estimated Installation Property Acreage: ~3665 acres

Estimated Amount of Forest Cover upon/prior to Navy Acquisition: TBD

- Evergreen: TBD
- Deciduous: TBD
- Mixed: TBD

2014 Estimated Current Amount of Forest Cover: ~2000 acres

- Evergreen: ~205 acres
- Deciduous: ~930 acres
- Mixed: ~856 acres
- Upland: TBD
    - 2014 Estimated Upland Forest Cover Lost: 0
    - 2014 Estimated Upland Forest Cover Mitigated: ~0.1acre
- Wetland: TBD
    - 2014 Estimated Wetland Forest Cover Lost: 0
    - 2014 Amount of Forested Wetland Mitigation: 0

2014 Trees Planted: 12

2014 Trees Regenerating from Construction or Timber Harvest Activities:

- Since 2006, ROTHR Timber Harvest Phase I: 102 acres (~20,400 trees)
- Since 2008, ROTHR Timber Harvest Phases II & III: 190 acres (~38,000 trees)
- Since 2011, ROTHR Vegetation Clearing Field 11: 41 acres (~8,200 trees)
- Since 2011, BRIG Construction: 1 acre (~200 trees)
- Since 2012, IAMS range work: 33 acres (~6,682 trees)

2014 Merchantable Timber Trees Permanently Removed: 0

2014 Non-merchantable Timber Trees Removed: ~ 11 trees

- 2013, Fence Line Security Vegetation Clearing: ~7 trees
- 2013, Hazardous Tree Removals: 2 trees
- 2014, Main Gate Upgrades: 11 trees (11 trees planted to mitigate tree removal)

2014 Trees Removed as a Forestry Action (currently re-foresting naturally): 0

2014 Trees Pruned: ~20

2014 Firewood Sales: 0

Notes:

1. Living trees removed for non-construction purposes are replaced. Trees removed for construction purposes are replaced to the maximum extent practical. Trees removed for construction within a wetland area will be replaced or mitigation credits will be purchased within the watershed.
2. Currently, have Vegetation Community, Forest Inventory, and Invasive Species Projects underway or getting ready to be awarded, which will update existing Forestry Program Information and answer TBD information as appropriate/available.

3. All forest clearing and naturally regenerating estimates are based on 200 trees per acre at maturity. Any areas that are not naturally regenerating and are being specifically managed as part of a forestry program project will be reflected accordingly.

2014 Expenditures & Reimbursements:

Project Association	Acreage	# trees	Type of Action	Type of Funding	Expenditure/ Reimbursement (in 2014)	Info. Source
Service Call	...	10	Vegetation Trimming/Pruning	Service Call/CC	(-$2,495.42)	FMS
Front Gate/Relay Rd. Construction	1	11	Tree Removal and Mitigation	Contract	(-$4,000.00)	FMS/ FEAD
FenceLine Clearing Security/Safety Compliance/Landscape Maintenance	...	20	Vegetation Trimming/Pruning	Self-help	(-$1,200.00)	FMS
Ag-lease Ditch Clearing	0	0	Clearing	Agricultural	(-$0.00)	NR-Ag
ArborDay Celebration	...	1	Planting/Care	NR/Self-help	(-$200.00)	NR
Trail Maintenance (Recreation/Education/ Survey Site Access)	3.00	600	Trimming/Pruning	NR/Self-help	(-$236,400.00)	NR
Natural Resources Manager - Forestry Program	3,665.00	...	Forestry Program	NR/Forestry	(-$5,340.00)	IEPD
Natural Resources Specialist	3,665.00	...	Forestry Program	NR/Forestry	(-$5,340.00)	IEPD
Biological Science Technician	3,665.00	...	Forestry Program	NR/Forestry	(-$5,340.00)	IEPD
Conservation Law-enforcement Officer	3,665.00	...	Forestry Program	NR/Forestry	(-$5,340.00)	IEPD
Equipment/Supplies/Maintenance	3,666.00	...	Forestry Program	NR/Forestry	(-$2,000.00)	NR
Contracted Timber Value Reimbursement	0.00	0	Timber Value Reimbursement	Forestry Reserve	(-$0.00)	NR
Firewood Permit Sales	0.00	0	Permit Sale	Forestry	(-$0.00)	NR
Prescribed/Wildland Fire Management	0	0	Fire/Habitat Management	NR	(-$0.00)	NR
Urban Area Tree Assessment	0	0	Vegetation Mngt. Program	NR	(-$0.00)	NR
FY12 Award/FY14 Completed: Natural Heritage/Species and Communities of Concern Inventory		…	Endangered/Species of Concern Mngt. Program	NR	-$180,261.90 (-$85,130.93)	
FY12 Award/FY14 Completed: Migratory and Breeding Bird Inventories		…	Avian Species Mngt. Program	NR	-$40,087.47 (-$19,043.74)	NR
FY12 Award/FY14 Completed: Invasive Species Inventory		…	Invasive Species Mngt. Program	NR	-$53,654.00 (-$26,596.47)	NR

FY12 Award/FY14 Complete: Vegetation Community Classification Mapping		…	Vegetative Mngt. Program	NR	-$74,398.65 (-$5,000.00)	NR
FY13 Award/FY14 Complete: Forest Inventory		…	Forest Mngt. Program	NR	-$36,397.33 (-$28,000.00)	NR
FY14 Awarded/FY16 Complete: Northern-Long-eared Bat Tracking		…	Endangered/Species of Concern Mngt. Program	NR	-$89,772.90 (-$44,886.45)	

2014 Total Urban Forestry Resources Funding Transactions = $476,313.01 *(Includes projects awarded in previous fiscal years, only those portions of funds executed in the current FY were reported. Includes funding associated with any Forest Resources action, including wildlife survey work.)*
2014 Total Urban Forestry Funding Reimbursements = $0.00
(Requirement = $2600.00 based on 1,300 population)

Arbor Day Observance and Proclamation

The annual Arbor Day Tree Planting took place at the NSAHR-NWA Chapel with the pre-school children on 24 April 2014. We planted a native Virginia live oak (*Quercus virginiana*) with: LCDR McLin, Officer in Charge; Michael Wright, Installation Natural Resources Manager; Scott Bachman, Virginia Department of Forestry Representative; several children from the NSAHR-NWA Child Development Center (CDC); and several adults from the community. 25 Children and 16 adults participated in and/or attended the actual tree planting ceremony. Many others contributed to the preparation for the ceremony and others provided continued care for the tree after the ceremony. The CDC classes and WMR staff adopted the tree to help nurse it into becoming a mature tree. The Natural Resources program, in addition to purchasing the tree, purchased tree gators, mulch, and tree protectors to help ensure adequate water supply during early development and to prevent landscaping (mowing & weedwhacking) practices from damaging/scaring the tree. Event announcements were made: on the US Navy Currents Magazine's Facebook and Twitter Accounts; via community email & word of mouth; and via a News Release by the Navy's Public Affairs Officer.

A map of Arbor Day Tree Celebration planting locations is available upon request from the installation's Natural Resources Manager, Mike Wright.

Appendix K

Agricultural Outlease Program

Enclosure 1 Agricultural Outlease Units

Enclosure 2 Soil and Water Conservation Plans

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Enclosure 1. Agricultural Outlease Units

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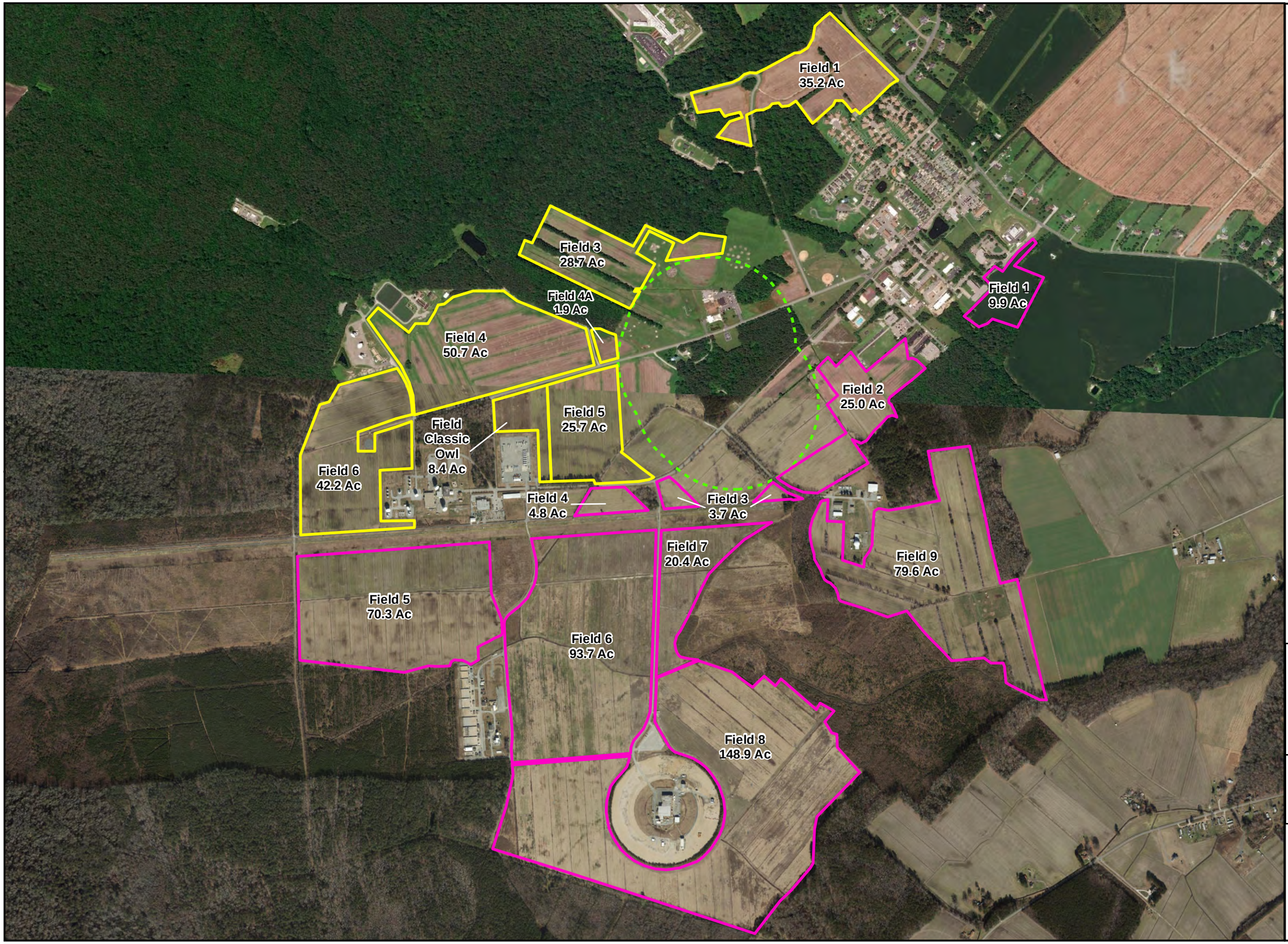

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

OVERVIEW
AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 1 OF 18

Legend

- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

1. **Imagery source: DigitalGlobe (6 Nov 2018)**
2. **All agricultural lease limits and water well locations were provided by the NAVFAC Midlant Planning and Conservation group.**
3. **Scale bar is graphic and based off of an 11x17 print.**

N

0 500 1,000 2,000 Feet

WGS 1984 UTM Zone 18N

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Mapped By: S. Hutt
Reviewed By: R. Allahar
Map Created: 10/9/2019
Cadastral Project #: CSS-284-20-002

NAVFAC Naval Facilities Engineering Command
AM1 Cadastral
AM-1 Mid-Atlantic
Norfolk, VA 23511
(757) 341-0270

Author: sheila.hutt **Date:** 10/9/2019 **Document Path:** Z:\AM 12 Cadastral Survey\CADASTRAL\NAVSUPPACT HAMPTON ROADS_VA\NORTHWEST CHESAPKE VA\PROJECTS\CSS-284-20-002\CSS-284-20-002_1.mxd

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 2 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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N

0 125 250 500 Feet

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NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 3 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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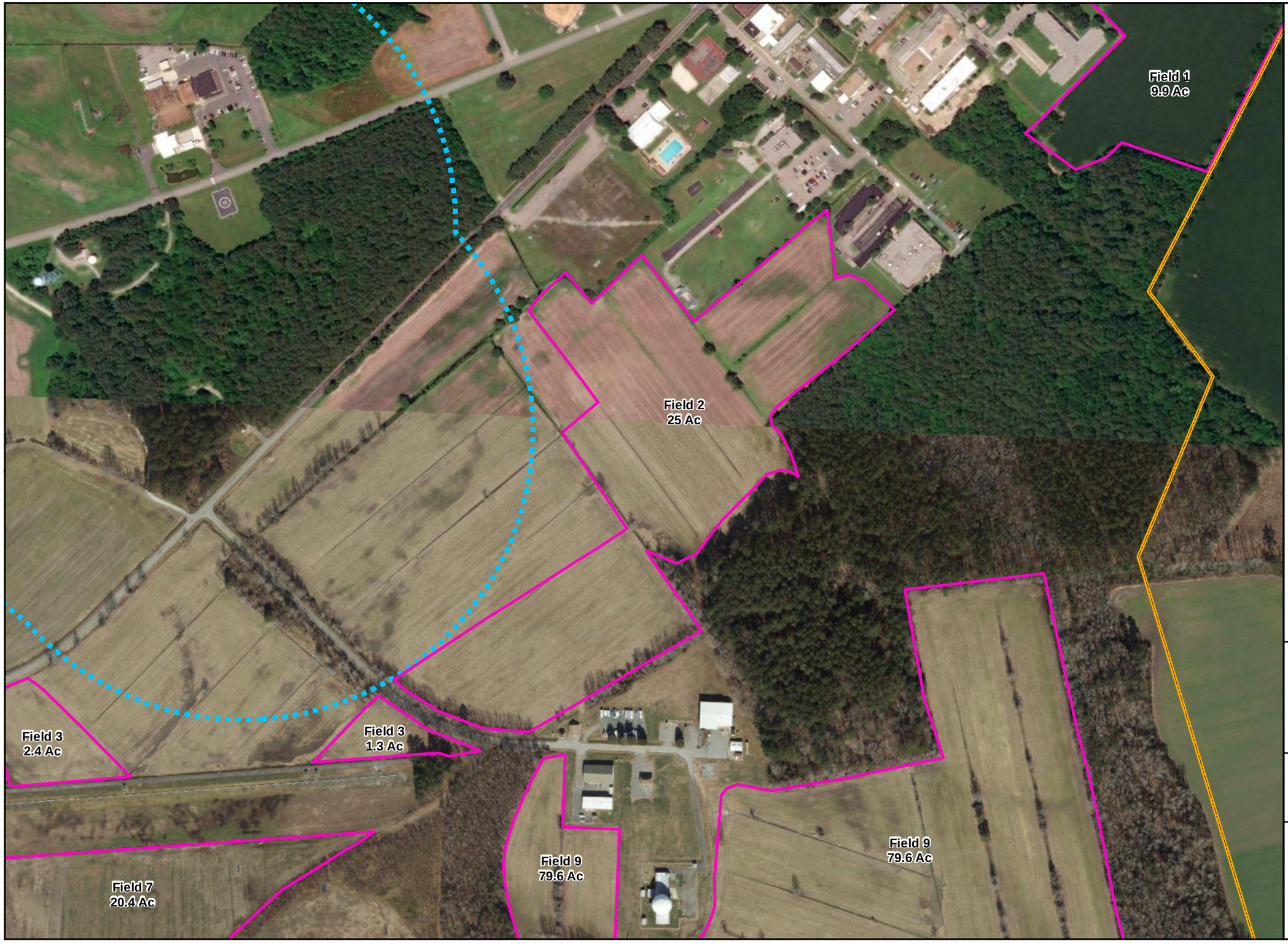

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 4 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

1. **Imagery source: DigitalGlobe (6 Nov 2018)**
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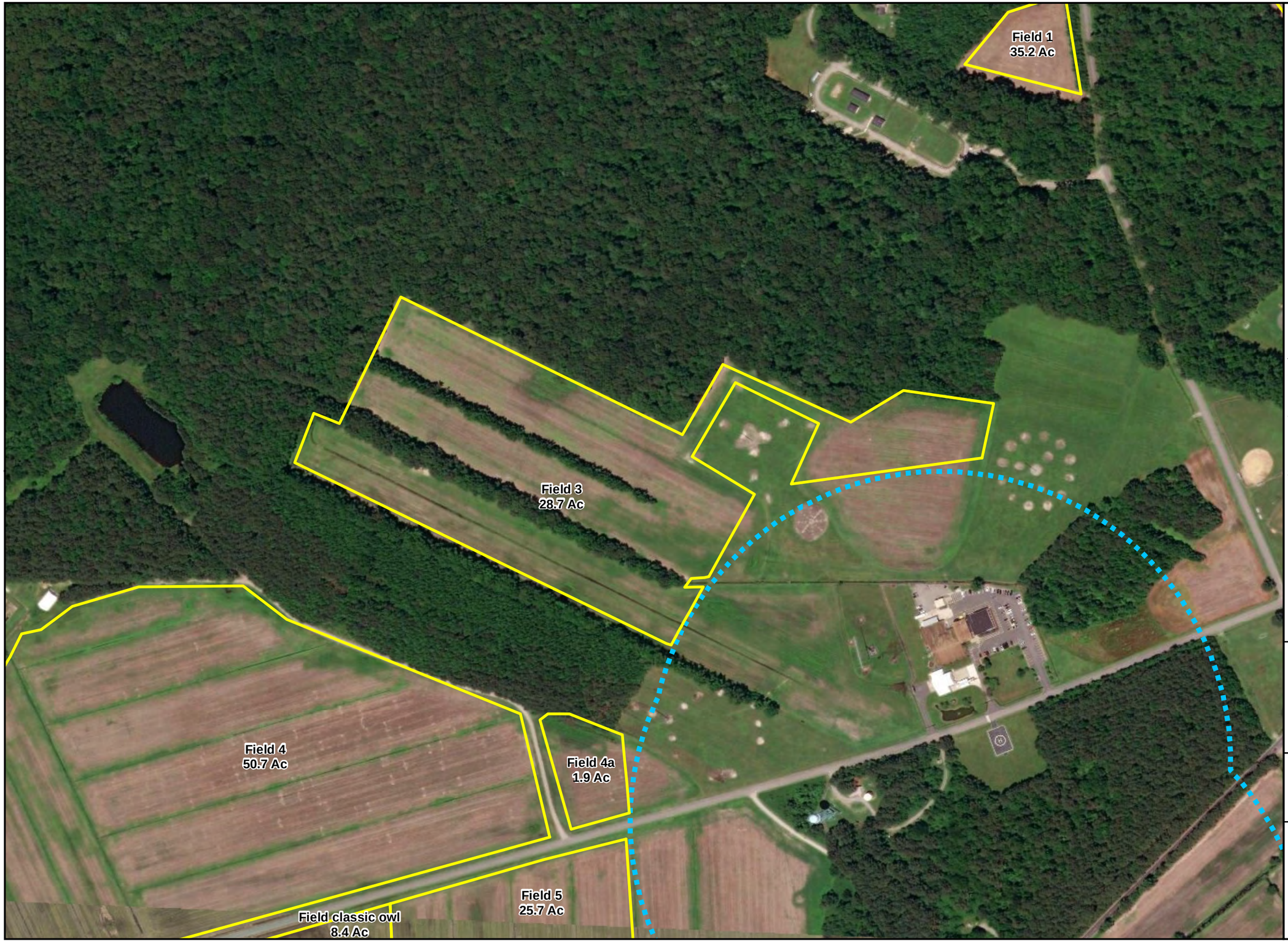
Author: sheila.hutt **Date:** 10/9/2019 **Document Path:** Z:\AM 12 Cadastral Survey\CADASTRAL\NAVSUPPACT HAMPTON ROADS VAINORTHWEST CHESAPKE VA\PROJECTS\CSS-284-20-002\CSS-284-20-002_2.mxd



NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 5 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

1. **Imagery source: DigitalGlobe (6 Nov 2018)**
2. **All agricultural lease limits and water well locations were provided by the NAVFAC Midlant Planning and Conservation group.**
3. **Scale bar is graphic and based off of an 11x17 print.**

N

0 125 250 500 Feet

WGS 1984 UTM Zone 18N

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Mapped By: S. Hutt
Reviewed By: R. Allahar
Map Created: 10/9/2019
Cadastral Project #: CSS-284-20-002

NAVFAC Naval Facilities Engineering Command
AM1 Cadastral

AM-1 Mid-Atlantic
Norfolk, VA 23511
(757) 341-0270

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Field 4
50.7 Ac

Field 4a
1.9 Ac

Field classic owl
8.4 Ac

Field 5
25.7 Ac

Field 2
25 Ac

Field 4
4.8 Ac

Field 3
2.4 Ac

Field 3
1.3 Ac

Field 9
79.6 Ac

Field 7
20.4 Ac

Field 6
93.7 Ac

Field 5
70.3 Ac

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 6 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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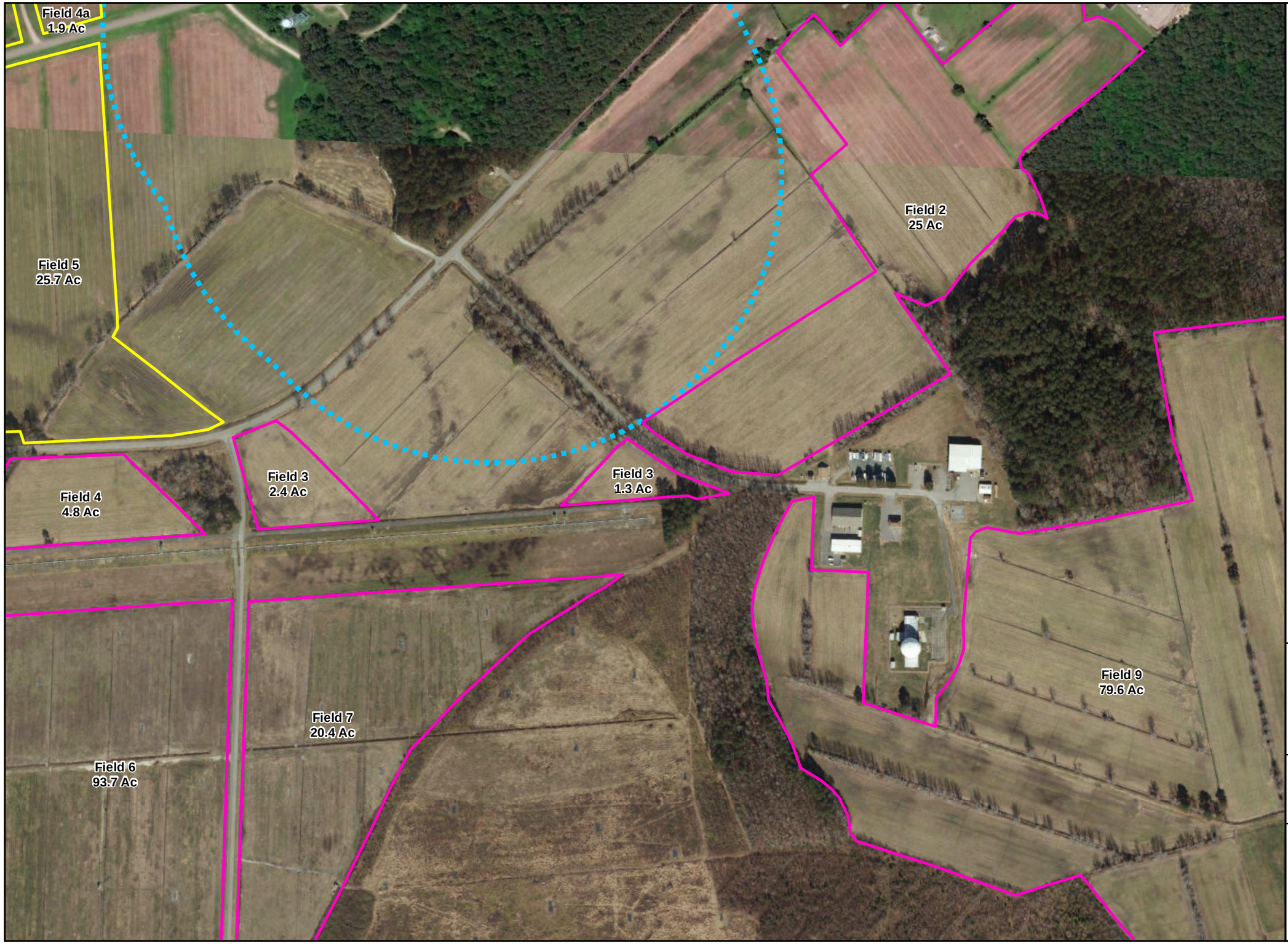

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 7 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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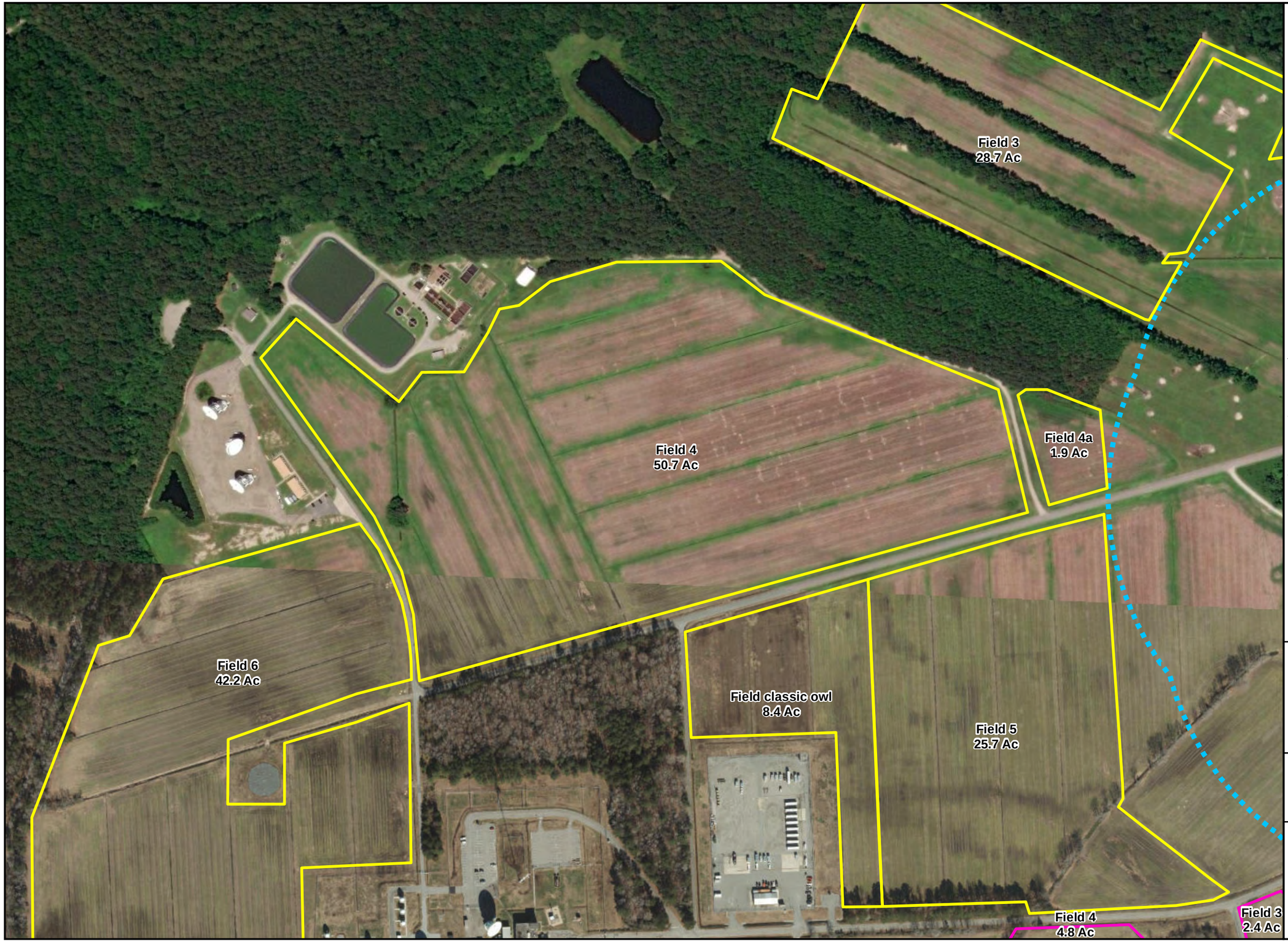

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 8 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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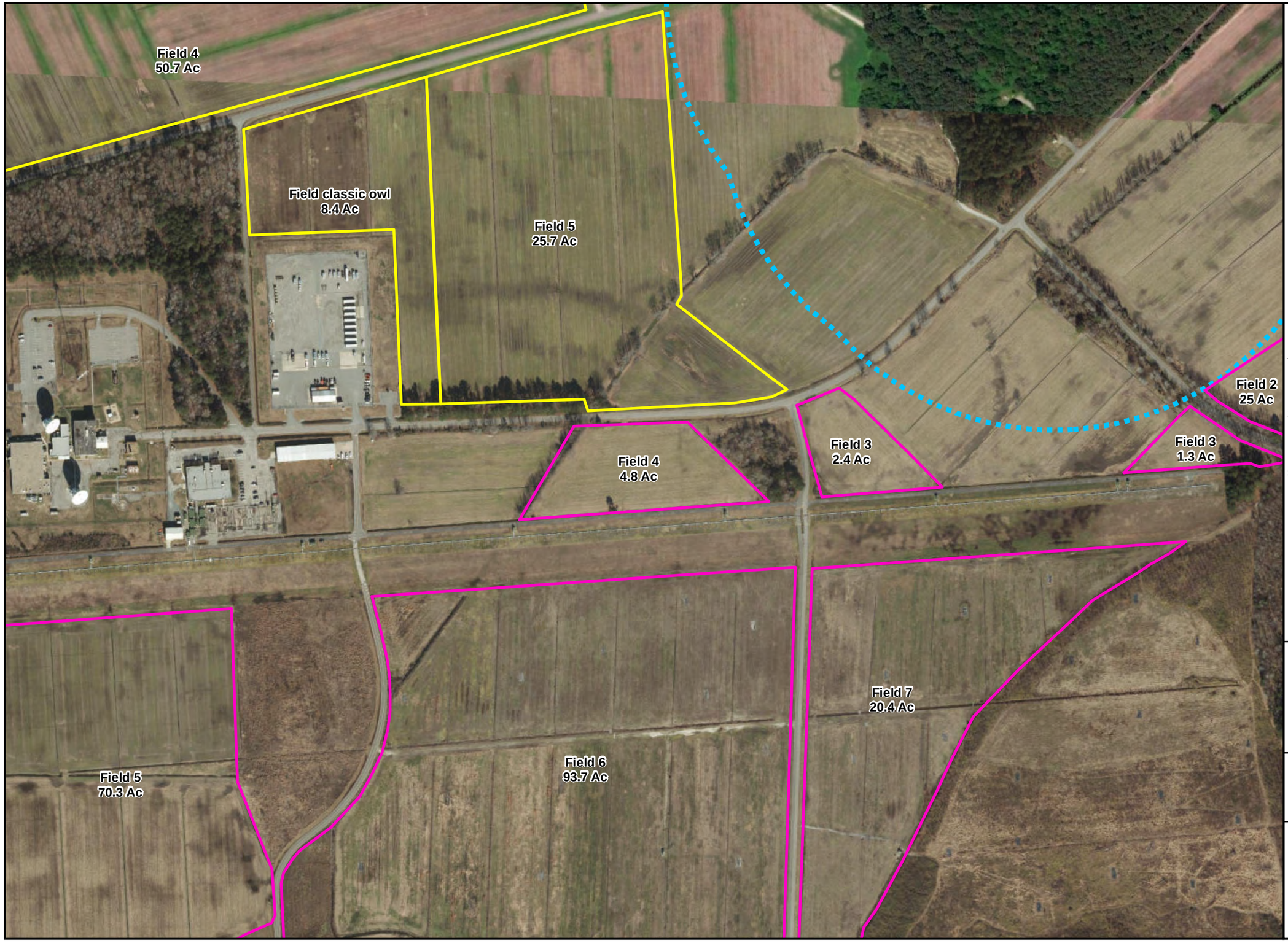

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 9 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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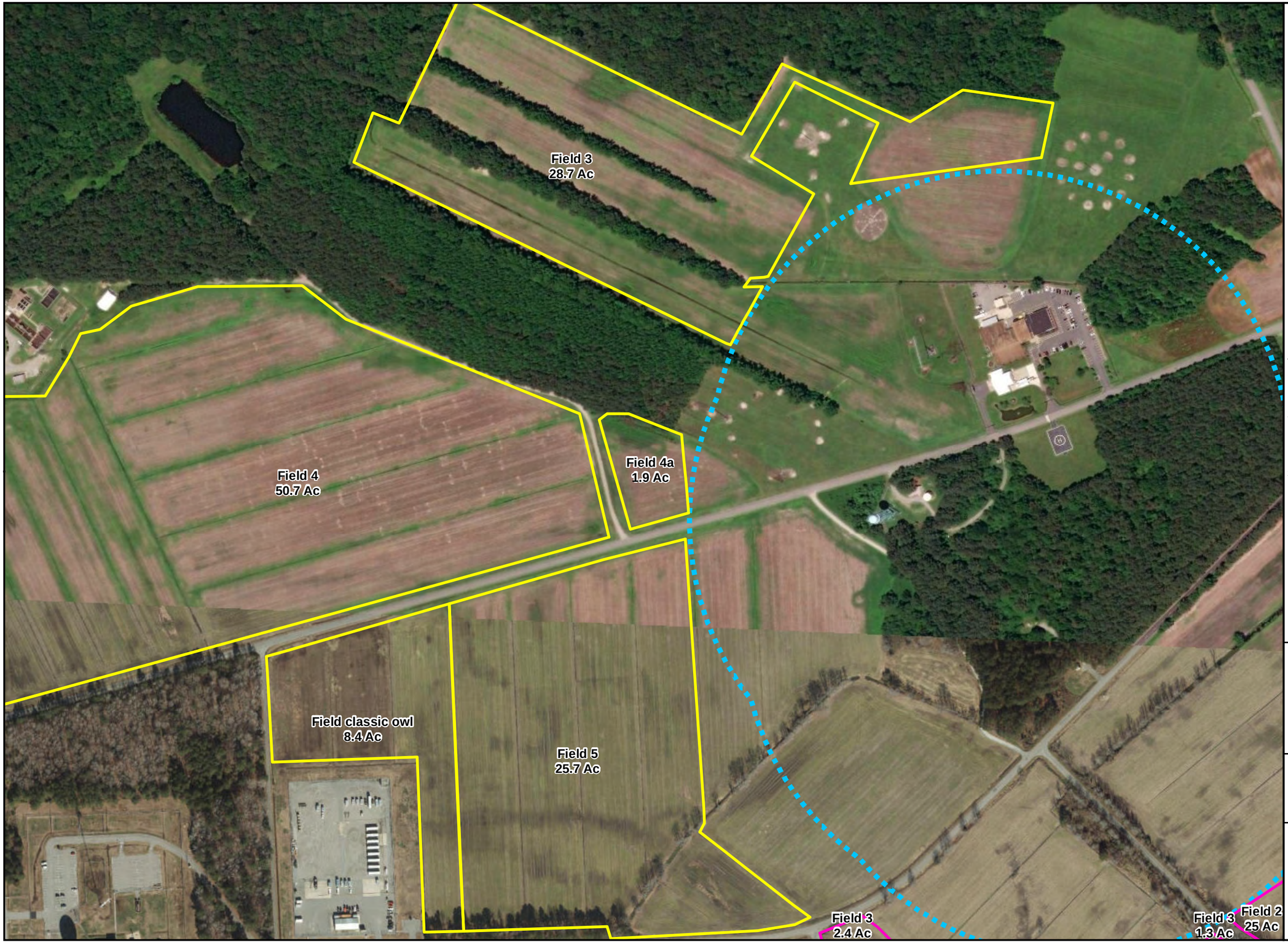

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 10 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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N

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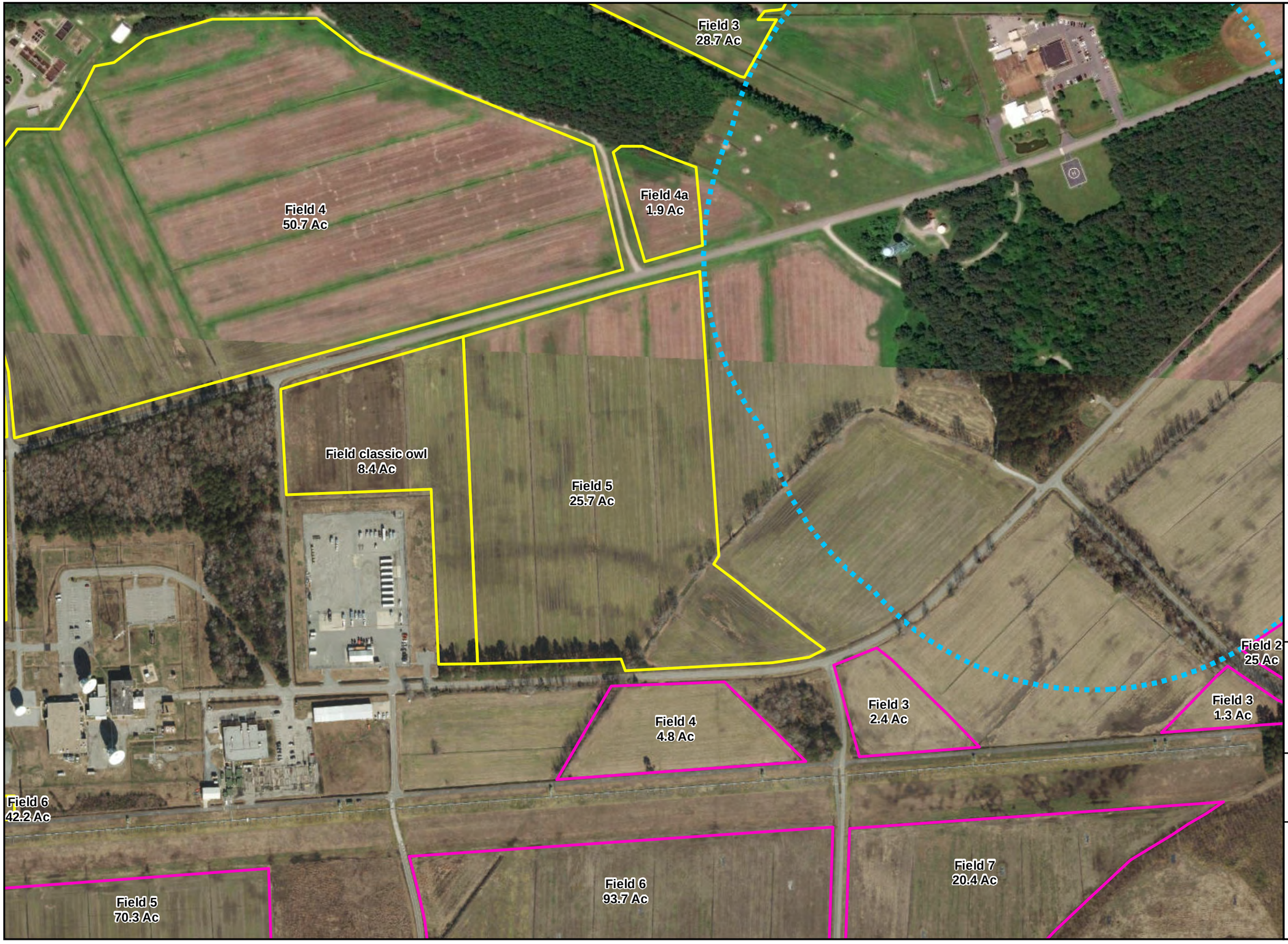

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 11 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

1. **Imagery source: DigitalGlobe (6 Nov 2018)**
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N

0 125 250 500 Feet

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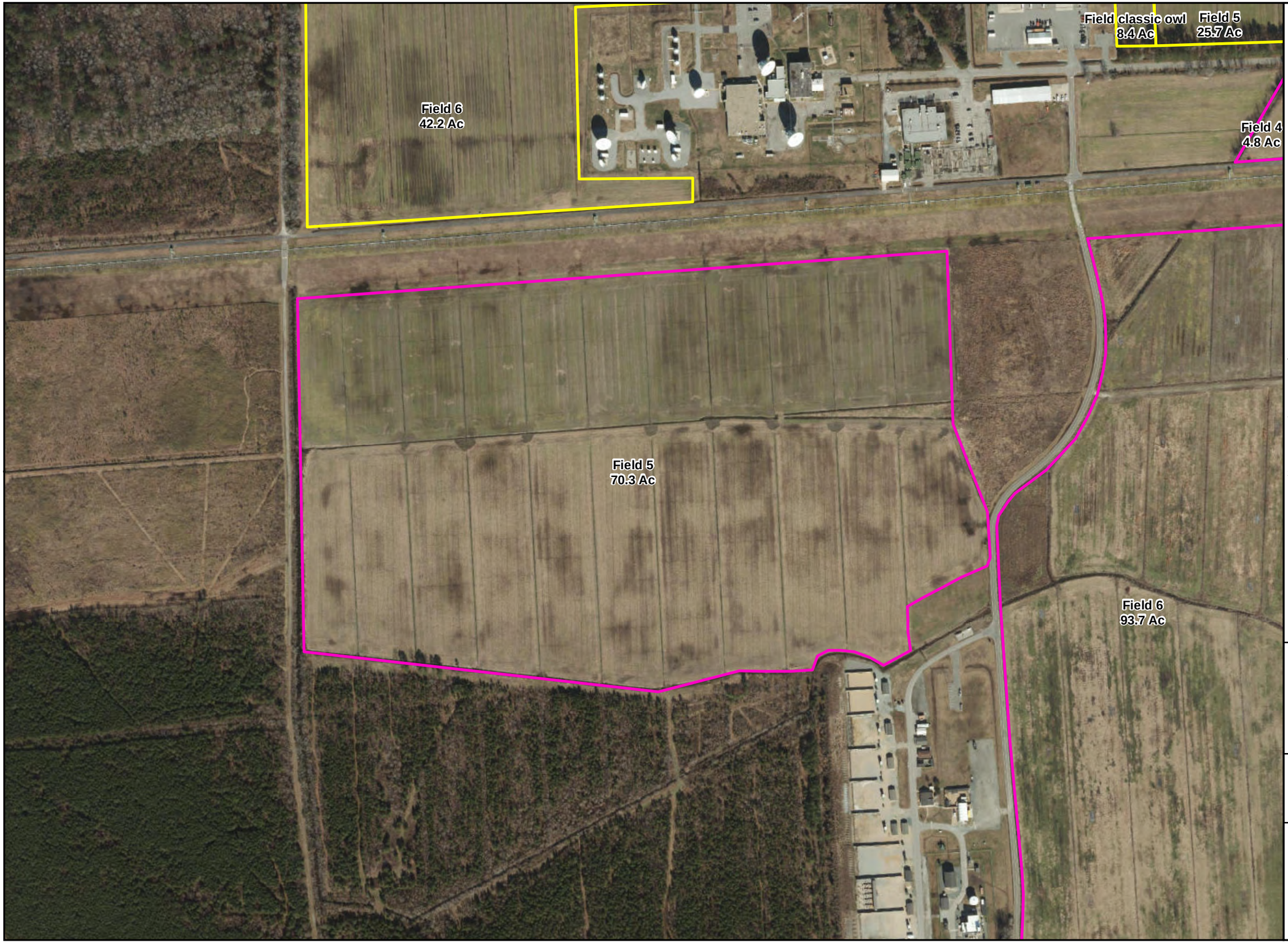

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 12 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

1. **Imagery source: DigitalGlobe (6 Nov 2018)**
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N

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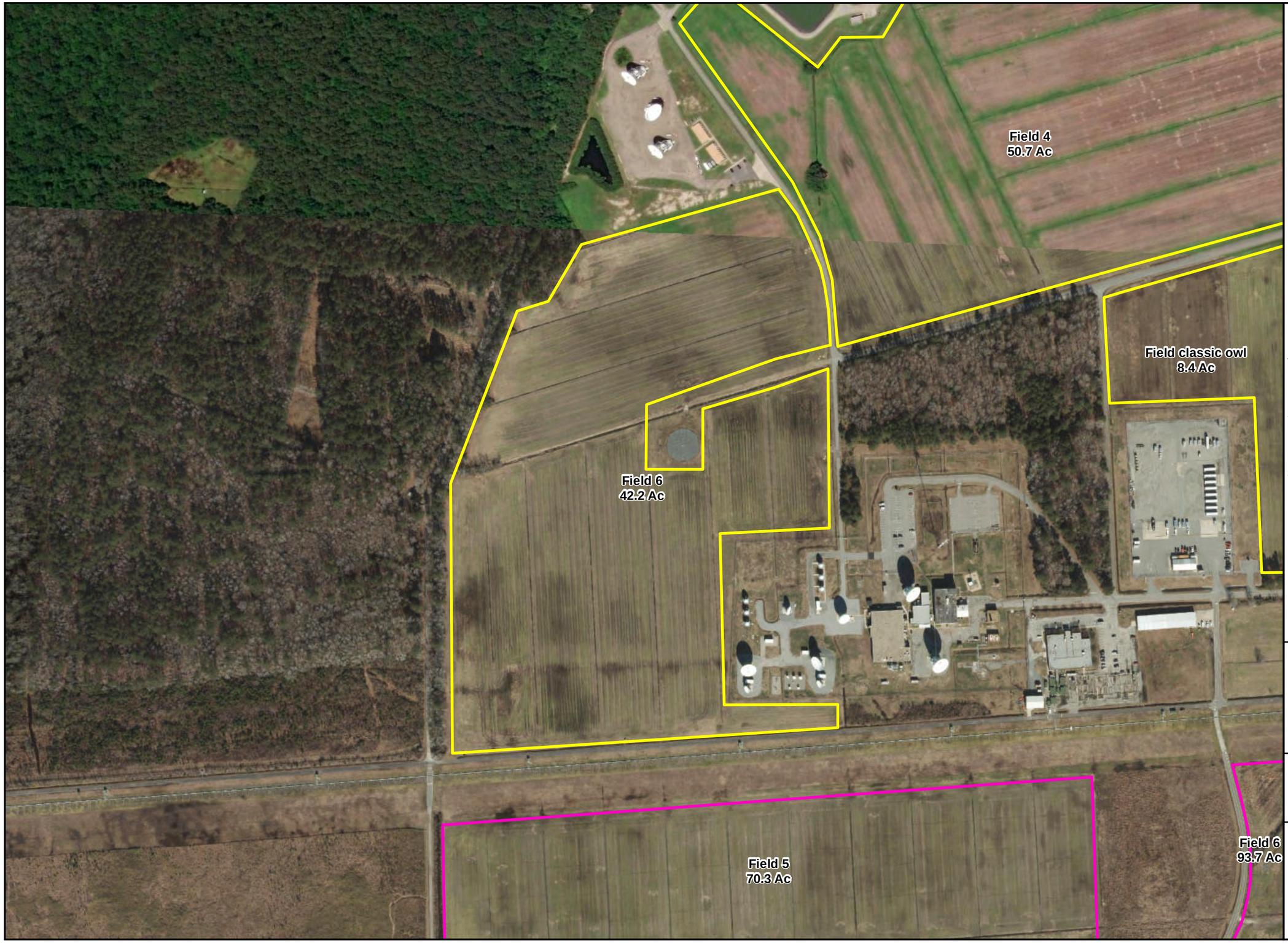

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 13 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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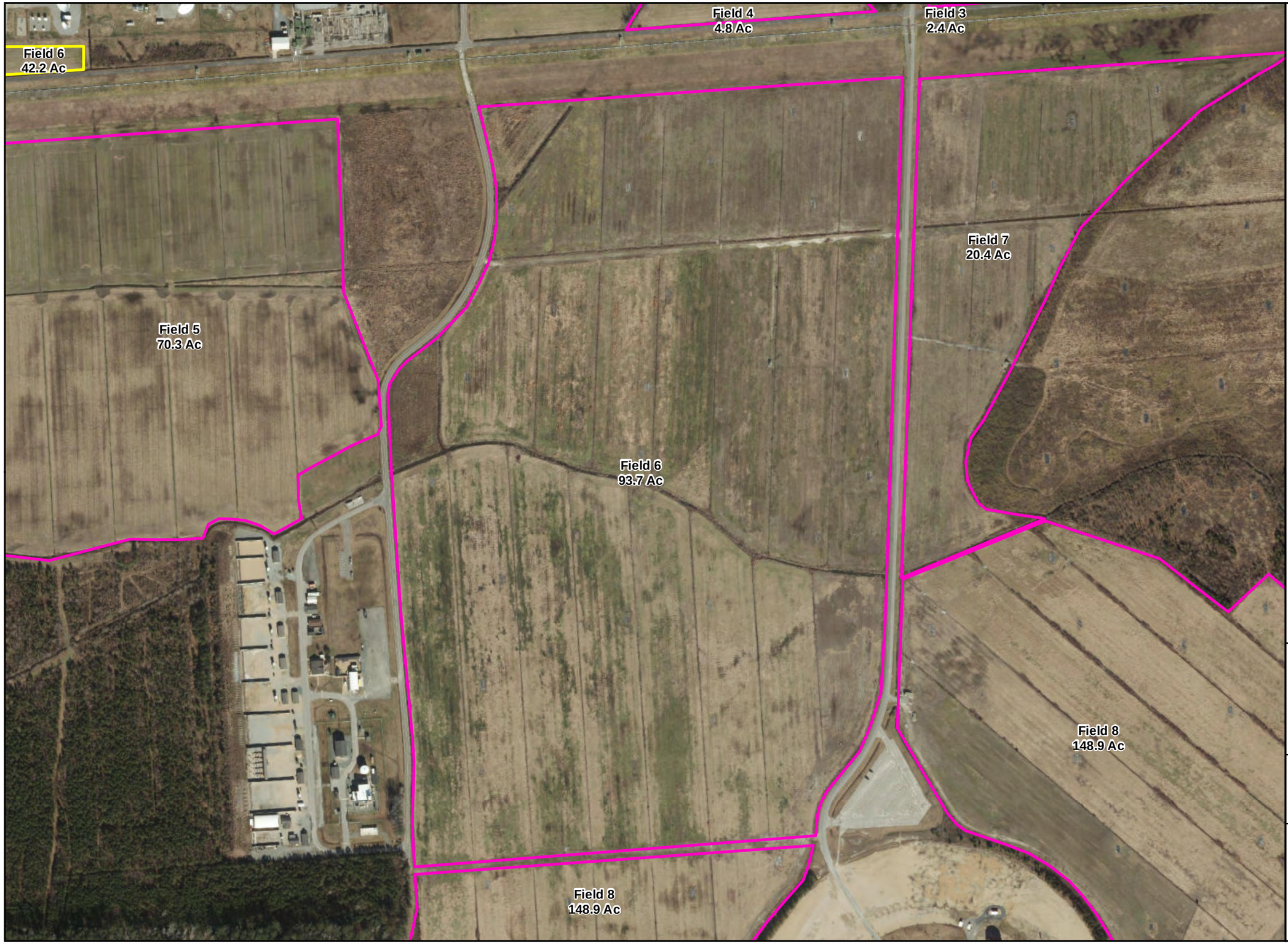

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 14 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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N

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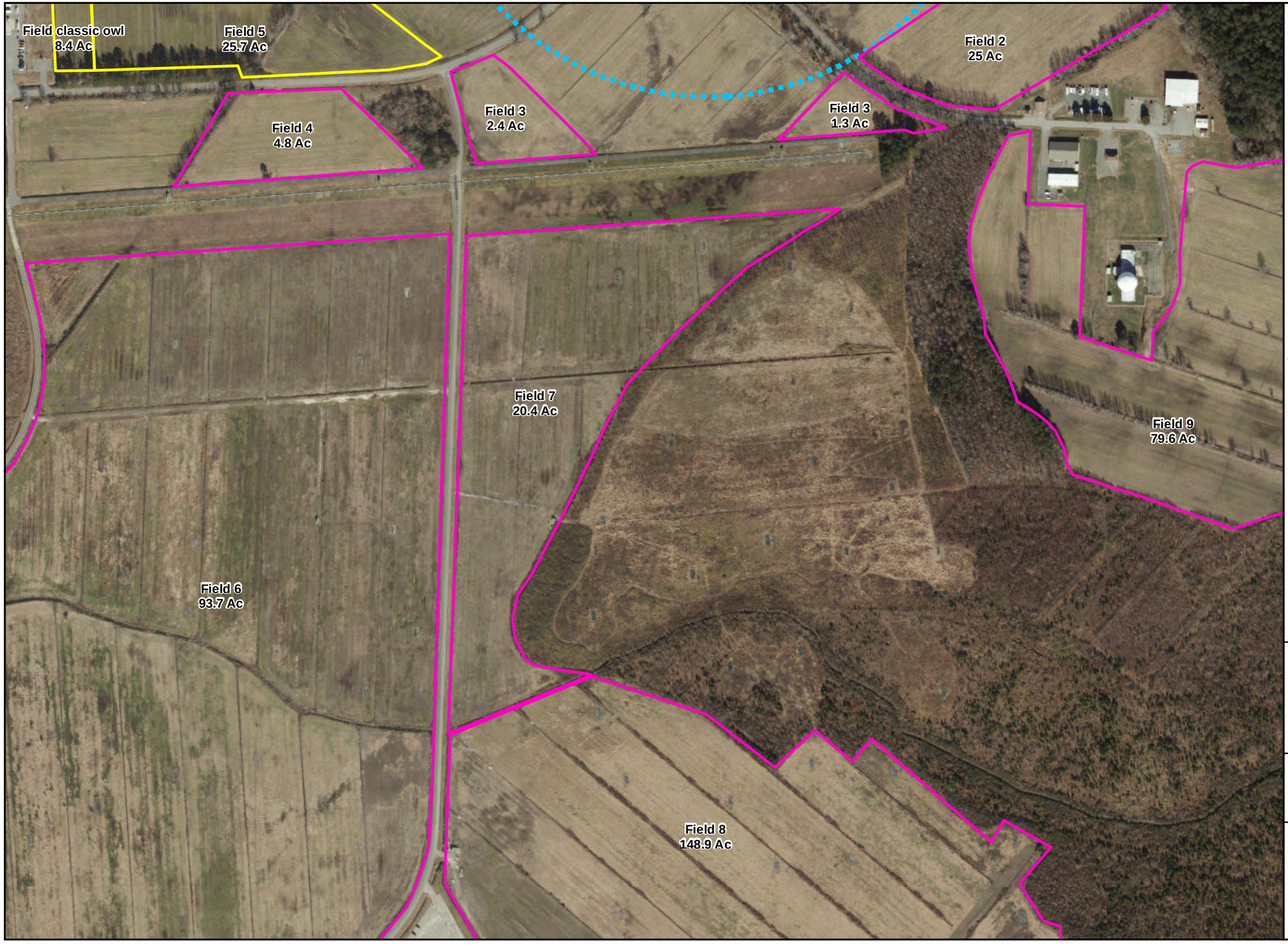

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 15 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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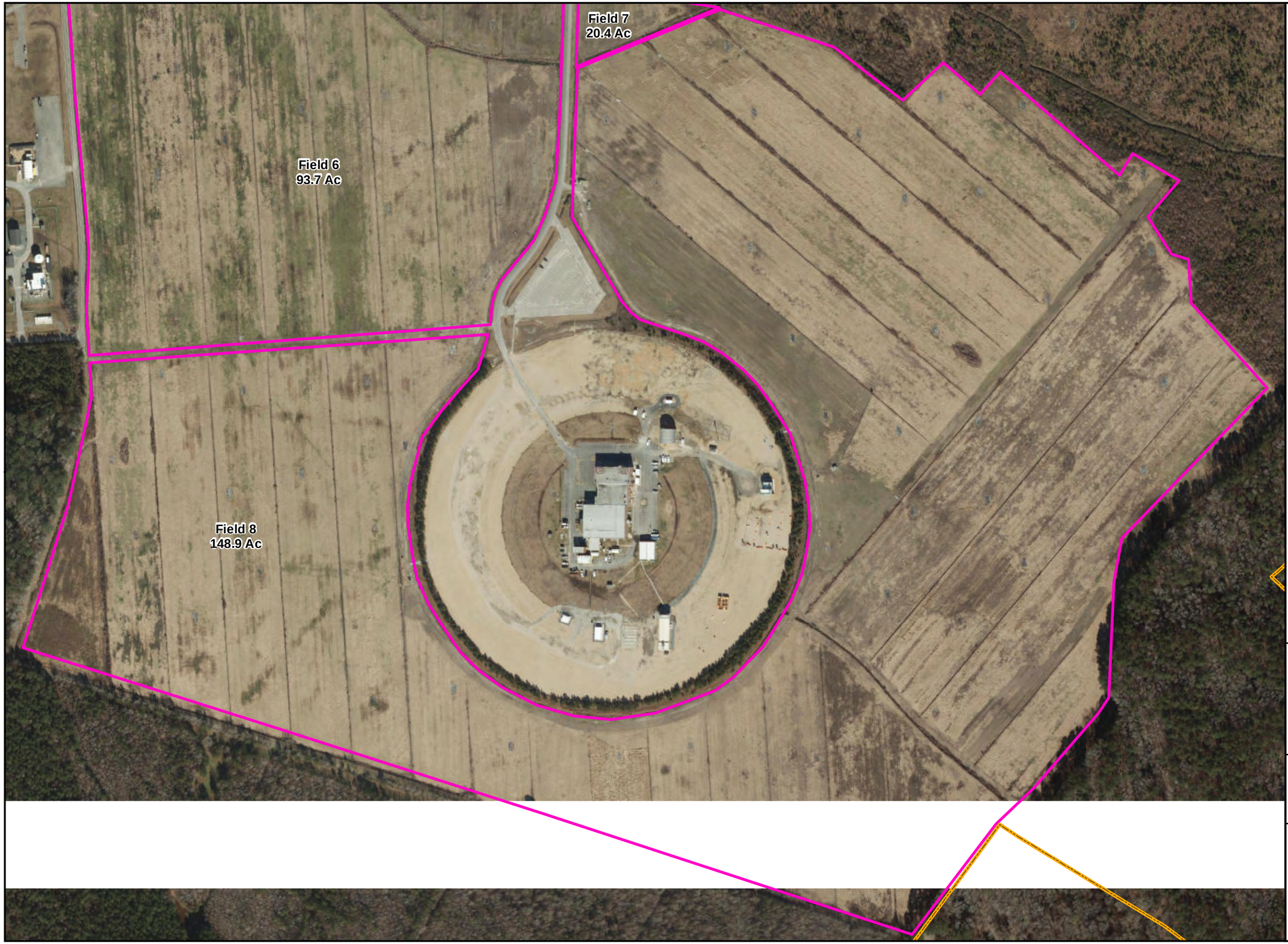

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 16 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

Notes:

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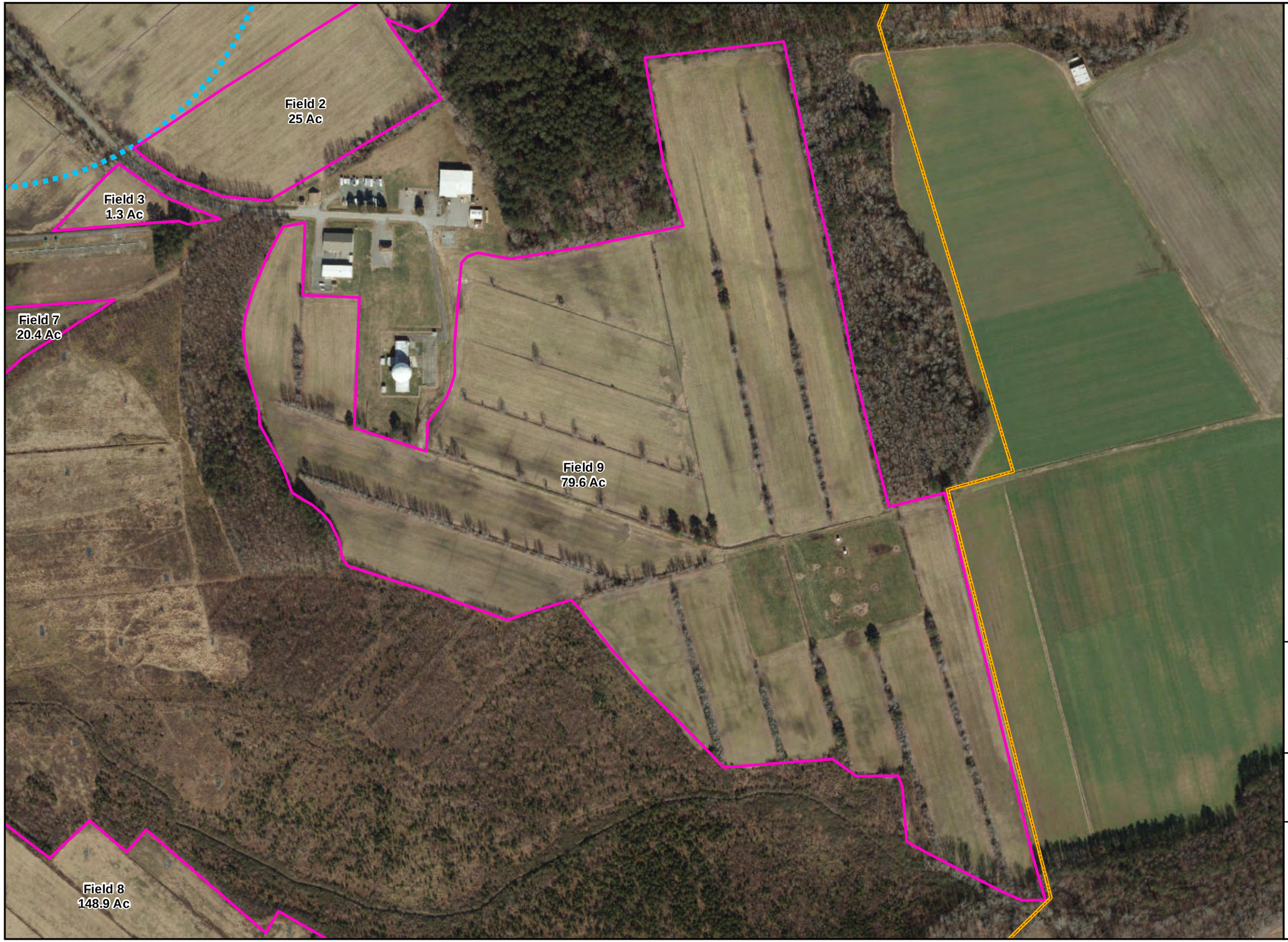

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 17 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

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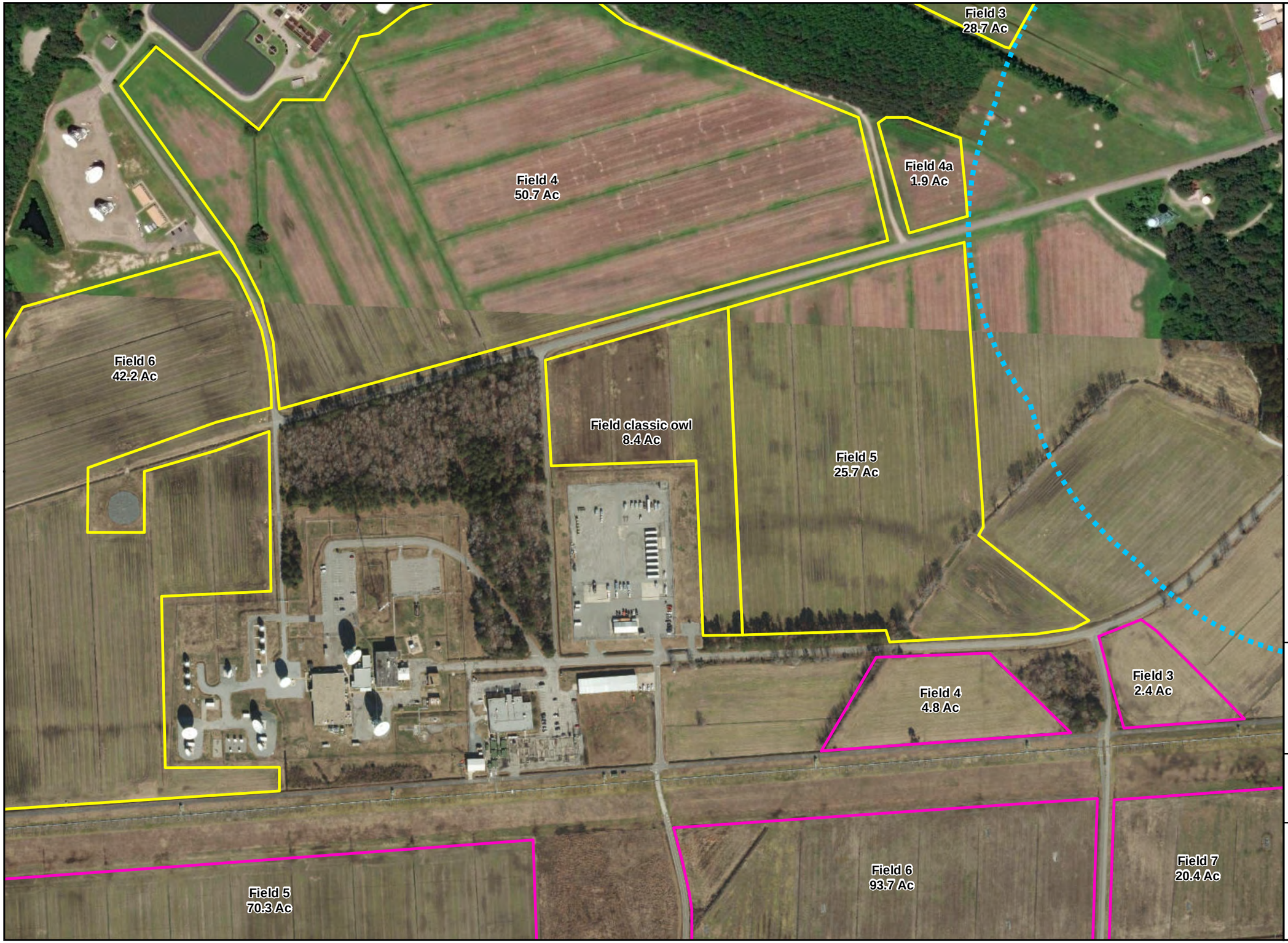

NAVSUPPACT HAMPTON ROADS
NORTHWEST ANNEX

AGRICULTURAL OUTLEASES
UNITS NW-1 & NW-2
CHESAPEAKE, VA

SHEET 18 OF 18

Legend

- Site
- Outgrant NW-1
- Outgrant NW-2
- Well Buffer (1,000 Ft)

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Mapped By: S. Hutt
Reviewed By: R. Allahar
Map Created: 10/9/2019
Cadastral Project #: CSS-284-20-002

NAVFAC Naval Facilities Engineering Command
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AM-1 Mid-Atlantic
Norfolk, VA 23511
(757) 341-0270

Author: sheila.hutt **Date:** 10/9/2019 **Document Path:** Z:\AM 12 Cadastral Survey\CADASTRAL\NAVSUPPACT HAMPTON ROADS VA\NORTHWEST CHESAPKE VA\PROJECTS\CSS-284-20-002\CSS-284-20-002_2.mxd

Enclosure 2. Soil and Water Conservation Plans

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SOIL AND WATER CONSERVATION PLAN

Naval Support Activity Hampton Roads, Northwest — Unit NW-1
Chesapeake, Virginia — Lease Area 192.8 Acres
February 28, 2020

GENERAL INFORMATION

This Plan was prepared by **Mr. Bryan Alexander the Agricultural Lease Manager at the Environmental Planning and Conservation Division, Naval Facilities Engineering Command (NAVFAC MID-Atlantic), Building Z-140, Room 116, 9324 Virginia Avenue, Norfolk, VA 23511 phone 757-341-1656.** Mr. Alexander will be the Government Representative of the Navy in administering the Soil and Water Conservation Plan.

The Real Estate Contracting Officer, Mr. Paul Moomaw, Hampton Roads, Naval Facilities Engineering Command (NAVFAC MID-ATLANTIC) Norfolk, Virginia Telephone 757-433-2678 will be the Government Representative for the Navy in administering the lease.

Daily operational access issues can be resolved by calling the **NSA HR-NWA Natural Resources Manager, Taylor Austin at 757-421-8240 or the NAVFAC MID-ATLANTIC Agricultural Lease Manager, Bryan Alexander at 757-341-1656.**

The unit of land available for agriculture leasing is located at Naval Support Activity Hampton Roads Northwest Annex (NSA HR-NWA), Chesapeake, Virginia. The gross area of 192.8 acres includes access roads and drainage ditches. Net farmable area will be less than the 192.8 acres. The unit is located on the northern side of the Station, and is accessed through the main gate off of Ballahack, Relay and Milepost Roads (Attachment "1").

Special Requirements

During the term of this lease it is required that lessee mow the road shoulders within his lease area. The road shoulders measure approximately 6 acres and immediately bound the lease area. The Lessee must mow these shoulders 2 times per year. The first mowing will take place in June after spring planting, the second in late August just prior to harvest. **Bids should reflect the cost of this mowing.**

Special Provisions

Current military use of the land requires maintaining large expanses of cleared land without obstructions that would interfere with communication operations. **There is a strict prohibition of electronic interference with communications.**

The installation requires that the lessee coordinate at least 72 hours prior to bringing equipment and/or chemicals onto the installation, with the NSA HR-NWA Natural Resources Manager, Taylor Austin at 757-421-8240.

In the event that the lessee experiences a delay or problem caused by the Navy, they must immediately notify the NSA HR-NWA Natural Resources Manager, Taylor Austin to resolve the problem at 757-421-8240.

Hunting on the leased lands is permitted. The Station is responsible for coordinating the programs with the lessee. Excessive damage caused by these activities must be reported immediately to the NSA HR-NWA Natural Resources Manager, Taylor Austin at 757-421-8240.

The Agricultural Lease Manager, Bryan Alexander 757-341-1656 requires a crop report including crop location and planting schedules be provided to him 1 month prior to field preparation and planting each season.

Farming operations are to be restricted to the current agricultural fields that are highlighted on the corresponding map in this plan and to the production of corn, soybeans, small grains, cotton, or hay/silage crops. Though this installation is not an airfield it does have a helicopter landing site and on occasion special event helicopter training exercises. As such, when agreeing to the terms and conditions of the agricultural lease, special attention shall be paid to crop selection and its underlying impacts to Bird/Animal Strike Hazard (BASH). To help mitigate BASH concerns crop location and planting schedules should be provided to the NSA HR-NWA Natural Resources Manager, Taylor Austin 757-421-8240 no later than within 72 hours of field preparation and planting each season.

No farming shall occur within the 20 foot buffer security strips bordering the SATCOM & MUOS fence lines in field 6 and the Classic Owl field. These buffer strips are identified on the map that is included in this plan, see (Attachment "2").

When harvesting crops, spillage should be minimized and cleaned up promptly.

No deviation in land use or drainage improvements, as outlined in this plan, shall be permitted without prior written consent of the Real Estate Contracting Officer.

Under Article 10B of the Lease General Provisions, cultivation of federally subsidized crops on the leased land is prohibited.

The Lessee is required to park and load all farm equipment and vehicles within leased property boundaries.

All equipment should be clean (no visible soil, plant or animal material) prior to arrival on the installation to minimize and avoid the spread of non-native invasive species. It is recommended that all equipment after utilization on the installation also be cleaned prior to utilization on other properties. If equipment is being utilized on one Navy installation and is transported to another Navy installation it must be cleaned prior to use on the other Navy property. Fueling and maintenance of farm equipment should be done offsite prior to being utilized on Navy property. In the event of an emergency, best management practices should be implemented with spill kit.

Cultural Resources

A "Phase I" archaeological survey has been completed at NSA HR-NWA. This survey has identified prehistoric and historic sites on the Station; many of these sites are found within the agricultural units. To alleviate any potential destruction of these sites the State Historic Preservation Officer (SHPO) recommends that the only ground-disturbing activity permitted will be the ongoing agricultural cultivation practices and be limited to the current plow zone. If the lessee anticipates a problem which would cause him to deviate from his current cultivation practices he shall notify the NAVFAC MID-ATLANTIC Agricultural Lease Manager, Bryan Alexander 757-341-1656.

Conservation Inventory

The 192.8 acres is considered a single farming unit. The land is wet and requires drainage. The land capability is Class IIIW for soil type 71 Acredale silt loam. The land capability is Class III when properly drained. Open ditch drainage is required to assure production.

Conservation Practices

All conservation practices shall be performed in accordance with standard specifications of the USDA Natural Resources Conservation Service (NRCS). The Lessee shall utilize the technical services of the local Field Office located at the Municipal Center, Chesapeake, Virginia, in the design, layout, construction, and supervision of the conservation practices performed. All improvements shall become the property of the government at the expiration of the lease.

Soil fertility shall be maintained at the optimum level for the crops that are to be grown. USDA NRCS should be notified if nutrient deficiencies arise and resolved in accordance with their recommendations. USDA NRCS or

the Virginia Tech Extension Service can assist in making fertilizer and lime recommendations that will be sufficient to maintain adequate pH levels and soil fertility.

The use of Hampton Roads Sanitation Division's biosolids disposal program will be approved on a case-by-case scenario. Coordination of this program must be made **30 days** prior to application with the NAVFAC MID-ATLANTIC Agricultural Lease Manager, Bryan Alexander and NSA HR-NWA Natural Resource Manager, Taylor Austin.

Herbicides/Pesticides

Pesticides to be used by the Lessee must be coordinated and approved by Mr. Christopher Martin (757-322-4611) at NAVFAC Atlantic's Applied Biology Section, within 30 days of award of the lease. This includes any potential pesticides used for aerial application. Pesticide requirements are found in Attachments 3 and 4 of this plan, as well as the Armed Forces Pest Management Board Technical Guide 15. All pesticide approvals and the reporting of pesticide use, must be done through the NAVFAC Online Pesticide Reporting System. The web address is: https://noprs.pestlogics.com Contact Mr. Martin @ 757-322-4611 for assistance setting up a NOPRS account. Actual application of herbicides/pesticides shall be reported annually into NOPRS as well as a hard copy submitted to the Agricultural Lease Manager, Bryan Alexander during the yearly agricultural inspection occurring during the month of December.

Application of pesticides will conform to the Environmental Protection Agencies "Worker protection standards" as stated on the Pesticide label.

Mixing of pesticides is allowed on site if the lessee uses spill containment equipment. Storing of pesticides on site is not allowed. Pesticides shall not be mixed or sprayed within the well buffer area identified in Attachment 1.

The Lessee shall report all farm chemical and/or fuel spills, leaks or releases to NSA HR-NWA via the Command Duty Officer number at 757-567-2850 and to the NSA HR-NWA Natural Resources Manager at 757-421-8240.

All aerial application request will be approved on a case by case scenario. The lessee must contact the Agricultural Lease Manager, Bryan Alexander at 757-341-1656 at least 72 hours prior to application event. The pilot of the crop dusting aircraft shall contact the Command Duty Officer (CDO) prior to takeoff to update ETA and location, and coordinate with Air Traffic Control, where required.

The Pilot shall contact the NTU Tower prior to entering the Class Delta airspace and receive clearance to begin the spray operations.

The Officer In Charge will determine whether or not to cancel or reschedule the operation.

The control and/or eradication of Federal and State listed noxious weeds, particularly **Johnsongrass,** *Sorghum halepense*, is required. Any pesticides and herbicides used for insect, disease, or weed control shall be approved and registered by the Environmental Protection Agency and the Commonwealth of Virginia. New pesticed requests are required to be submitted through NOPRS and must be approved prior to use.

The lessee is responsible for removal of all debris, refuse, garbage, pesticide containers, and unused residue of farm operations from the leased area and the Installation. The Lessee is encouraged to use the City of Chesapeake's pesticide container recycling program (see back of pesticide form for information).

Additional requirements for pesticide use on the property are provided in Attachment 3, Pesticide Mixing, Storage and Use on Navy-Owned Property Leased for Agricultural Purposes.

Conservation Requirements

Non-Reimbursable work

Soil and water conservation goals on this property include control of surface run-off and concurrent reduction in soil erosion, sedimentation and nutrient loading. The following measures will achieve these goals and are the responsibility of the lessee:

1. A conservation cropping system shall be established to include minimum tillage.

2. Maintenance of ditches and culverts is the responsibility of the lessee (subject to inspection at any time during the term of the lease) and shall include the following:

a. Mowing of ditch banks is required every other year of the lease. Mowing must be completed by 31 December. If this poses a problem for the lessee, he should notify the NAVFAC MID-ATLANTIC Agricultural Lease Manager, Bryan Alexander at 757-341-1656.

c. Boundary ditches are considered lease area to the ditch center-line

3. Any acreage not cropped shall be seeded to a cover crop of hay or silage for protection and erosion control. If land is left fallow crop residue shall be left on the soil surface as a winter cover to provide mulch and soil improvement until seedbed preparation the following spring. Minimum tillage practices are encouraged.

Yearly inspections by the Agricultural Lease Manager, Bryan Alexander will ensure compliance with these conditions and other environmental requirements.

Reimbursable Work

During the term of this lease, it is anticipated that reimbursable work will be requested. The reimbursable work will be based on a scope of work furnished by the Agricultural Lease Manager, Mr. Bryan Alexander. The Lessee will be requested to provide an estimate for the work based on the scope of work. If the Lessee decides not to do the work himself, he may contract with a third party to do so (to be approved by the Real Estate Contracting Officer), or inform the Government that he is not capable of performing the work.

If the proposal is acceptable the Real Estate Contracting Officer will either; (1) issue a letter of authorization to begin work or (2) will forward a lease modification to the lease authorizing the work. Work should not begin until the letter of authorization or lease modification has been received.

When the work has been completed, a joint inspection will be performed by the Lessee and the Agricultural Lease Manager, Bryan Alexander. If the work is complete and acceptable, terms of the letter or modification will be activated (i.e., rent reduction granted).

GOVERNMENT OFFICES CONCERNED WITH THIS LEASE

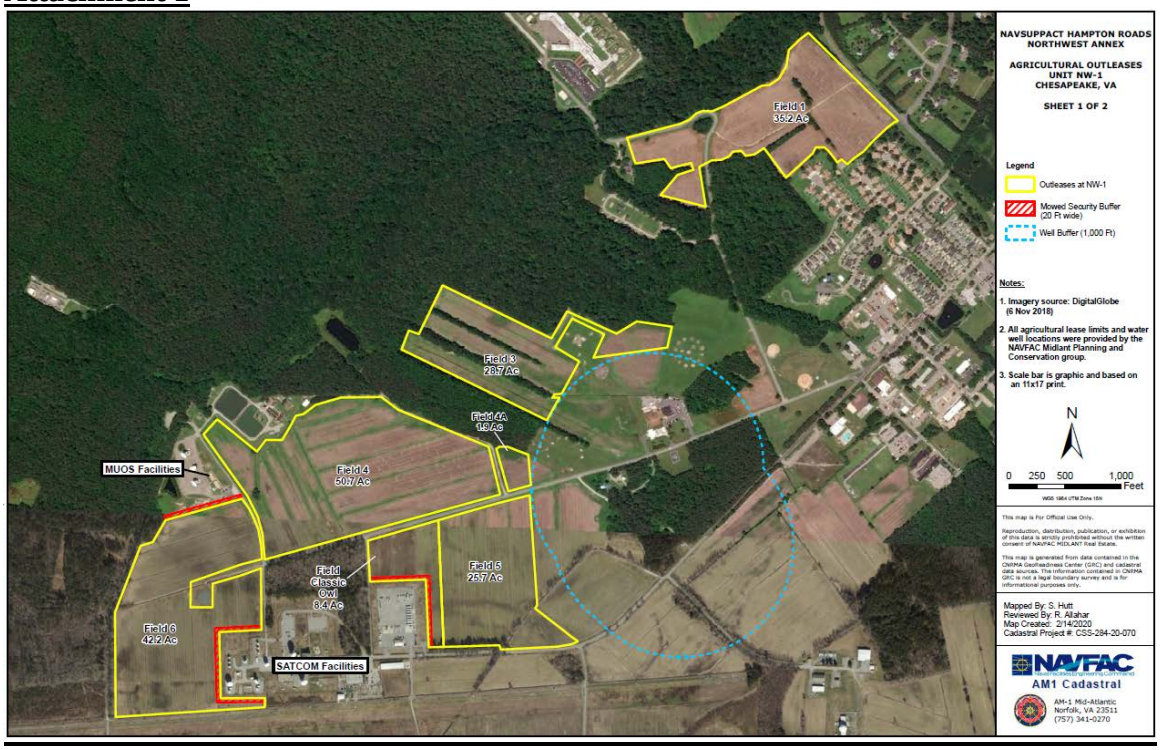
Mr. Bryan Alexander
Agricultural Lease Manager
NAVFAC Mid-Atlantic
9324 Virginia Avenue.
Norfolk, VA 23511
(757) 341-1656

Mr. Taylor Austin
Natural & Cultural Resources Manager
1321 Northwest Blvd
Building 8
Chesapeake, VA 23322
(757) 421-8240

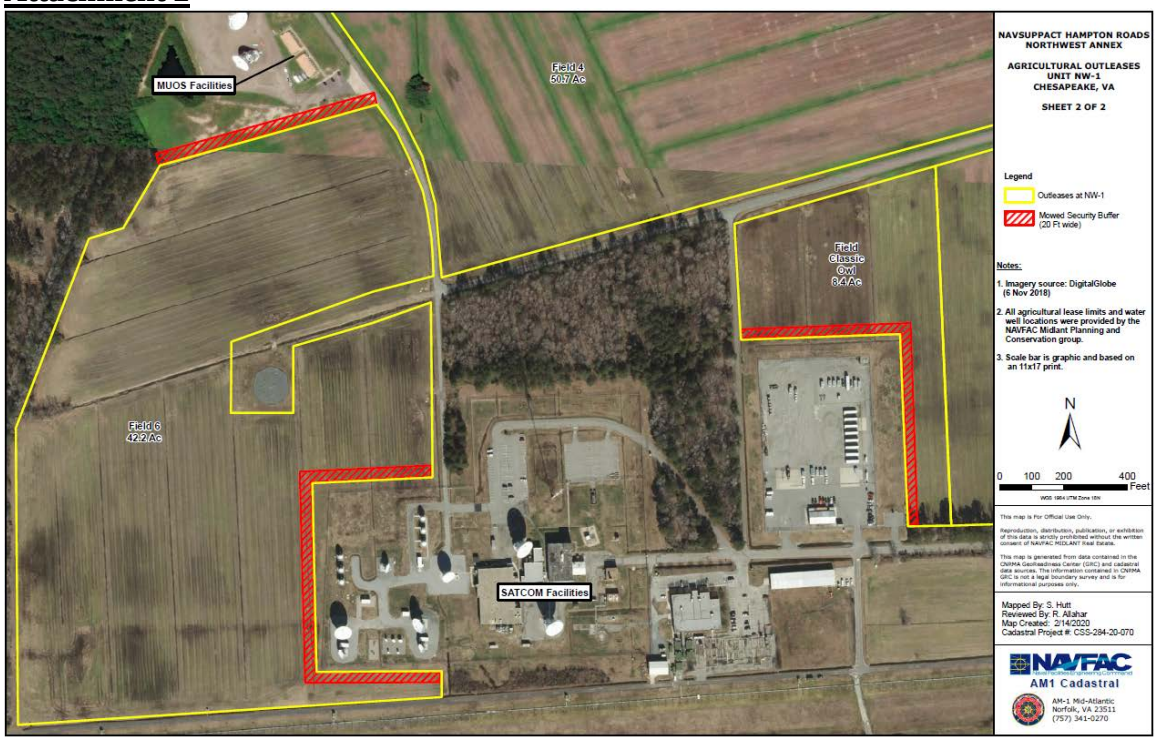
Mr. Paul Moomaw
Real Estate Contracting Officer
Naval Facilities Engineering Command
Mid-Atlantic
Virginia Ave
Norfolk, VA 23511-2699
(757) 433-2678

Amanda R. M. Pack
Deputy Director, Real Estate Services
Operations Branch Manager
NAVFAC Mid-Atlantic Asset Management
9324 Virginia Avenue
Norfolk, VA 23511-3095
757-341-1996

Attachment 1



Attachment 2



ATTACHMENT 3

Pesticide Mixing, Storage, and Use
on
Navy-Owned Property
Leased for Agricultural Purposes

1. a. Certified Applicators Requirement

All pesticide applications shall be performed by a State-certified pesticide applicator. Private applicator's licenses are acceptable if the Lessee performs the work. Commercial grade license(s) are required if the Lessee hires (for fee) an application company to apply the pesticide(s). "Registered Technician" status is not permitted to apply pesticides on DoD property. The pesticide applicator shall be certified in the category in which the work will be performed.

b. Integrated Pest Management

Integrated Pest Management (IPM) is a pest population management system that uses all suitable control techniques (chemical, biological, cultural, mechanical, or physical) to maintain pest populations at or below tolerable levels. Integrated Pest Management (IPM) techniques shall be used to the maximum extent practicable.

2. SUBMITTAL REQUIREMENTS

a. Business License

If a commercial applicator will apply pesticides (i.e. the Lessee does NOT have a private applicators license), the commercial applicator shall provide proof of a business license (as a pesticide application business) as required by the Commonwealth of Virginia. A copy of this business license shall be forwarded to the Agricultural Lease Manager, Bryan Alexander before the pesticide application(s) are performed.

b. Certificate of Insurance

If a commercial applicator will apply pesticide(s), proof of Insurance as a pesticide applicator business shall be forwarded to the Navy representative designated as responsible for oversight of the outlease before the pesticide application(s) are performed.

c. Pesticide Approval

All pesticides must be approved within 30 days after award of lease. Approval is based on EPA registration number. A list of the pesticide(s) proposed for use (by either a private and/or commercial applicator) shall be submitted into NOPRS for approval before the pesticide application(s) are performed. Any changes in pesticides to be used shall have prior approval before their use (Submittal for changes shall be entered into NOPRS).

d. Pesticide Labels and Safety Data Sheets

Submit copies of labels and safety data sheets to the Agricultural Lease Manager, Bryan Alexander.

e. Commercial Pesticide Applicators Certificate(s) In the Appropriate Categories

Submit legible copies of State pesticide applicators certificate(s) in the appropriate applicator categories (the category in which the work will be performed) to the Agricultural Lease Manager, Bryan Alexander.

f. Pesticide Label Reference Book

The Lessee shall maintain a reference book of approved pesticide labels and Safety Data Sheets (MSDS), and have it readily available **ON-SITE** (in the truck or other vehicle that was used to arrive on site) whenever any pesticides are on site. The reference book shall be readily available for inspection. Label and SDS requirements are based on EPA registration number.

g. Reporting Pesticide and Fertilizer Use

The Lessee shall report all pesticide and/or fertilizer use annually into NOPRS, as well as, submit a hard copy to the Agricultural Lease Manager, Bryan Alexander during the annual agricultural inspection occurring during the month of December.

3. PESTICIDE APPLICATION AND CONTROL OPERATIONS

All pesticides must be used in accordance with Federal, state, local, and installation publications, and any requirements identified in attachments. All pesticides shall be procured, processed, handled, and applied in strict accordance with the manufacturer's label. All pesticides shall be registered with the U.S. Environmental Protection Agency and the Commonwealth of Virginia's pesticide regulatory agency.

a. Pesticide Preparation and Use.

During preparation, and/or application of pesticides, the Contractor shall:

(1) Always store pesticides in original containers having EPA-registered labels or in containers meeting EPA label requirements; and
(2) Use application equipment appropriate for the nature and size of work, that is clean, calibrated, and in proper operational condition; and
(3) Never leave equipment unattended during filling and application/usage; and
(4) Use back flow preventers on hoses when connected to water outlets in filling operations, and
(5) Inspect equipment (per manufacturer's label) and the area during application to insure proper and safe treatment; and
(6) Keep safety equipment and spill kit available on site when pesticides are present.

b. Pesticide Mixing.

The Lessee shall mix pesticides on a portable containment device. The device shall be capable of containing 110% of capacity.

c. Storage of Pesticides.

No pesticides shall be stored at the site. Any pesticide container and/or application tank shall be secured against theft and vandalism when the site is unattended during the day. Only those pesticides expected to be used that day should be imported to the site.

d. Pesticide Disposal.

The Lessee shall not dispose of any pesticides, pesticide containers, pesticide residue, pesticide rinse water, or any pesticide contaminated articles on government property.

e. Spill Management.

A pesticide spill containment kit shall be available on site if pesticides are being applied. Follow the requirements that are written in the Armed Forces Pest Management Board Technical Guide 15 that is attached to this plan.

f. **Safety Equipment.**

When pesticides are being mixed or applied, a portable eyewash station and at least 2 gallons of fresh water (in plastic jugs marked “emergency wash water”) shall be within 25 feet of the operation.

g. Pesticide Spills and Decontamination.

The Lessee is responsible for properly cleaning, decontaminating, and reporting pesticide spills to the Agricultural Lease Manager, Bryan Alexander.

h. Pesticide Dispersal Equipment Markings.

All pesticide dispersal equipment shall be clearly and plainly marked with "DANGER"..."PESTICIDES".

4. SPECIFIC PESTICIDE USE PROVISIONS

a. The Lessee shall coordinate, 72 hours in advance, with the Agricultural Lease Manager, Bryan Alexander, that pesticide(s) and/or application equipment will be brought onto the site.

b. All application of pesticides shall conform to the Worker Protection Standards CFR 170 as amended.

c. All pesticide applications shall conform to all label and supplemental labeling of the pesticide product.

d. All applicable laws and regulations regarding notification and posting shall be strictly adhered to.

e. Pesticides shall not be mixed or sprayed within the well field buffer identified in Attachment 1.

5. HERBICIDE REQUIREMENTS

Only glyphosate herbicides may be used for non-selective vegetation management. Paraquat use is not permitted. Simizine or any simizine family herbicide use is not permitted. Selective herbicides may be approved for use. If lessee is growing cotton specialty defoliant herbicides will be authorized through the normal approval process.

ATTACHMENT "4"

REPORTING REQUIREMENTS

Item # Description	Submit To
1. Request pesticide additions through NOPRS	Submit online at https://noprs.pestlogics.com/
2. Submit copies of current State Certification For all employees that will be applying pesticides, Including those of contract Commercial Applicators 30 days after award of lease. Include copies of proof of insurance by Commercial Applicator.	Bryan Alexander, NAVFAC Mid-Atlantic Agricultural Lease Manager
.	
3. Submit Soil Test and Nutrient management plan 90 days after award of lease.	Bryan Alexander, NAVFAC Mid-Atlantic Agricultural Lease Manager
4. Report pesticide use on NOPRS annually Including negative reports	Submit online at https://noprs.pestlogics.com/
5. Pesticide Spill Report Immediately	NSA HR-NWA Natural Resources Manager Emergency Communication Center
6. Approval of Aerial Pesticide application 72 hours prior	Christopher Martin, NAVFAC Atlantic Entomologist Bryan Alexander, NAVFAC Mid-Atlantic Agricultural Lease Manager Taylor Austin, NSA HR-NWA Natural Resources Manager

Submit all pesticide approvals in the NAVFAC Online Pesticide Reporting System:
https://noprs.pestlogics.com/
Contact Christopher Martin @ 757-322-4611 for assistance setting up a NOPRS account.

SOIL AND WATER CONSERVATION PLAN

Naval Support Activity Hampton Roads, Northwest — Unit NW-2
Chesapeake, Virginia — Lease Area 456.3 Acres
February 28, 2020

GENERAL INFORMATION

This Plan was prepared by **Mr. Bryan Alexander the Agricultural Lease Manager at the Environmental Planning and Conservation Division, Naval Facilities Engineering Command (NAVFAC MID-Atlantic), Building Z-140, Room 116, 9324 Virginia Avenue, Norfolk, VA 23511 phone 757-341-1656.** Mr. Alexander will be the Government Representative of the Navy in administering the Soil and Water Conservation Plan.

The Real Estate Contracting Officer, Mr. Paul Moomaw, Hampton Roads, Naval Facilities Engineering Command (NAVFAC MID-ATLANTIC) Norfolk, Virginia Telephone 757-433-2678 will be the Government Representative for the Navy in administering the lease.

Daily operational access issues can be resolved by calling the **NSA HR-NWA Hampton Roads Natural Resources Manager, Taylor Austin at 757-421-8240 or the NAVFAC MID-ATLANTIC Agricultural Lease Manager, Bryan Alexander at 757-341-1656.**

The unit of land available for agriculture leasing is located at NSA HR-NWA , Chesapeake, Virginia. The gross area of approximately 456.3 acres includes access roads and drainage ditches. See (attachment "1").

Special Requirements

Except for Fields 1 and 2, during the term of this lease it is required that lessee mow the road shoulders within his lease area. The road shoulders measure approximately 5 acres and immediately bound the lease area. The Lessee must mow these shoulders 2 times per year. The first mowing will take place in June after spring planting, the second in late August just prior to harvest. **Lease bids should reflect the cost of this mowing.**

Special Provisions

Current military use of the land requires maintaining large expanses of cleared land without obstructions that would interfere with communication operations. **There is a strict prohibition of electronic interference with communications.**

The station requires that the lessee coordinate at least 72 hours prior to bringing equipment and/or chemicals onto the installation, with the NSA HR-NWA Natural Resources Manager, Taylor Austin at 757-421-8240.

In the event that the lessee experiences a delay or problem caused by the Navy, they must immediately notify the NSA HR-NWA Natural Resources Manager, Taylor Austin to resolve the problem at 757-421-8240.

Hunting on the leased lands is permitted. The Station is responsible for coordinating the programs with the lessee. Excessive damage caused by these activities must be reported immediately to the NSA HR-NWA Natural Resources Manager, Taylor Austin at 757-421-8240.

The Agricultural Lease Manager, Bryan Alexander 757-341-1656 requires a crop report including crop location and planting schedules be provided to him 1 month prior to field preparation and planting each season.

Farming operations are to be restricted to the production of corn, soybeans, small grains, cotton, or hay/silage crops with the exception of 54.2 acres that border the south side of the ROTHR antenna. In this 54.2 acre area, corn can not be grown. The 54.2 acres are identified on the map that is included with this plan, see (Attachment

"2"). Though this installation is not an airfield it does have a helicopter landing site and on occasion special event helicopter training exercises. As such, when agreeing to the terms and conditions of the agricultural lease, special attention shall be paid to crop selection and its underlying impacts to Bird/Animal Strike Hazard (BASH). To help mitigate BASH concerns crop location and planting schedules should be provided to the NSA HR-NWA Natural Resources Manager, Taylor Austin 757-421-8240 no later than within 72 hours of field preparation and planting each season.

When harvesting crops, spillage should be minimized and cleaned up promptly.

No deviation in land use or drainage improvements, as outlined in this plan, shall be permitted without prior written consent of the Real Estate Contracting Officer.

Under Article 10B of the Lease General Provisions, cultivation of federally subsidized crops on the leased land is prohibited.

The Lessee is required to park and load all farm equipment and vehicles within leased property boundaries.

All equipment should be clean (no visible soil, plant or animal material) prior to arrival on the installation to minimize and avoid the spread of non-native invasive species. It is recommended that all equipment after utilization on the installation also be cleaned prior to utilization on other properties. If equipment is being utilized on one Navy installation and is transported to another Navy installation it must be cleaned prior to use on the other Navy property. Fueling and maintenance of farm equipment should be done offsite prior to being utilized on Navy property. In the event of an emergency, best management practices should be implemented with spill kit.

Cultural Resources

A "Phase I" archaeological survey has been completed at NSA HR-NWA. This survey has identified prehistoric and historic sites on the Station; many of these sites are found within the agricultural units. To alleviate any potential destruction of these sites the State Historic Preservation Officer (SHPO) recommends that the only ground-disturbing activity permitted will be the ongoing agricultural cultivation practices and be limited to the current plow zone. If the lessee anticipates a problem which would cause him to deviate from his current cultivation practices he shall notify Mr. Bryan Alexander, Agricultural Lease Manager at NAVFAC MID-ATLANTIC 757-341-1656.

Conservation Inventory

The 456.3 acres is considered a single farming unit. The land is wet and requires drainage. The land capability is Class IIIW for soil type 71 Acredale silt loam. The land capability is Class III when properly drained. Open ditch drainage is required to assure production.

Conservation Practices

All conservation practices shall be performed in accordance with standard specifications of the USDA Natural Resources Conservation Service (NRCS). The Lessee shall utilize the technical services of the local Field Office located at the Municipal Center, Chesapeake, Virginia, in the design, layout, construction, and supervision of the conservation practices performed. All improvements shall become the property of the government at the expiration of the lease.

Soil fertility shall be maintained at the optimum level for the crops that are to be grown. USDA NRCS should be notified if nutrient deficiencies arise and resolved in accordance with their recommendations. USDA NRCS or the Virginia Tech Extension Service can assist in making fertilizer and lime recommendations that will be sufficient to maintain adequate pH levels and soil fertility.

The use of Hampton Roads Sanitation Division's biosolids disposal program will be approved on a case-by-case scenario. Coordination of this program must be made **30 days prior** to application with the NAVFAC MID-

ATLANTIC Agricultural Lease Manager, Bryan Alexander and NSA HR-NWA Natural Resource Manager, Taylor Austin.

Herbicides/Pesticides

Pesticides to be used by the Lessee must be coordinated and approved by Mr. Christopher Martin (757-322-4611) Entomologist at NAVFAC Atlantic, within 30 days of award of the lease. This includes any potential pesticides used for aerial application. Pesticide requirements are found in Attachments 3 and 4 of this plan, as well as the Armed Forces Pest Management Board Technical Guide 15. All pesticide approvals and the reporting of pesticide use, must be done through the NAVFAC Online Pesticide Reporting System. The web address is: https://noprs.pestlogics.com Contact Mr. Martin @ 757-322-4611 for assistance setting up a NOPRS account. Actual application of herbicides/pesticides shall be reported annually into NOPRS as well as a hard copy submitted to the Agricultural Lease Manager, Bryan Alexander during the yearly agricultural inspection occurring during the month of December.

Application of pesticides will conform to the Environmental Protection Agencies "Worker protection standards" as stated on the Pesticide label.

Mixing of pesticides is allowed on site if the lessee uses spill containment equipment. Storing of pesticides on site is not allowed. Pesticides shall not be mixed or sprayed within the well buffer area identified in Attachment 1.

The Lessee shall report all farm chemical and/or fuel spills, leaks or releases to NSA HR-NWA via the Command Duty Officer number at 757-567-2850 and to the NSA HR-NWA Natural Resources Manager, Taylor Austin at 757-421-8240.

All aerial application request will be approved on a case by case scenario. The lessee must contact the Agricultural Lease Manager, Bryan Alexander at 757-341-1656 at least 72 hours prior to application event. The pilot of the crop dusting aircraft shall contact the Command Duty Officer prior to takeoff to update ETA and location, and coordinate with Air Traffic Control, where required.

The Pilot shall contact the NTU Tower prior to entering the Class Delta airspace and receive clearance to begin the spray operations.

The Officer in Charge will determine whether or not to cancel or reschedule the operation.

The control and/or eradication of Federal and State listed noxious weeds, particularly **Johnsongrass,** *Sorghum halepense*, is required. Any pesticides and herbicides used for insect, disease, or weed control shall be approved and registered by the Environmental Protection Agency and the Commonwealth of Virginia. New pesticide requests are required to be submitted through NOPRS and must be approved prior to use.

The lessee is responsible for removal of all debris, refuse, garbage, pesticide containers, and unused residue of farm operations from the leased area and the Installation. The Lessee is encouraged to use the City of Chesapeake's pesticide container recycling program (see back of pesticide form for information).

Additional requirements for pesticide use on the property are provided in Attachment 3, Pesticide Mixing, Storage and Use on Navy-Owned Property Leased for Agricultural Purposes.

Conservation Requirements

Non-Reimbursable work

Soil and water conservation goals on this property include control of surface run-off and concurrent reduction in soil erosion, sedimentation and nutrient loading. The following measures will achieve these goals and are the responsibility of the lessee:

1. A conservation cropping system shall be established to include minimum tillage.

2. Maintenance of ditches and culverts is the responsibility of the lessee (subject to inspection at any time during the term of the lease) and shall include the following:

a. Mowing of ditch banks is required every other year of the lease. Mowing must be completed by 31 December. If this poses a problem for the lessee, he should notify the NAVFAC MID-ATLANTIC Agricultural Lease Manager, Bryan Alexander at 757-341-1656.

c. Boundary ditches are considered lease area to the ditch center-line.

3. Any acreage not cropped shall be seeded to a cover crop of hay or silage for protection and erosion control. If land is left fallow crop residue shall be left on the soil surface as a winter cover to provide mulch and soil improvement until seedbed preparation the following spring. Minimum tillage practices are encouraged.

Yearly inspections by the Agricultural Lease Manager, Bryan Alexander will ensure compliance with these conditions and other environmental requirements.

Reimbursable Work

During the term of this lease, it is anticipated that reimbursable work will be requested. The reimbursable work will be based on a scope of work furnished by the Agricultural Lease Manager, Mr. Bryan Alexander. The Lessee will be requested to provide an estimate for the work based on the scope of work. If the Lessee decides not to do the work himself, he may contract with a third party to do so (to be approved by the Real Estate Contracting Officer), or inform the Government that he is not capable of performing the work.

If the proposal is acceptable the Real Estate Contracting Officer will either; (1) issue a letter of authorization to begin work or (2) will forward a lease modification to the lease authorizing the work. Work should not begin until the letter of authorization or lease modification has been received.

When the work has been completed, a joint inspection will be performed by the Lessee and Navy representatives. If the work is complete and acceptable, terms of the letter or modification will be activated (i.e., rent reduction granted).

GOVERNMENT OFFICES CONCERNED WITH THIS LEASE

Mr. Bryan Alexander
Agricultural Lease Manager
NAVFAC Mid-Atlantic
9324 Virginia Avenue
Norfolk, VA 23511
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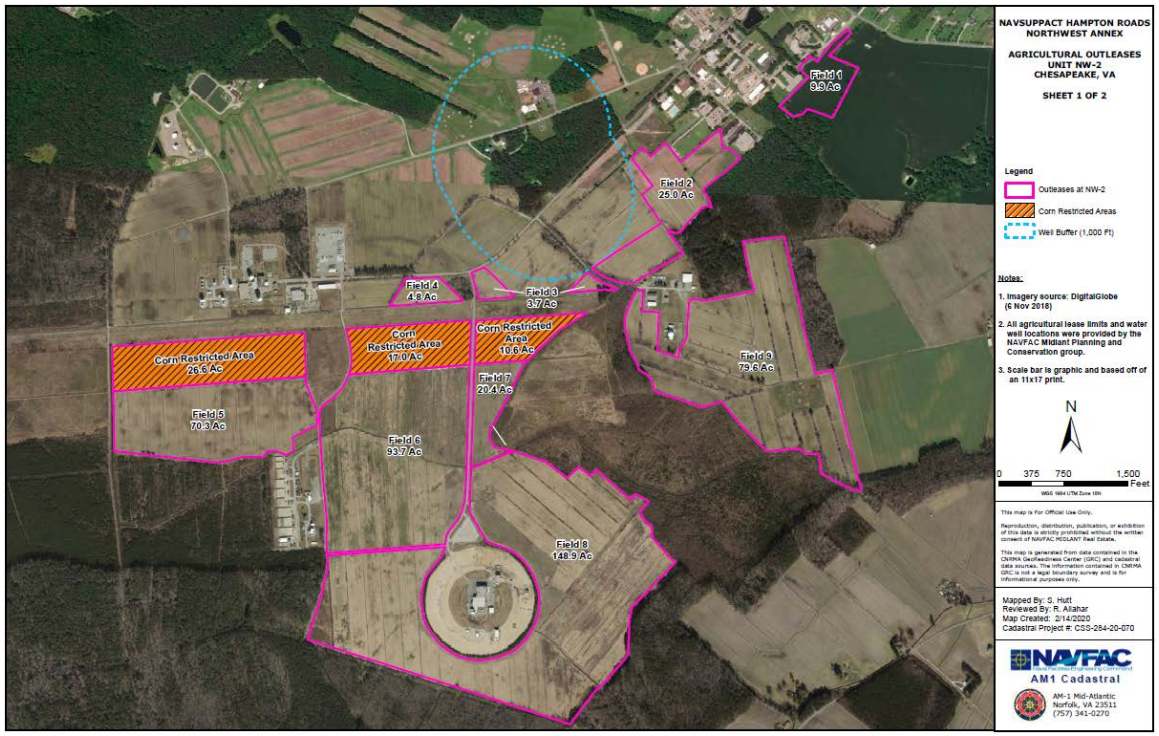
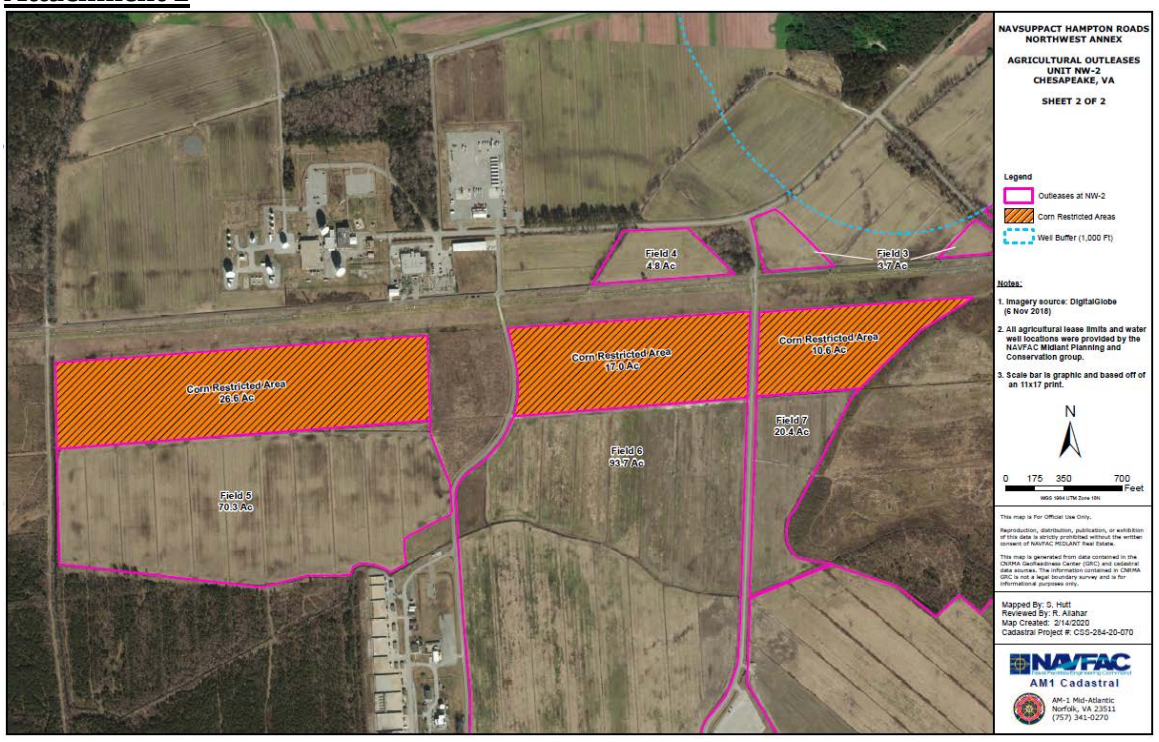
Attachment 1



Attachment 2



ATTACHMENT 3

Pesticide Mixing, Storage, and Use
on
Navy-Owned Property
Leased for Agricultural Purposes

1. a. Certified Applicators Requirement

All pesticide applications shall be performed by a State-certified pesticide applicator. Private applicator's licenses are acceptable if the Lessee performs the work. Commercial grade license(s) are required if the Lessee hires (for fee) an application company to apply the pesticide(s). "Registered Technician" status is not permitted to apply pesticides on DoD property. The pesticide applicator shall be certified in the category in which the work will be performed.

b. Integrated Pest Management

Integrated Pest Management (IPM) is a pest population management system that uses all suitable control techniques (chemical, biological, cultural, mechanical, or physical) to maintain pest populations at or below tolerable levels. Integrated Pest Management (IPM) techniques shall be used to the maximum extent practicable.

2. SUBMITTAL REQUIREMENTS

a. Business License

If a commercial applicator will apply pesticides (i.e. the Lessee does NOT have a private applicators license), the commercial applicator shall provide proof of a business license (as a pesticide application business) as required by the Commonwealth of Virginia. A copy of this business license shall be forwarded to the Navy representative designated as responsible for oversight of the outlease before the pesticide application(s) are performed.

b. Certificate of Insurance

If a commercial applicator will apply pesticide(s), proof of Insurance as a pesticide applicator business shall be forwarded to the Navy representative designated as responsible for oversight of the outlease before the pesticide application(s) are performed.

c. Pesticide Approval

All pesticides must be approved within 30 days after award of lease. Approval is based on EPA registration number. A list of the pesticide(s) proposed for use (by either a private and/or commercial applicator) shall be submitted into NOPRS for approval before the pesticide application(s) are performed. Any changes in pesticides to be used shall have prior approval before their use (Submittal for changes shall be entered into NOPRS).

d. Pesticide Labels and Safety Data Sheets

Submit copies of labels and safety data sheets to the Agricultural Lease Manager, Bryan Alexander.

e. Commercial Pesticide Applicators Certificate(s) In the Appropriate Categories

Submit legible copies of State pesticide applicators certificate(s) in the appropriate applicator categories (the category in which the work will be performed) to the Agricultural Lease Manager, Bryan Alexander.

f. Pesticide Label Reference Book

The Lessee shall maintain a reference book of approved pesticide labels and Safety Data Sheets (MSDS), and have it readily available **ON-SITE** (in the truck or other vehicle that was used to arrive on site) whenever any pesticides are on site. The reference book shall be readily available for inspection. Label and SDS requirements are based on EPA registration number.

g. Reporting Pesticide and Fertilizer Use

The Lessee shall report all pesticide and/or fertilizer use annually into NOPRS, as well as, submit a hard copy to the Agricultural Lease Manager, Bryan Alexander during the annual agricultural inspection occurring during the month of December.

3. PESTICIDE APPLICATION AND CONTROL OPERATIONS

All pesticides must be used in accordance with Federal, state, local, and installation publications and any requirements identified in attachments. All pesticides shall be procured, processed, handled, and applied in strict accordance with the manufacturer's label. All pesticides shall be registered with the U.S. Environmental Protection Agency and the Commonwealth of Virginia's pesticide regulatory agency.

a. Pesticide Preparation and Use.

During preparation, and/or application of pesticides, the Contractor shall:

(1) Always store pesticides in original containers having EPA-registered labels or in containers meeting EPA label requirements; and
(2) Use application equipment appropriate for the nature and size of work, that is clean, calibrated, and in proper operational condition; and
(3) Never leave equipment unattended during filling and application/usage; and
(4) Use back flow preventers on hoses when connected to water outlets in filling operations, and
(5) Inspect equipment (per manufacturer's label) and the area during application to insure proper and safe treatment; and
(6) Keep safety equipment and spill kit available on site when pesticides are present.

b. Pesticide Mixing.

The Lessee shall mix pesticides on a portable containment device. The device shall be capable of containing 110% of capacity.

c. Storage of Pesticides.

No pesticides shall be stored at the site. Any pesticide container and/or application tank shall be secured against theft and vandalism when the site is unattended during the day. Only those pesticides expected to be used that day should be imported to the site.

d. Pesticide Disposal.

The Lessee shall not dispose of any pesticides, pesticide containers, pesticide residue, pesticide rinse water, or any pesticide contaminated articles on government property.

e. Spill Management.

A pesticide spill containment kit shall be available on site if pesticides are being applied. Follow the requirements that are written in the Armed Forces Pest Management Board Technical Guide 15 that is attached to this plan.

f. **Safety Equipment.**

When pesticides are being mixed or applied, a portable eyewash station and at least 2 gallons of fresh water (in plastic jugs marked "emergency wash water") shall be within 25 feet of the operation.

g. Pesticide Spills and Decontamination.

The Lessee is responsible for properly cleaning, decontaminating, and reporting pesticide spills to the Agricultural Lease Manager, Bryan Alexander 757-341-1656.

h. Pesticide Dispersal Equipment Markings.

All pesticide dispersal equipment shall be clearly and plainly marked with "DANGER"..."PESTICIDES".

4. SPECIFIC PESTICIDE USE PROVISIONS

a. The Lessee shall coordinate, 72 hours in advance, with the Agricultural Lease Manager, Bryan Alexander, that pesticide(s) and/or application equipment will be brought onto the site.

b. All application of pesticides shall conform to the Worker Protection Standards CFR 170 as amended.

c. All pesticide applications shall conform to all label and supplemental labeling of the pesticide product.

d. All applicable laws and regulations regarding notification and posting shall be strictly adhered to.

e. Pesticides shall not be mixed or sprayed within the well buffer area identified in Attachment 1.

5. HERBICIDE REQUIREMENTS

Only glyphosate herbicides may be used for non-selective vegetation management. Paraquat use is not permitted. Simizine or any simizine family herbicide use is not permitted. Selective herbicides may be approved for use. If lessee is growing cotton specialty defoliant herbicides will be authorized through the normal approval process.

ATTACHMENT "4"

REPORTING REQUIREMENTS

Item # Description	Submit To	Date Required
1. Request pesticide additions through NOPRS	Submit online at https://noprs.pestlogics.com/	
2. Submit copies of current State Certification For all employees that will be applying pesticides, Including those of contract Commercial Applicators 30 days after award of lease. Include copies of proof of insurance by Commercial Applicator. .	Bryan Alexander, NAVFAC Mid-Atlantic Agricultural Lease Manager	
3. Submit Soil Test and Nutrient management plan 90 days after award of lease	Bryan Alexander, NAVFAC Mid-Atlantic Agricultural Lease Manager	
4. Report pesticide use in NOPRS annually Including negative reports	Submit online at https://noprs.pestlogics.com/	
5. Report Pesticide Spill immediately	NSA HR-NWA Natural Resources Specialist Emergency Communication Center	
6. Approval of Aerial Pesticide application 72 hours prior	Bryan Alexander, NAVFAC Mid-Atlantic Agricultural Lease Manager Taylor Austin, NSA HR-NWA Natural Resources Manager	

Submit all pesticide approvals in the NAVFAC Online Pesticide Reporting System:
https://noprs.pestlogics.com/
Contact Christopher Martin @ 757-322-4611 for assistance setting up a NOPRS account.

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Appendix L

INRMP Projects Table and Implementation Schedule

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Project Number	Project Title	Description	ERL	Version	Progress Code	Guidebook	SIC	Fund Code	Process Step	Process Step Date
4275ANR201	1 S MA NSA HR - Threatened & Endangered Species Surveys (Various Species)	Conduct Presence/Absence Inventory of Federal and State Threatened and Endangered Species, Species At Risk (SAR), Birds of Conservation Concern (BCC), and Vegetation Communities of Concern.	4	N45 POM-22 Final/POM-23 Baseline	Non-Annual Recurring	12104	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 15:57
4275ANR202	CWA MA NSA HR - Wetland Mapping Inventory	conduct baseline wetland delineations and re-evaluation at all installations under NSA HR. Re-evaluation includes verification of previous inventory boundaries and updating the boundaries as necessary to reflect changes in the wetland property boundaries.	4	N45 POM-22 Final/POM-23 Baseline	Non-Annual Recurring	12105	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 15:58
4275ANR204	MBTA MA NSA HR - Migratory & Breeding Bird Surveys	Conduct migratory and breeding bird surveys to establish bird population, activity (Feeding, Breeding, Stop-over, Flight Pattern, etc.), frequency and habitat utilization data, which may include MAPS (which may be completed via CESU).	4	N45 POM-22 Final/POM-23 Baseline	Non-Annual Recurring	12101	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 15:58
4275ANR205	4 SAR MA NSA HR - Species and Habitat of Concern Protection	Implement various habitat enhancement and restoration projects in support of Species of Concern and Habitats of Concern in accordance with the resource's management plan.	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12104	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 15:59

4275ANR206	SWCA MA NSA NWA - Forest Management	conduct an inventory and assessment of urban, natural, and timber harvest forest conditions every 5 - 10 years or sooner as deemed necessary due to major land or mission changes.	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12108	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 15:59
4275ANR209	SWCA MA NSA HR -Soil & Water Conservation	Conduct base wide erosion and sediment control assessment as deemed necessary due to major land or mission changes. Identify areas in need of repair due to erosion. Identify causes for the erosion. Stop and repair the erosion problems.	4	N45 POM-22 Final/POM-23 Baseline	Non-Annual Recurring	12107	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:00
4275ANR211	SIKES MA NSA HR - Vegetation Classification Mapping	Produce and update Vegetation Community Classification Landcover surveys for NSA Hampton Roads installations	4	N45 POM-22 Final/POM-23 Baseline	Non-Annual Recurring	12101	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:01
4275ANR216	SWCA MA NSA HR â€“ Habitat Management	Habitat management areas require active habitat manipulation efforts in order to sustain biodiversity, protect at risk species, and meet military training needs.	4	N45 POM-22 Final/POM-23 Baseline	Non-Annual Recurring	12107	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:01
4275ANR218	EO 13751 MA NSA HR - Invasive Species	Develop an invasive species assessment and management plan (to be updated every 5 years); remove/control invasive species (as plan recommends upon approval), and conduct pre, during and post invasive species control monitoring (annually, contract/agreement awarded every 3 years).	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12106	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:02

4275ANR219	SIKES MA NSA HR - Wildlife Emergency Response	Purchase of wildlife control equipment and supplies to support emergency wildlife calls supported by the Base Natural Resources Program Staff.	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12999	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:03
4275ANR220	SIKES MA NSA NWA â€“ Nuisance Wildlife Inventory, Assessment & Removal	Develop a nuisance wildlife assessment and management plan (revised every 5 years); remove nuisance wildlife, and conduct pre, during and post nuisance wildlife removal effort monitoring (annually).	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12101	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:03
4275ANR221	MSFCA MA NSA HR - Fisheries, Ditches & Streams	Conduct an inventory and assessment of ditch, stream, pond, and lake functions (this includes wildlife that live in and contribute to the functionality of the water resource, i.e. fish population assessments) and hydrology. Develop a Habitat enhancement plan for these water resources.	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12101	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:04
4275ANR222	Sikes MA NSA HR - Outdoor Recreation Program Requirements	Maintain hunting, fishing, and nature: trails; boardwalks; fishing stations picnic shelters; ranges; elevated shooting stands/platforms; check-station; walk-in cooler; freezer; electronic permit sales; and brochures (i.e. mass production of rules & regulations pamphlets, maps, archery training materials, permits, etc.)	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12109	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:05

4275ANR223	SIKES MA NSA NWA - Equipment Storage Structures	Repair and maintain equipment storage structures (annually) to protect natural resource management equipment.	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12999	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	4/30/2020 16:06
4275ANR226	CHS MA NSA HR - INRMP	Funds labor and equipment purchases required for the update and periodic revision of the INRMP.	4	N45 POM-22 Final/POM-23 Baseline	Recurring	12103	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	5/4/2020 7:42
4275ANR233	5 DL MA NSA HR Nesting Bald Eagle Surveys	Develop a Cooperative Ecosystems Studies Unit (CESU) Agreement to conduct Winter Eagle Nest Surveys and banding of fledgling eagles.	4	N45 POM-22 Final/POM-23 Baseline	Non-Annual Recurring	12104	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	5/4/2020 7:42
4275ANR234	1 S MA NSAHR NWA Listed and SAR Bat Species Surveys and Tracking	Conduct basewide monitoring/roost/hibernacula tracking/identification surveys for the Northern long-eared bat.	4	N45 POM-22 Final/POM-23 Baseline	Non-Annual Recurring	12104	CN	O&MN	CNO Senior Leadership Advisory Panel(SLAP) Review	5/4/2020 7:42