



# 7

## Pollution Prevention

The Department of Defense's (DoD) Pollution Prevention Program reduces pollution through improvements in energy and water efficiency, the use of alternative fuels, and other activities that improve resource utilization. Within the Department, pollution prevention is the first priority in achieving compliance with applicable requirements. Through the Pollution Prevention Program, DoD ensures that ongoing operations are safe, uninterrupted, and contribute to sustained military readiness.

Pollution prevention goals and objectives help DoD to reduce future environmental restoration and compliance requirements and associated costs. DoD's primary pollution prevention framework ensures that DoD Components do two things:

- Comply with environmental laws, regulations, and standards
- Accomplish specific environmental objectives associated with an array of pollution prevention activities

## Pollution Prevention at a Glance

Fiscal Year 2009 Funding: **\$114.4 million**

### Program Accomplishments

- Diverted **66 percent** of construction and demolition (C&D) debris in Fiscal Year (FY) 2009
- Reduced hazardous waste disposal by nearly **14,000 tons** in Calendar Year (CY) 2008
- Updated the **DoD Green Procurement Strategy** to reflect new federal legislation and guidance in FY2009
- Increased recycling of Toxics Release Inventory (TRI) chemicals on-site by **27 percent** and off-site by **17 percent** in CY2008

## Applicable Requirements

DoD's Pollution Prevention Program includes, but is not limited to, projects implemented to comply with the following regulations:

- 10 United States Code §2577
- 40 Code of Federal Regulations §261.2
- Executive Order (E.O.) 13423 "Strengthening Federal Environmental, Energy, and Transportation Management"
- Resource Conservation and Recovery Act (RCRA) §6002
- Energy Independence and Security Act of 2007
- Energy Policy Act (EPA) of 2005
- Federal Acquisition Regulation (FAR)
- 2002 Farm Security and Rural Investment Act (Farm Bill)
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- FY2008 National Defense Authorization Act (NDAA) §888
- Pollution Prevention Act (PPA) of 1990

### Strategic Policy and Planning Documents:

- DoD Instruction (DoDI) 4715.4 "Pollution Prevention"
- DoDI 4715.6 "Environmental Compliance"
- DoD Integrated Solid Waste Management (ISWM) Policy
- DoD Toxic and Hazardous Chemicals Reduction Plan
- DoD Green Procurement Strategy
- DoD Compliance Management Plan
- Consolidated EPCRA Policy for DoD Installations, Munitions Activities, and Operational Ranges

## Management Practices

DoD established its Pollution Prevention Program in 1985, which continues to address difficult and complex problems while maintaining routine efforts using the following hierarchy:

- Source reduction
- Reuse
- Recycling
- Composting/mulching
- Incineration for volume reduction with energy recovery
- Other forms of volume reduction
- Landfilling

While source reduction is the most effective method of pollution prevention, additional measures across the range of military operations integrate sustainable practices into the day-to-day mission activities. Various organizational groups, strategic policy and planning documents, and training opportunities are in place to assist DoD Components with this integration.

## Chapter Contents

This chapter summarizes performance trends for the following pollution prevention initiatives:

- Solid Waste
- Hazardous Waste
- Green Procurement
- Toxics Release Inventory
- Ozone-Depleting Substances

## Solid Waste

During FY2009, DoD demonstrated the following performance:

- Diverted **39 percent** of non-hazardous municipal solid waste
- Diverted **66 percent** of construction and demolition (C&D) debris, **16 percentage points** over the established goal
- Diverted **55 percent** combined non-hazardous municipal solid waste and C&D debris

## Overview

DoD activities generate residential and commercial waste, non-hazardous industrial waste, non-hazardous process waste, C&D debris, yard waste, and logistics waste such as packaging. Through Integrated Solid Waste Management (ISWM), DoD Components can determine the most cost effective, energy-efficient, and least-polluting ways to deal with the installation or facility solid waste stream.

## Management Practices

DoD deploys integrated solutions to accomplish waste reduction goals. ISWM allows managers to make local waste diversion or disposal decisions based on waste stream characterizations, economic evaluations, and market analysis.

Installations must make every effort to maximize non-hazardous solid waste diversion to optimize reduction in both the volume of solid waste disposed and overall cost of non-hazardous solid waste management. Many installations establish Qualified Recycling Programs (QRPs) to recover value for material diverted from waste in addition to avoiding disposal costs. QRP managers identify opportunities to sell recyclable material and develop the diversion program based on recycling costs, sales proceeds, and avoided costs. In FY2009, DoD certified its intensive QRP Management training course through the Interservice Environmental Education Review Board.

Improved management and promotion of additional recycling opportunities support DoD waste reduction goals and lessens future disposal costs. Additionally, installations are better equipped to make good business decisions that reduce waste volume, maximize diversion, and realize potential cost savings.

## Evaluation Criteria

DoD's ISWM Policy Memorandum sets two goals for non-hazardous solid waste:

- 40 percent diversion of non-hazardous municipal solid waste (without C&D) by the end of CY2010
- 50 percent diversion of C&D debris solid waste by the end of CY2010

DoD monitors progress toward the CY2010 diversion goals using solid waste and recycling metrics. These metrics calculate the rate at which installations prevent non-hazardous solid waste from entering a disposal facility. Each year, the percentage of solid waste diverted varies depending on the amount, location, and types of solid waste generated. C&D waste is dependent on the schedule for construction, demolition, and renovation projects at an installation.

## Performance Summary

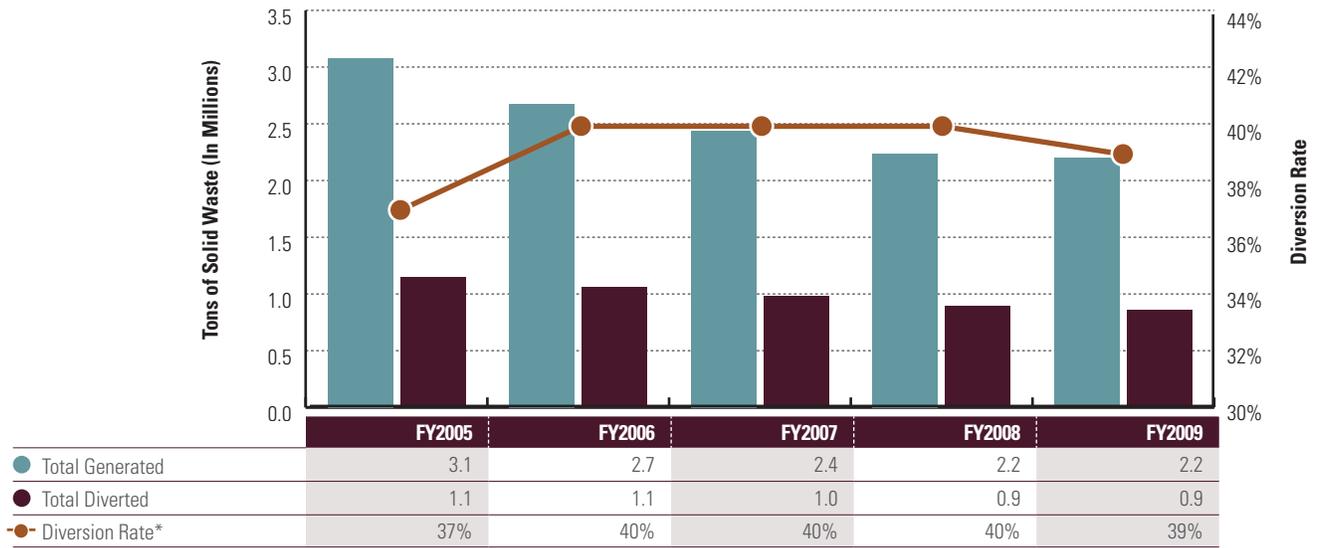
DoD has not only met, but exceeded agency goals for C&D debris diversion. Additionally, the overall implementation of ISWM practices resulted in cost-savings of \$162.7 million in FY2009. This amount represents the associated costs for solid waste and C&D debris received by landfills or incinerators.

DoD generated a total of approximately 5.2 million tons of solid waste in FY2009, consisting of 2.2 million tons of non-hazardous municipal solid waste and 3.0 million tons of C&D debris. The generation of municipal solid waste equates to 3.2 pounds per person each day. DoD diverted 39 percent of its non-hazardous municipal solid waste, which is consistent with previous years (Figure 7-1).

In FY2009, DoD's C&D diversion rate was 66 percent (Figure 7-2). While this rate represents a decrease from FY2008, it remains well above the 50 percent diversion goal for C&D debris.

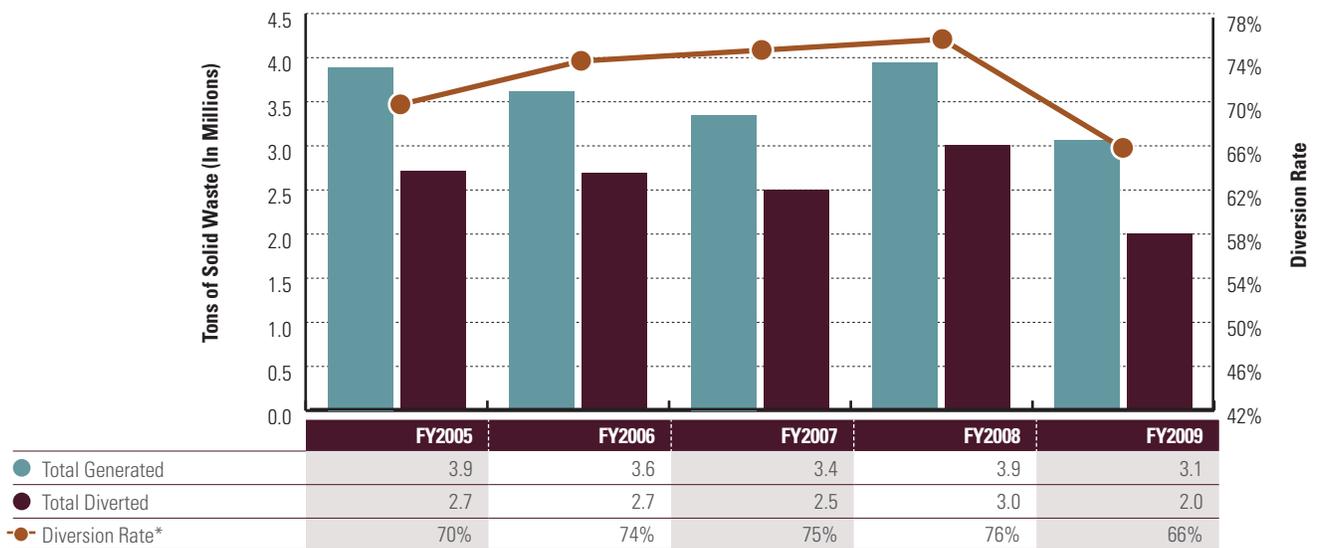
Appendix B, Section 7 contains solid waste diversion data by DoD Component.

**Figure 7-1** DoD Non-Hazardous Solid Waste Progress, excluding C&D Debris (millions of tons) (U.S. and Territories & Overseas)



\*Diversion rates are calculated from exact numbers.

**Figure 7-2** DoD C&D Debris Solid Waste Progress (millions of tons) (U.S. and Territories & Overseas)



\*Diversion rates are calculated from exact numbers.

## Hazardous Waste

During CY2008, DoD demonstrated the following performance:

- Reduced disposal by **15 percent** from CY2007 to CY2008
- Reduced disposal by **53 percent** from CY1996 to CY2008
- Established the **DoD Toxic and Hazardous Chemicals Reduction Plan**

### Overview

DoD’s goal is to efficiently manage hazardous waste. Hazardous waste is a subset of solid waste and is any waste containing properties that are dangerous or potentially harmful to human health or the environment. DoD is successfully implementing major pollution prevention efforts to reduce hazardous waste disposal.

### Management Practices

In January 2008, DoD deployed the agency-level Toxic and Hazardous Chemicals Reduction Plan (the Plan), outlining the DoD programs, initiatives, and actions necessary to reduce toxic and hazardous chemicals under E.O. 13423. The Plan follows three principles:

- Identify the major DoD programs and initiatives relevant to toxic and hazardous chemicals
- Build upon existing DoD programs and initiatives relevant to toxic and hazardous chemicals
- Use the DoD environmental management system (EMS) framework as a tool for achieving continual improvement in toxic and hazardous chemical management in DoD

DoD leverages the EMS framework to align and coordinate relevant programs at all organizational levels for reducing the procurement, use, release, or disposal of toxic and hazardous chemicals. As DoD’s supply chain integrator and manager of hazardous chemicals, the Defense Logistics Agency (DLA) assists the Military Services in their efforts to comply with the Plan. Chapter 2 describes the Department’s EMS Program in detail.

In June 2009, DoD’s Chemical and Material Risk Management and Business Enterprise Integration Directorates held a two-day, strategic planning workshop to assist in developing a chemical management policy based on lifecycle costs, operational readiness, and mission impact.

This workshop served as a forum to:

- Share best practices
- Evaluate metrics

- Recognize progress
- Identify duplicate efforts
- Identify cost cost savings opportunities
- Make recommendations to ensure continuous improvement

### Evaluation Criteria

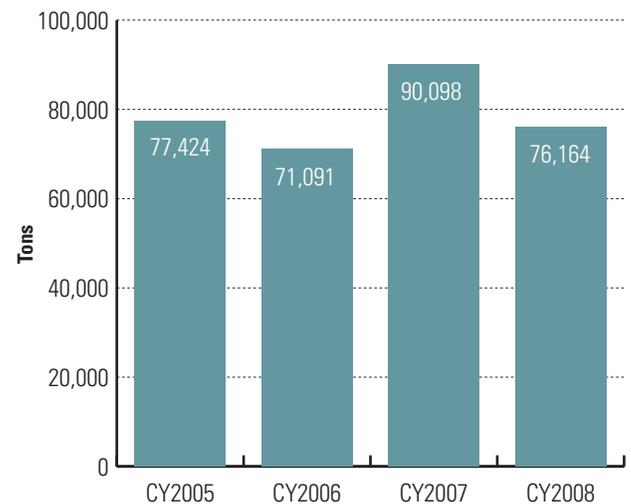
DoD calculates the hazardous waste reduction rate on a calendar year basis and includes hazardous waste treated on-site and shipped off-site in the United States, its territories, and overseas. In CY2005, DoD revised the hazardous waste metric to include hazardous waste treated on-site among certain waste categories targeted for reduction. Prior to CY2005, the metric included mainly hazardous waste shipped off-site (both recycled and disposed).

### Performance Summary

In CY2008, DoD disposed over 76,000 tons of hazardous waste, which is 15 percent less than CY2007 (Figure 7-3). This represents a decrease from the CY1996 total of over 143,000 tons, largely due to reduced hazardous waste generated.

Appendix B, Section 7 contains hazardous waste performance data by DoD Component.

**Figure 7-3** DoD Hazardous Waste Disposal (U.S. and Territories & Overseas)



## Green Procurement

In FY2009, DoD demonstrated the following progress:

- Updated its **Green Procurement Strategy** to reflect new federal legislation and guidance
- Graduated **7,167 people** from the Defense Acquisition University (DAU) green procurement training course

### Overview

DoD established its Green Procurement Program (GPP) in 2004 to practice sustainable and environmentally-friendly acquisition, and ensure that DoD purchasing activities are aligned with federal green procurement requirements.

DoD's GPP applies to the acquisition of all products and services that include but are not limited to office products (electronic equipment); printing services; fleet vehicles; fleet maintenance products; traffic control barricades and signage; park and recreation services; appliances; and building construction, renovation, and maintenance. These products and services fall into the following categories:

- Recycled-content products
- ENERGY STAR® and Federal Energy Management Program-designated products
- Water-efficient products
- Energy from renewable sources
- Biobased products
- Environmentally preferable products and services
- Alternative fuel vehicles and alternative fuels
- Low or non-toxic products
- Non-ozone depleting substances (ODSs)

The DoD GPP guiding elements are to:

- Educate DoD personnel about federal green procurement preference programs
- Increase the purchase of green products and services
- Reduce the amount of solid waste generated
- Reduce consumption of energy and natural resources
- Expand markets for green products and services

### Management Practices

DoD's GPP is co-stewarded by the Deputy Under Secretary of Defense for Installations and Environment and the Director of Defense for Procurement and Acquisition Policy. To ensure DoD's GPP is meeting its internal and external requirements, DoD established a variety of management tools and workgroups. The management framework of the GPP is similar to the EMS framework:

- Policy
- Planning

- Implementation and operation
- Checking and corrective action
- Management review

DLA uses the following management tools to track agency procurement of environmentally friendly products as required in §314 of the FY2003 NDAA:

- **DoD EMALL** is a full service electronic shopping tool where DoD Components purchase goods and services for their installations. DoD EMALL helps DoD meet federal procurement requirements by identifying products that meet certain environmental criteria. DLA tracks these criteria in online reports that can be generated to show the total dollar amounts of green purchases by agency or installation.
- **Environmental Reporting Logistics System (ERLS)** generates a Green Procurement Report (GPR) to better meet the tracking requirements of §314 of the FY2003 NDAA. The GPR captures DLA requisitions from a variety of ordering systems. Then it calculates the dollar value of the requisitions by looking at the National Stock Numbers (NSNs) that are considered environmentally preferable in the Federal Catalog System (FCS).

### Evaluation Criteria

The success of DoD's GPP can be measured in two ways:

1. How DoD's GPP is complying with federal procurement requirements
2. How the program is meeting DoD's own procurement goals

While the long-term goal of DoD's GPP is to achieve 100 percent compliance through the sustainable acquisition of green products and services, DoD has short-term goals to meet new or updated federal requirements, to meet its own GPP requirements, and to focus on specific areas of the program.

DoD's GPP outlines the following metrics, which DoD uses to evaluate compliance with federal requirements:

- Change in the number of "not required" and "meets requirements" codes from the individual contracting action report
- Increase in purchases of federally defined indicator items
- Increase in contracting personnel trained in green procurement
- Increase in organizations or installations participating in the Federal Electronics Challenge
- Decrease in contract audit findings indicating lack of compliance with GPP requirements

By adhering to these specific goals and metrics and ensuring compliance with federal procurement requirements, DoD's GPP is setting the standard for green procurement strategy and implementation.

### Performance Summary

To date, DoD has seen several GPP success stories. The renovation of the Pentagon as a "green" building with an updated, sustainable design is one example of the success through the GPP program. After renovations, the Pentagon is now using energy- and water-efficient products, recycled-content materials, green cleaning products, and is improving indoor air quality.

In FY2009, DoD updated the Green Procurement Strategy to reflect new federal legislation and guidance. DoD also launched an online training course introducing the GPP, discussing applicable policies and laws, outlining the different components of the program, and discussing the implementation strategy. The course is available through the DAU and is used across the federal government.

## Toxics Release Inventory

In CY2008, DoD demonstrated the following performance:

- Decreased hydrochloric acid (acid aerosols only) releases by **20 percent**
- Decreased lead releases by **7 percent**

### Overview

The Toxics Release Inventory (TRI) or EPCRA §313 provides information about toxic chemicals that are released into the environment or transferred off-site for further waste management.

The purpose of TRI reporting is to establish an inventory of chemical releases in a publicly accessible database that includes information on routine and accidental releases of chemicals into the environment.

The relevant DoD policy is the “Consolidated EPCRA Policy for DoD Installations, Munitions Activities, and Operational Ranges” (referred to as DoD’s Consolidated EPCRA Policy). This policy explains how EPCRA and TRI requirements apply to DoD installations, superseding all previous DoD EPCRA and TRI policies issued by the Office of the Secretary of Defense. DoD’s Consolidated EPCRA Policy modified the reporting requirement for operational ranges, effective CY2007, recognizing that ranges on contiguous property are reported with the rest of the installation. Operational range activities will continue to be tracked separately from the main installation activities because DoD does not include facility releases from military munitions, operational range activities, and conventional and chemical military munitions demilitarization in reduction goals.

### Evaluation Criteria

Each year, DoD facilities that are subject to the TRI requirements report DoD TRI chemical releases and off-site transfers to EPA, which are included in EPA’s publicly accessible database, TRI Explorer ([www.epa.gov/triexplorer](http://www.epa.gov/triexplorer)). DoD uses the submitted TRI data to identify:

- Processes that produce DoD TRI chemical releases and off-site transfers
- Procedures that require the use of TRI toxic chemicals
- Pollution prevention opportunities

EPA’s TRI Explorer includes information from a list of over 600 chemicals and 30 chemical categories. DoD facilities that manufacture, process, or otherwise use a TRI-listed chemical in quantities greater than the established reporting threshold over the course of a calendar year, evenly, intermittently, or in a single event, must report all releases and waste management activities on TRI chemical inventory forms, referred to as Form Rs. The TRI reporting period for this Defense Environmental Programs Annual Report to Congress is CY2008.

### CY2008 Top 10 DoD TRI Chemicals

Figure 7-4 shows DoD’s CY2008 top 10 TRI chemicals, the number of pounds released or transferred in CY2008, the percent change in chemical releases from the previous year, and the primary sources of each chemical’s releases.

Figure 7-5 illustrates the change in the CY2004 top 10 DoD TRI chemicals.

**Figure 7-4** CY2008 Top 10 DoD TRI Chemicals, Including Ranges (U.S. and Territories)

Name of Chemical	Pounds Released or Transferred	CY2007–CY2008 % Change	Primary Sources
1. Nitrate Compounds	16,822,155	5%	Energetic manufacturing operations, wastewater treatment operations
2. Copper	5,112,625	14%	Operational range activities
3. Lead Compounds	2,525,775	51%	Operational range activities
4. Lead	1,923,104	-7%	Operational range activities
5. Ethylene Glycol	982,567	68%	Vehicle maintenance
6. Aluminum (Fume or Dust)	748,497	152%	Operational range activities
7. Zinc (Fume or Dust)	519,700	118%	Munitions manufacturing
8. Dichloromethane	489,807	56%	Aircraft and vehicle maintenance
9. Hydrochloric Acid (1995 and After "Acid Aerosols" Only)	267,597	-20%	Co-manufactured by-product from wastewater treatment operations
10. Xylene (Mixed Isomers)	263,573	49%	Surface coating and ship preservation

**Figure 7-5** Change in CY2004 Top 10 DoD Chemicals, Including Ranges, U.S. and Territories (Pounds Released or Transferred)

Name of Chemical	CY2004	CY2005	CY2006	CY2007	CY2008	CY2004–CY2008 % Change
1. Nitrate Compounds	15,530,463	14,512,774	16,003,171	15,970,190	16,822,155	8%
2. Copper	3,349,513	3,821,405	5,759,548	4,477,646	5,112,625	53%
3. Lead Compounds	1,432,743	1,699,037	1,917,832	1,676,646	2,525,775	76%
4. Lead	1,033,084	1,141,699	2,101,936	2,071,587	1,923,104	86%
5. Hydrochloric Acid (1995 and After "Acid Aerosols")	453,569	342,039	370,873	336,130	267,597	-41%
6. Aluminum (Fume or Dust)	325,005	382,249	325,231	296,786	748,497	130%
7. Dichloromethane	322,197	479,107	422,350	314,490	489,807	52%
8. Zinc (Fume or Dust)	316,906	311,654	323,281	238,333	519,700	64%
9. Toluene	223,286	271,639	197,357	218,734	223,663	0%
10. Xylene (Mixed Isomers)	213,720	268,319	241,992	177,288	263,573	23%
<b>Total</b>	<b>23,200,486</b>	<b>23,229,922</b>	<b>27,663,571</b>	<b>25,777,830</b>	<b>28,896,496</b>	<b>25%</b>

**Figure 7-6** CY2008 Top 10 DoD TRI Installations (U.S. and Territories)

Name of Installation	Pounds Released or Transferred	CY2007–CY2008 % Change	Primary Sources
1. Radford AAP	14,318,846	3%	Energetic manufacturing operations
2. McAlester AAP	1,085,618	115%	Munitions manufacturing and demilitarization
3. Red River Army Depot	956,774	103%	Wheeled and tracked vehicle maintenance operations
4. Anniston Army Depot	625,637	14%	Heavy tracked vehicle maintenance
5. MCB Camp Lejeune Range	577,399	12%	Operational range activities
6. Pearl Harbor Naval Complex	552,279	46%	Wastewater treatment operations
7. Fort Bragg Range	547,599	66%	Operational range activities
8. Nellis AFB and Training Range	451,306	342%	Operational range activities
9. MCB Camp Lejeune	448,296	4%	Wastewater treatment operations
10. Fort Hood Range	390,134	83%	Operational range activities

### CY2008 Top 10 DoD TRI Installations

Figure 7-6 shows DoD's CY2008 top 10 TRI installations, the number of pounds released or transferred in CY2008, the percent change in releases from the previous year, and the primary sources of each installation's releases.

Figure 7-7 illustrates the change in CY2004 top 10 DoD TRI installations.

### Performance Summary

In CY2008, the majority of DoD's TRI on-site releases were released into the water and onto the land (Figure 7-8). TRI chemicals entering into the water on-site are primarily from nitrate compounds, which are released as a result of propellant manufacturing operations and wastewater treatment operations. TRI chemicals released on-site to the land are mainly from heavy metals (e.g., lead, copper),

which are a result of munitions that were either used on training ranges or treated/demilitarized during open burning and open detonation operations.

Recycling is an essential waste management activity because the process diverts chemicals from landfills, saves energy, and reduces costs. In CY2008, DoD sent 2.0 million pounds of TRI chemicals off-site to be recycled, a 17 percent increase from the previous reporting year. DoD also reported 68 million pounds of TRI chemicals were recycled on-site in CY2008, which resulted in a 27 percent increase from CY2007 (Figure 7-8).

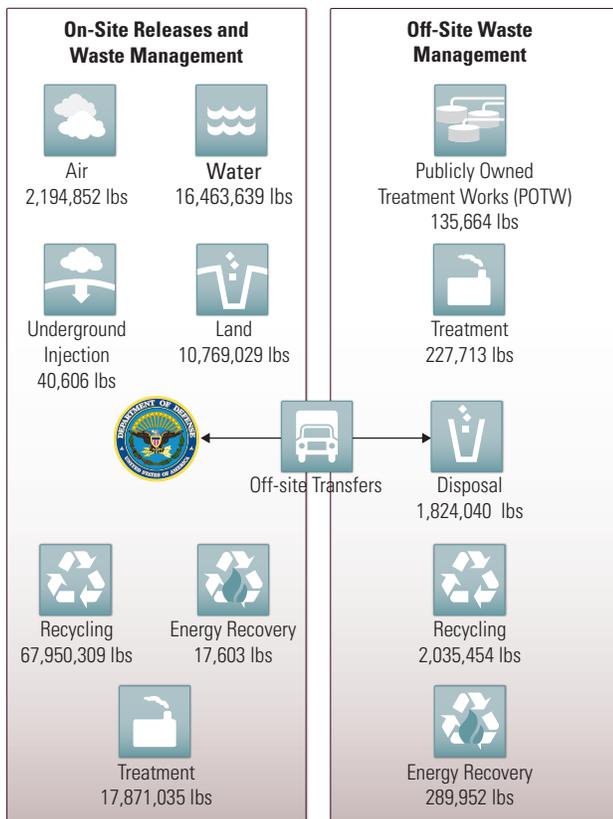
Beginning in CY2001, operational ranges were required to report DoD TRI chemical releases and off-site transfers. Previously, many installations were not required to report, including many National Guard bases and Reserve installations. In CY2001, 69 facilities reported 4.2 million pounds of DoD TRI chemical range releases and off-site transfers. The revised range reporting guidance in DoD's

Figure 7-7 Change in CY2004 Top 10 DoD Installations, U.S. and Territories (Pounds Released and Transferred)\*

Name of Installation	CY2004	CY2005	CY2006	CY2007	CY2008	CY2004–CY2008 % Change
1. Radford AAP	12,818,237	11,704,540	13,757,844	13,919,076	14,318,846	12%
2. MCB Camp Lejeune	719,992	504,922	537,250	432,333	448,296	-38%
3. Fort Sill Field DPW/EQD	541,127	454,457	543,358	335,276	194,444	-64%
4. Fort Bragg Range	429,653	459,717	555,636	329,769	547,599	27%
5. Anniston Army Depot	365,832	694,698	624,530	546,475	625,637	71%
6. Air Defense Artillery Center & Ranges Fort Bliss	349,255	360,820	134,069	236,146	226,227	-35%
7. MCB Camp Lejeune Range	332,892	306,153	419,548	517,593	577,399	73%
8. MCB Camp Pendleton	309,485	300,586	422,251	339,095	325,714	5%
9. Fort Dix Range	294,245	169,050	153,712	--	216,128	-27%
10. Pearl Harbor Naval Complex	294,092	517,958	329,226	377,068	552,279	88%
<b>Total</b>	<b>16,454,811</b>	<b>15,472,900</b>	<b>17,477,424</b>	<b>17,032,830</b>	<b>18,032,568</b>	<b>10%</b>

\* A value of "--" represents no data reported

Figure 7-8 CY2008 DoD TRI Releases and Transfers, Including Ranges



Consolidated EPCRA Policy, effective in CY2007, resulted in an increase in range reporting. In CY2008, a total of 176 range facilities reported 9.2 million pounds of DoD TRI chemical releases and off-site transfers. This resulted in a 120 percent increase in releases since CY2001. In CY2008, range releases accounted for 29 percent of the total DoD TRI chemical releases and off-site transfers.

In CY2008, DoD reported 31.7 million pounds of TRI chemical releases and off-site transfers, including releases from operational ranges (Figure 7-9). This resulted in a 13 percent increase from the previous year and a 26 percent increase from CY2004. In CY2008, the largest increase of reportable quantities from the previous year was from chemicals sent off-site for disposal and not for treatment, recycling, or energy recovery.

When excluding DoD TRI chemical releases and off-site transfers reported from operational range activities, DoD's TRI chemical releases and off-site transfers totaled 22.5 million pounds in CY2008, a 10 percent increase from the previous year and a 16 percent increase from CY2004 (Figure 7-10).

DoD's total TRI chemical releases and off-site transfers, excluding releases from operational ranges are used to measure progress in reducing overall chemical releases. DoD does not include releases from operational range activities as part of the reduction efforts.

Appendix B, Section 7 contains TRI performance data by DoD Component.

**Figure 7-9** DoD TRI Reportable Quantities, Including Ranges, U.S. and Territories (Pounds Released or Transferred)

Category	CY2004	CY2005	CY2006	CY2007	CY2008	CY2004–CY2008 % Change
On-site to Water	15,047,339	14,132,130	15,628,423	15,539,126	16,463,639	9%
On-site to Air	2,268,777	2,205,025	2,142,410	1,843,543	2,194,852	-3%
On-site Underground Injection	0	0	34,877	34,508	40,606	0%
On-site to Land	6,546,294	7,740,930	10,559,615	9,100,333	10,769,029	65%
Off-site to POTW	148,672	221,007	211,994	130,725	135,664	-9%
Off-site Treatment	389,928	681,889	689,221	193,723	227,713	-42%
Off-site Disposal	640,445	651,428	1,160,777	1,188,412	1,824,040	185%
<b>Total</b>	<b>25,041,456</b>	<b>25,632,409</b>	<b>30,427,317</b>	<b>28,030,370</b>	<b>31,655,544</b>	<b>26%</b>

**Figure 7-10** DoD TRI Reportable Quantities, Excluding Ranges, U.S. and Territories (Pounds Released or Transferred)

Category	CY2004	CY2005	CY2006	CY2007	CY2008	CY2004–CY2008 % Change
On-site to Water	15,047,185	14,131,901	15,626,580	15,537,100	16,460,754	9%
On-site to Air	2,200,404	2,149,466	2,073,081	1,630,607	1,663,090	-24%
On-site Underground Injection	0	0	34,877	34,508	40,606	0%
On-site to Land	881,555	874,138	1,023,989	1,686,317	2,163,642	145%
Off-site to POTW	148,672	111,007	211,994	130,725	135,605	-9%
Off-site Treatment	389,928	681,889	689,221	193,278	227,713	-42%
Off-site Disposal	640,284	569,423	1,050,545	1,171,158	1,782,718	178%
<b>Total</b>	<b>19,308,028</b>	<b>18,517,823</b>	<b>20,710,288</b>	<b>20,383,693</b>	<b>22,474,129</b>	<b>16%</b>

## Ozone-Depleting Substances

- To date, DoD has recovered and sent **10 million pounds** of Ozone-Depleting Substances (ODSs) to the Defense Reserve for reclamation and use in mission-critical applications.

### Overview

DoD is committed to reducing the use of ODSs as part of its mission to sustain the environment. Ground-level ozone is a pollutant that poses a significant threat to human health and the environment. However, naturally occurring ozone in the stratosphere filters potentially damaging ultraviolet (UV) radiation from the sun. ODSs are compounds that deplete this protective layer in the stratosphere, allowing higher levels of UV radiation to reach the Earth's surface. Exposure to UV radiation increases the risk of skin cancer, cataracts, and weakened immune systems in humans. Moreover, UV radiation can impact photosynthesis and disrupt plant metabolism, blocking natural food chains and agricultural productivity. DoD is committed to reducing the use of ODSs as part of its mission to sustain the environment.

DoD has used ODSs in various applications. Some of these include:

- Shipboard and submarine refrigeration and cooling
- Shipboard machinery and flammable liquid compartment fire suppression systems
- Facility air conditioning, refrigeration, and fire suppression systems
- Armored vehicle explosion suppression and engine compartment fire suppression systems
- On-board aircraft fire suppression systems
- Carrier deck and flight line fire protection
- Tactical vehicles air conditioning
- Electronics cooling
- Precision cleaning solvents
- Foam blowing

Through DoD's ODS Program, DoD Components select alternative chemicals with lower or zero ozone depletion potential without sacrificing the quality of the mission.

### Management Practices

DLA manages DoD's ODSs through a Defense Reserve located in Richmond, Virginia. ODSs at the reserve are classified into two distinct types.

- Class I ODSs have a high ozone depleting potential and include chlorofluorocarbons (CFCs), halons, and methyl chloroform

- Class II ODSs have a lower ozone depleting potential and include hydrochlorofluorocarbons (HCFCs)

The Defense Reserve accepts both used and unused CFCs, halons, and HCFC-22. As part of DoD's pollution prevention efforts, the Department has instituted specific procedures to ensure these substances are available only to authorized users. In addition to serving as a warehouse, the Defense Reserve operates as a repair facility, providing reclamation of turned in ODSs and cylinder refurbishment.

The Defense Reserve is an essential part of the Department's plan for phasing out the use of ODSs and provides DoD with the capability to recover and centrally receive, reclaim, and issue ODSs. The importance of this inventory has escalated because replacement of ODSs has proven to be more difficult than projected, and alternatives are not as available as expected.

## Performance Summary

### DoD

DoD is a leader in ODS reduction and was one of the first organizations to commit to finding solutions to reduce the use of ODSs following the 1987 Montreal Protocol.

DoD developed the world's first Halon 1301 alternative for certain military weapon systems. During the 20<sup>th</sup> anniversary celebration of the Montreal Protocol, DoD received a Best-of-the-Best Stratospheric Ozone Protection Award from EPA. The Department was presented with the award for its leadership in military ozone layer protection and in developing ozone-friendly policies and technologies. To date, DoD Components have recovered and sent approximately 10 million pounds of ODSs to the Defense Reserve for reclamation and use in mission-critical applications.

DoD Components annually report the status of ODS performance, which is summarized below.

### Army

The Army remains committed to removing all ODSs from its inventory. The Army's vision for ODS elimination has four main elements:

- Support the development of affordable ODS alternatives
- Promote the retrofit of all Army weapon systems dependent on ODSs
- Ensure ODSs are available for mission-dependent weapon systems
- Prohibit the use of ODSs in weapon system development and design

To align with its vision, the Army began eliminating ODSs in industrial and weapon system processes. Since 1992, the Army has eliminated:

- 98 percent of Class I ODSs used in facilities, including 100 percent elimination of halon used for fire suppression and 100 percent elimination of CFC used for air conditioning and refrigeration
- 75 percent of Class I ODSs used in weapons system support, including 68 percent reduction in halon use for legacy weapon systems
- 100 percent of Class I ODS solvents used in maintenance and industrial operations

All Army installations have ODS elimination plans in place. For Class I ODSs, installations are prohibited from using new CFC refrigerants in air conditioning and refrigeration systems, although recovered CFCs can be reused. Also, installations are prohibited from purchasing new halon or reusing halon recovered from retrofitted fire suppression systems in buildings. All recovered halon must be turned in to the Defense Reserve, where a stockpile of approximately one million pounds is stored for mission-critical legacy weapon systems. Ongoing efforts to expand the Reserve include storing HCFC-22, a Class II ODS used for tactical refrigeration and air conditioning.

The Army is a world leader behind the research and development needed to eliminate ODSs. The Army has:

- Identified halon alternatives for explosive protection in the crew compartments of manned vehicles
- Retrofitted engine fire suppression systems
- Developed a "natural" refrigerant using carbon dioxide (CO<sub>2</sub>)

## Navy

The Navy's comprehensive plan to reduce ODSs outlines instructions to:

- Conserve existing supplies of Class I ODSs
- Establish a reserve of Class I ODSs to support mission-critical operations
- Develop next-generation, ozone-friendly systems for new acquisition programs
- Convert existing systems using Class I ODSs to environmentally preferable alternatives, when technically and economically feasible

Since 1989, this plan has reduced the Navy's annual consumption of Class I ODSs by nearly 97 percent. To date, the Navy has retrofitted or replaced nearly all of the 3,000 CFC-containing air conditioning and refrigeration

systems at shore facilities. Navy policy also prohibits the refill of existing shore facility halon fire suppression systems in the event of discharge.

For mission-critical legacy weapons systems, the Navy uses a combination of retrofit and end-of-life phase-out for Class I ODSs. Between 1993 and 2008, the Navy converted over 1,190 shipboard CFC air conditioning and refrigeration systems to non-CFC refrigerants. The Navy returned any recovered CFC refrigerant to the Defense Reserve.

The Navy designed and flew the first aircraft in the world using alternatives to halon fire suppression systems and continues to install non-halon systems in new aircraft. The Navy is also a world leader in developing and implementing halon alternatives for new ship designs. Additionally, Navy ships use high efficiency non-CFC chillers and food refrigeration systems, which are up to 25 percent more energy-efficient than older CFC systems.

## Marine Corps

The Marine Corps has successfully implemented its ODS plan at the installation level. With the exception of Marine Corps Base Camp Butler, Japan, and Marine Corps Base Hawaii, all Marine Corps installations have transitioned to non-ODS substitutes or technology. All Marine Corps installations are fully expected to transition to non-ODS substitutes or alternative technology by December 2010.

The Defense Reserve supports weapon systems that are mission-critical to the Marine Corps. These weapon systems include the Amphibious Assault Vehicle, the Light Armored Vehicle, and the M1A1 Main Battle Tank. The Marine Corps is also implementing a transition plan to upgrade fire suppression systems for the Light Armored Vehicle to non-ODS technology.

## Air Force

Since 1993, the Air Force has eliminated over 96 percent of its original annual ODS usage. By recovering halon from retired fire suppression systems and extinguishers, the Air Force contributes to the Defense Reserve stockpile.

The Air Force plans to replace over 2,000 F-15 and F-16 fighter aircraft, which use ODSs in integrated fire and explosion suppression systems, with the F-22 and F-35 aircraft, which have no ODS requirements.

The Air Force is continuing to work with the Navy to find an effective replacement for fire-extinguishing systems. If successful, this effort would eliminate the largest remaining Air Force ODS use.

Over the last two decades, Air Force organizations have won numerous ozone protection awards. Most recently, EPA recognized Air Force at an awards ceremony held in conjunction with the 20<sup>th</sup> anniversary of the Montreal Protocol. Air Force was presented with two Best-of-the-Best Stratospheric Ozone Protection Awards: one award for the overall Air Force ODS Management program and another for Air Force Research Laboratory's and Aeronautical Systems Center's work on aviation halon replacement.