



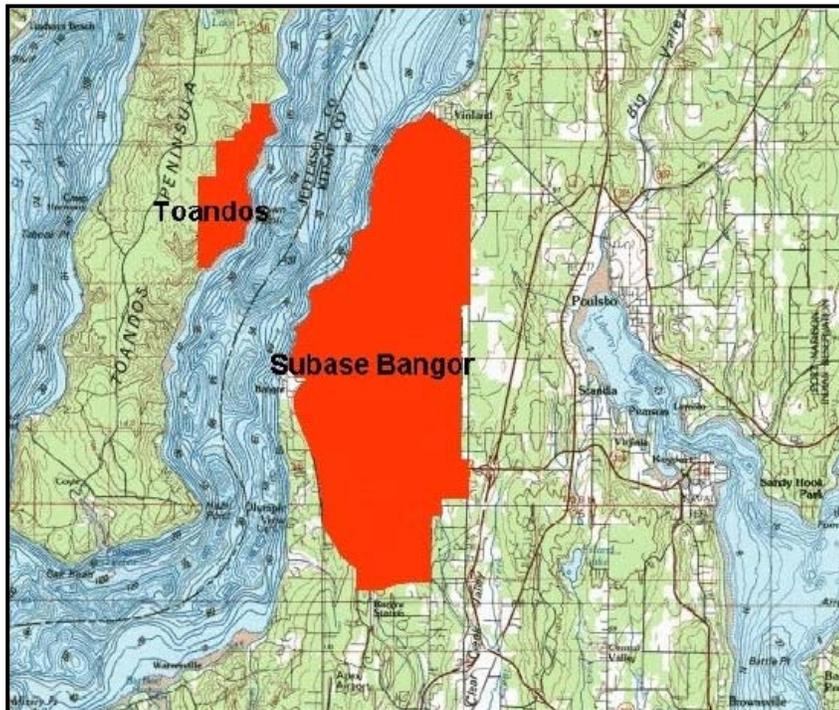
# Naval Submarine Base Bangor

## 1.0 INTRODUCTION

Naval Submarine Base (SUBASE) Bangor hosts over 54 tenant commands, most directly support the TRIDENT program.

The mission of the SUBASE Bangor environmental staff is to support the TRIDENT launched ballistic missile systems, maintain and operate facilities for administration and personnel support which includes base security, berthing, messing, and recreational services, and provide logistics support to other facilities in the area. The environmental staff exists to support the Fleet.

SUBASE Bangor encompasses 7201 acres bordered to the west by Hood Canal, a Washington State designated pristine saltwater inlet of Puget Sound. Approximately 10,000 military, civilian, and contractor personnel make up the combined workforce.



## 2.0 BACKGROUND

SUBASE Bangor served primarily as an ammunition depot from 1944 to 1973, supplying the Pacific Fleet with munitions during that timeframe. The base received the first TRIDENT missile submarine in 1982. Currently, the base is homeport of 9 submarines and includes facilities and manpower to support maintenance of all these platforms and their specialized systems.

Seventeen environmental staff members from Navy Region Northwest (NRNW) are specifically assigned to SUBASE Bangor. The Bangor site manager reports to the base commanding officer. Additional resources are applied as needed from the regional staff.

The region is developing an Environmental Management System (EMS) similar to ISO 14001 format. It will be implemented throughout the region in FY 2004.

## 3.0 PROGRAM SUMMARY

Pollution prevention has been an ingrained cultural characteristic of the environmental staff for well over a decade. In fact, during the 2002 Washington State Governor's Pollution Prevention and Sustainable Practices Award ceremony honoring the winners (SUBASE Bangor and 4 other state groups), one staff member of the Washington State Department of Ecology commented that Bangor had come a long way since the mid '80s. During that time, she conducted compliance audits at Bangor. Many processes have been in place for years that maintain control of hazardous materials and waste. However, the environmental staff is never content maintaining status quo and continually suggests and implements changes to reduce materials, waste and costs.

### 3.1 Hazardous Material Control

Several means of controlling hazardous materials at SUBASE Bangor are:

a. Authorized Use List (AUL) - The shops are requested to update their AULs annually for materials no longer required. Any requested additions to the AUL must go through an approval process where chemical constituents are compared to the base's banned chemical list. Substitutes are sought for any requested products that contain a banned chemical. If none are found, then a waiver may be granted. The majority of waivers granted have been for products called out in the required technical documentation for equipment maintenance and identified by Military Standard (MIL-STD) or Military Specification (MIL-SPEC).

b. Banned Chemical List - In general, SUBASE Bangor's banned chemicals are lead and lead compounds, mercury and mercury compounds, phenols, chromates, trichloroethylene, chlorofluorocarbons, halons, Polychlorinated Biphenyls (PCBs), asbestos, Class I Ozone Depleting Substances (ODSs), radioactive materials, Volatile Organic Compounds (VOCs) targeted by EPA per 40 CFR Part II 2b (Hazardous Air Pollutants), chemicals listed in 40 CFR 355.50 Appendix A, and reproductive chemical stressors.

c. Affirmative Procurement - Recycled content products and EPA designated items are given preference for purchase, when feasible.

d. Hazardous Material Control and Management (HMC&M) Instruction - The HMC&M instruction for SUBASE Bangor was updated in 2002. The update incorporated procedures and responsibilities for project contractors performing work within the SUBASE Bangor fence line.

e. Procedures for Contractors - Contractors coming on base are required to submit a hazardous material control plan for approval. The plan shall include Material Safety Data Sheets (MSDSs) for any materials to be used on base, estimated quantities, the processes the material will be used in, and a written statement stating that no products containing chemicals from the base's banned chemical list will be used.

f. HMC&M Committee - The SUBASE Bangor HMC&M Committee meets regularly for control and minimization of hazardous materials used on base. Hazardous materials are screened and evaluated for personnel safety, chemical components, and workplace hazards. Committee members represent the areas of safety, environmental, supply, and industrial hygiene.

### 3.2 Toxic Release Inventory (TRI) Reporting

In 1997 through the HMC&M Committee, SUBASE Bangor coordinated with all the tenant commands and contractors to reduce xylene below the TRI reporting threshold. The base continues to maintain hazardous materials below TRI reporting thresholds so no Form R reports have been required since 1996.

### 3.3 Regional Waste Program

NRNW is moving toward using one waste tracking program throughout the Region. The waste designation process will be standardized, as well. At SUBASE Bangor, some of the 72 hour Predesignation Staging Areas (PSAs) will be converted to satellite accumulation areas.



### 3.4 Employee Training and Involvement

Employees at SUBASE Bangor are encouraged to contribute pollution prevention ideas. The Environmental web site has a location where employees can input their ideas and it is sent directly to the pollution prevention manager. Hazardous waste originator training is provided to SUBASE Bangor personnel from each shop that produces hazardous waste. Annual refresher training is required and training attendance is tracked. Hazardous Communications training, per 29 CFR 1910.1200 is required and provided to all employees. All supervisors are provided hazardous materials training via classroom or on-line, annually. Environmental awareness training is given to all incoming employees.

In addition to the HMC&M Committee, the Intermediate Maintenance Facility (IMF) formed a Process Improvement Quality Management Board (PIQMB) which identifies ideas and process changes that benefit the shops' work processes. Many ideas resulted in equipment requests forwarded by the SUBASE Bangor environmental staff to the Chief of Naval Operation's (CNO's) Pollution Prevention Equipment Program (PPEP) program. Out of those requests, much of the equipment has arrived and been installed at SUBASE Bangor. Volunteers from various IMF shops and SUBASE Bangor environmental staff participate in these regularly scheduled meetings.



### 3.5 Environmental Quality Assessments (EQAs)

The EQA Program replaces the Environmental Compliance Evaluation (ECE) Program that the Navy has used since 1989 to conduct environmental audits of its operations. The EQA Program is comprised of annual environmental internal and external assessments. The Major Claimant is responsible for conducting external assessments.

The internal assessment approach used by NRNW consists of a three tiered process and is the 'CHECK' portion of the EMS. Tier I focus is day to day compliance, Tier II is process improvement, and Tier III focus is program management review and improvement. Assessments are broken into 6 different Regional Media Teams (RMTs) as shown in Table 1. Currently, Tier II assessments have been completed for WASTE, OHS, and NEPA.

TABLE 1: Regional Media Teams (RMTs)

|                                    |  |
|------------------------------------|--|
| AIR                                | Air Pollution Control, Asbestos Containing Material, Ozone Depleting Substances                      |
| WATER                              | Drinking Water, Wastewater, Stormwater   |
| NEPA                               | National Environmental Policy Act, Natural Resources, Cultural Resources, Pesticides                 |
| HAZMAT                             | Pollution Prevention, Hazardous Materials, Emergency Planning and Community Right-to-Know Act        |
| OHS (Oil and Hazardous Substances) | Spill Prevention, Control, and Countermeasures/Spill Contingency Planning; Underground Storage Tanks |
| WASTE                              | Hazardous Wastes, Solid Wastes/Recycling, Toxic Substance Control Act                                |

## 4.0 ACCOMPLISHMENTS

The SUBASE Bangor environmental staff assists the Navy in carrying out their basic mission of national defense by ensuring environmental compliance. As the Navy is asked to continue doing more with less, many ongoing pollution prevention projects attempt to not only reduce quantities of hazardous materials and wastes, but to improve work processes for our sailors and civilian work force for cost savings in labor, waste disposal and hazardous material purchase. Table 2 summarizes the SUBASE Bangor pollution prevention projects completed during FY02 and FY03. From implementation of these projects, an estimated \$1,216,794 per year is saved in reduced hazardous material purchase, hazardous waste disposal, recycling revenue, and reduced labor costs. The PPEP program has for years been a generous benefactor to SUBASE Bangor's pollution prevention program and those projects are designated with a √ under the 'PPEP' column. Combined FY02 and FY03 pounds or savings reported in the following paragraphs are halved under the columns for 'Estimated Annual Material Reductions', 'Estimated Annual Waste Reductions', and 'Estimated Annual Savings' to give a yearly estimate.

**TABLE 2: SUMMARY of ACCOMPLISHMENTS**

The following categories are annotated in column 2 where they apply:

A – Material Substitution

B – Process Modification or Improvement

C – Improved Material Management

D – Compliance with E.O. 12856, Toxic Chemicals

E – Compliance with E.O. 13123, Energy Efficiency

F – Recycling Program

G – Affirmative Procurement

H – Research, Development, and Technology Demo./Valid.

I – Reductions Achieved

| Para No. | Category (A – I) | Opportunity                           | Estimated Annual Material Reductions | Estimated Annual Waste Reductions | Estimated Annual Savings (waste + material + labor) | Est. Annual Air/Water Emissions Reductions | P<br>P<br>E<br>P |
|----------|------------------|---------------------------------------|--------------------------------------|-----------------------------------|---|--|------------------|
| 4.1      | C, I             | Re-Utilization Store                  | √                                    | 95,184 lbs mat'l re-utilized      | \$251,500 cost avoidance                            |  |                  |
| 4.2      | F                | Recycling                             |                                      | 10,333 tons recycled              | \$600,619 saved in sales, cost avoidance            |  |                  |
| 4.3      | F                | Oil Refining and Recycling            | 31,500 lbs oil and glycol            | 31,500 lbs oil and glycol         | \$263   |  |                  |
| 4.4      | E                | Energy Projects                       |                                      |                                   | \$19,372 saved in reduced electricity               | √  |                  |
| 4.5      | B, I             | Powder Coating Paint System, IMF      | 10,400 lbs solvent and paint         | √                                 | \$175,240   | √  | √                |
| 4.6      | B, H, I          | Digital Radiography for NDT           | √                                    | √                                 | \$65,700  |  |                  |
| 4.7      | B, I             | Glovebox Abrasive Blast Unit, IMF     | 20,800 lbs blast grit                | 20,800 lbs waste blast grit       | \$11,980  |  | √                |
| 4.7      | B, I             | Glovebox Abrasive Blast Unit, SWFPAC  | 72 lbs solvent                       | 71 lbs solvent & rags             | \$29,540  |  | √                |
| 4.8      | B                | Downdraft Grinding Table, Shipfitters |                                      |                                   |   | 16.5 lbs/yr metal dust                     | √                |
| 4.8      | B                | Downdraft Grinding Table, Compressors |                                      |                                   | \$42,000  | √  | √                |
| 4.9      | B, I             | Pressure Blast Tumbler, Paint Shop    | 23,400 lbs blast grit                | 23,400 lbs waste blast grit       | \$13,920  |  | √                |
| 4.10     | B, I             | Enzyme Parts Washers                  |                                      | 156 lbs/yr rags                   | \$3160  | √  | √                |
| 4.11     | B, I             | Burn Off Oven                         | √                                    | √                                 |   |  | √                |
| 4.12     | B, I             | Plural Component Paint System         | √                                    | √                                 |   | √  | √                |
| 4.13     | B, I             | Brake Cleaners                        |                                      |                                   |   | √  | √                |
| 4.14     | B, I             | Lube Oil Dispensing Unit              | √                                    | √                                 |   |  | √                |
| 4.15     | B, I             | Plastic Baler                         |                                      |                                   |   | √  | √                |
| 4.16     | B, I             | Earthquake Valve                      |                                      |                                   |   | √  |                  |
| 4.17     | B, I             | HEPA Vacuums                          |                                      |                                   |   | √  | √                |
| 4.18     | F, I             | Propane Cylinder Recycling System     | √                                    | √                                 |   |  |                  |
| 4.19     | I                | Heating Oil UST Upgrade               |                                      |                                   |   | √  |                  |
| 4.20     | F, I             | Recycling of Blast Grit Waste         |                                      | √                                 |   |  |                  |
| 4.21     | I                | Re-Designation of Bulb Waste          |                                      | √                                 | \$3500  |  |                  |
| TOTALS   |                  |                                       | 86,172 lbs/yr                        | 181,444 lbs/yr                    | \$1,216,794 /yr                                     |  |                  |

#### 4.1 Re-Utilization Store

The Re-Utilization Store has been in operation since 1984 and continues to provide benefits to the area by providing hazardous materials turned in for disposal to customers for use. During the reporting period, the Re-Utilization Store re-issued or recycled over 95 tons (190,367 lbs) of excess hazardous materials that would have otherwise been disposed as hazardous waste. Approximately \$408,000 was saved in avoiding purchase of new materials and approximately \$95,000 was avoided in waste disposal costs.

#### 4.2 Recycling

The total SUBASE Bangor tonnage recycled for 2002 was 10,333 tons, representing 64% by weight of the total refuse produced base wide. Recycling sales generated \$245,577 in revenue, which assist funding the solid waste program. Cost avoidance due to recycling vice disposal was \$355,042. Recycled commodities are cardboard, office paper, newspaper, aluminum cans, various plastics, glass containers, magazines, cooking grease, yard waste, wood, metals, and lubricating oil.

#### 4.3 Oil Refining and Recycling

The Base Operating Service Contractor (BOSC) negotiated a contract to refine used vehicle oil. The vendor picks up expended oil and ethylene glycol and delivers clean refined oil and glycol for use. The vendor also tracks the inventory to ensure the BOSC always has oil and glycol in stock. Approximately 7500 gallons of oil and 1500 gallons of glycol were used and recycled during FY02 and FY03 at purchase cost savings of 5 cents and 10 cents a gallon, respectively. This equates to \$525 total savings during the 2 year time period.

#### 4.4 Energy Projects

SUBASE Bangor completed a building lighting retrofit using more energy efficient fluorescent light bulbs and electronic ballasts throughout most of the base. Traffic lights and fire alarm pull boxes were converted from incandescent bulbs to LEDs. Energy reductions of 545,854 kWh and \$19,372 annual savings are estimated for the lighting. With continued energy conservation efforts, SUBASE Bangor has reduced electrical energy consumption 3,233,100 kWh from FY02 to FY03. Natural gas consumption was reduced by 15,919 MBTUs and fuel oil consumption by 2,065 MBTUs through implementation of other energy reduction projects, such as resetting building thermostats to a lower temperature.

#### 4.5 Powder Coat Paint

The IMF Paint Shop received a larger powder coat spray booth and curing oven, which were installed and operational May 2002. This gave the shop the capability to powder coat a larger number and variety of parts, which previously were finished with solvent paint. Since implementation, solvent paint operations have been greatly reduced. Powder coat paint operations also yield large labor savings since it is a more time efficient process and the coating is tougher, more durable, and longer lasting. The Paint Shop is very pleased with their new equipment and consider it top notch. Since the shop is able to turn around parts more quickly, their productivity has increased dramatically.



#### 4.6 Digital Radiography

IMF's Non-Destructive Test (NDT) Lab received a digital radiography system September 2003 and plans to initially use it for welder qualifications while pursuing the necessary procedural changes to allow use in submarine Non-Destructive Inspections (NDI). The digital radiography system completely eliminates the chemicals used for conventional radiography. Multiple exposures are often necessary with conventional radiography in order to adjust exposure times, intensity levels, and x-ray sources. With digital radiography, operator radiation exposure is reduced since the new system decreases the need for taking additional shots and it uses a lower intensity source. This system saves labor, eliminates chemical usage and hazardous waste disposal. Estimated total cost savings in labor, materials and waste disposal is approximately \$65,700/yr.

#### 4.7 Glovebox Abrasive Blast Units

Three glovebox abrasive blast units were received at SUBASE Bangor and installed in October 2002. The IMF Paint Shop received 2 gloveboxes; one replaced a worn out unit and the other new unit was dedicated to epoxy repair on valves. The new gloveboxes recycle the blast media more efficiently for reductions in new blast grit purchase and corresponding blast grit waste reductions. Prior to receiving the new gloveboxes, every time epoxy repair was required the grit was replaced to ensure a good repair. The new glovebox dedicated to epoxy repair saves the grit and the time involved with replacing it. The Strategic Weapons Facility Pacific (SWFPAC) Handling Equipment Maintenance Facility (HEMF) Shop previously cleaned parts by wire wheeling and wiping with solvents and rags. Use of their new glovebox eliminates the solvent and waste solvent soaked rags. The HEMF Shop has also found the glovebox saves time in parts cleaning over their old method.



#### 4.8 Downdraft Tables

Two downdraft tables were received by IMF's Compressor Shop and the equipment became operational in December 2002. Airborne contaminants were prevalent from the previous process of wire wheeling compressor components in the shop space. Contamination is suspected in numerous compressor failures in the past and proven in one. IMF's Shipfitters Shop at the Delta Pier also received a downdraft table that they began operating in October 2002. Parts cleaning was previously accomplished by wire wheeling in the shop space with no air scrubbing, which provided a potential for the metal debris finding its way into Hood Canal. About 16.5 pounds/year of metal debris are captured with the downdraft table.

#### 4.9 Pressure Blast Tumbler

Small parts that do not require tight dimensional tolerances, such as septum plate washers, pipe brackets, sound mount parts, and other miscellaneous small parts, can be blasted in the tumbler. These small parts are difficult and dangerous to grit blast by hand and very time consuming to clean. This unit was installed in May 2002 at the IMF Paint Shop and has reduced blast grit purchases and expended grit disposal. Further labor savings are realized since the worker can load the unit and walk away to accomplish other tasks.

#### 4.10 Enzyme Parts Washers

The Morale, Welfare, and Recreation (MWR) Auto Hobby Shop received an enzyme parts washer for their customers to use in cleaning vehicle parts. The enzyme parts washers contain an aqueous solution with microbes and reduce the use of solvent parts washers at the Auto Hobby Shop. IMF's Shipfitters and Outside Machinist Shops both received an enzyme parts washer in March 2002. IMF's Shipfitters Shop reports that all greases are now completely consumed from their parts.

#### 4.11 Burn Off Oven

IMF's Paint Shop will received a burn off oven for removing powder coat paint. Currently the Paint Shop is using the Electrical Shop's oven, which is small. Larger parts were grit blasted which is an inefficient means of removing the tough powder coatings. After installation of the new burn off oven, savings in labor, and grit purchase and disposal have been realized.

#### 4.12 Plural Component Paint System

Two plural component paint systems were received by the IMF Paint Shop at the Delta Pier in August 2002. Submarine ballast tanks previously were coated with Mare Island epoxy paint but the use of high solids paints, which require the specialized plural component paint system for application has replaced the epoxy paint process. High solids paint coatings for ballast tanks are expected to provide a longer lasting coating, therefore reducing the frequency of grit

blasting and repainting of the tanks. High solids paints also contain a lower VOC content for a reduced air emissions benefit. High solids paint is premixed right before the nozzle, so less hazardous waste is produced from premixing the two-part paints.

#### 4.13 Brake Cleaners

Two self contained brake cleaning units were received for use in the BOSC heavy equipment maintenance shop. One unit was recently transferred to CBU-418 for use with their construction equipment. The brake cleaners are a glovebox unit with filtration for capturing all fine particles released during brake cleaning operations. This has enhanced the health of the worker's environment as well as controlling fugitive emissions.

#### 4.14 Lube Oil Dispensing Units

CBU-418 and the BOSC heavy equipment maintenance shop each received a lube oil dispensing unit. The lube oil dispensing unit contains an electric pump and retractable hose reel with metered dispensing handles and delivers lubricants to the vehicle, virtually eliminating spills. Previously, liquids were decanted from their original containers into buckets and carried across the shop.

#### 4.15 Plastic Baler

SUBASE Bangor's Recycling Center received a plastic baler, which is capable of condensing 20 cubic yards of loose plastic bottles to a single cubic yard. The baler eliminates 10 or more roundtrips of 100 miles each to the recycler every year, thereby saving the associated fuel and transportation costs.

#### 4.16 Earthquake Valve

An earthquake valve was installed in the propane tank yard at TRIDENT Training Facility (TTF) to prevent the release of this flammable and hazardous material in case of rupture during an earthquake.

#### 4.17 HEPA Vacuums

Twenty HEPA vacuums were distributed to various IMF shops to capture hazardous emissions from industrial processes.

#### 4.18 Propane Cylinder Recycling System

The BOSC purchased a propane cylinder recycling system which removes the sealing sleeve and internal valve stem from propane, propylene, mapp and calibration gas cylinders, then empties and filters the propellant. The empty cylinders are now recycled as scrap steel.

#### 4.19 Heating Oil Underground Storage Tank (UST) Upgrade

Removal of 26 unregulated USTs and their related piping and installation of 21 replacement tanks with double walled fiberglass, piping, automated inventory control, and leak detection equipment was accomplished. Seven sites suspected of soil contamination due to fuel oil release were tested. Lab results indicated 4 sites were contaminated above Model Toxic Clean-up Act required levels. One of those sites was remediated but ongoing site treatment and monitoring are required. The other 3 sites were remediated and returned to service.

#### 4.20 Recycling of Blast Grit Waste

For nearly the past 10 years, SUBASE Bangor has been recycling the vast majority of blast grit generated within SUBASE Bangor as a component of concrete. The remaining relatively small quantities of blast grit that had been disposed of as hazardous wastes is also decreasing because several paints containing heavy metals have been eliminated from use.



## 4.21 Re-Designation of Fluorescent Bulb Waste

In 1998 the base received a fluorescent bulb crusher with an attached mercury evacuation/filtration system. In CY 2002, the waste team began testing representative samples of the crushed mercury evacuated bulb waste in order to downgrade this waste from hazardous to non-hazardous. As a result, in CY 2002, 34% of the total bulb waste was designated non-hazardous and sent off base as refuse. In CY 2003 to date, 70% of the bulb waste for CY 2003 has been designated as non-hazardous, saving approximately \$3500/yr in disposal costs.

## 5.0 EDUCATION, OUTREACH, AND PARTNERING

SUBASE Bangor participates in various activities that educate the community on environmental topics and how SUBASE Bangor addresses them. SUBASE Bangor and NRNW also participate in other activities that pull the federal and business community together in partnerships that benefit the participants.

### 5.1 PPEP Equipment Case Studies

SUBASE Bangor and NRNW prepares case studies for PPEP equipment received. The intent is to provide feedback to the PPEP program identifying return on investment information and equipment performance, as well as communicate to the pollution prevention community. Any maintainability issues are identified, often with lessons learned or ideas on improving the equipment design. These case studies are shared within the region, with the PPEP program personnel, with other P2 managers within DOD, State Dept of Ecology, and any interested industry partners.

|  <b>FIELDIED EQUIPMENT</b>   |      | <b>ROI PRESSURE BLAST TUMBLER</b>  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
|---|------|--|---------------------|---|--|--|--|--|--|----|-------------|---|--|----|--|--|--|----|------------|--|--|----|----------|--|--|----|--|--------------|--|----|--------------------|--|--|--|--|---|--|----|--|---|--|----|--|--|--|----|----------|--------------------------------------|--|----|--|--|--|----|---------|--------------|--|----|-----------------|--------------------------------|--|--|--|---|--|----|--------------------|--------------------------------------|--|----|-------------|-------------------|------|--|-----|-----------------|--|----|---------------------|--|--|--|--|-------------------------------------|-----|--|--|---|-----|--|--------|--|-----|--|--------|--------------------------------------|-----|--|--|--------------------------------------|-----|--|--|
| <b>PRESSURE BLAST TUMBLER</b>   |      |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
|   |      |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| <p>The Pressure Blast Tumbler removes corrosion and coatings from parts in preparation for paint application. The shop uses glass bead media in the tumbler. The parts are loaded into the barrel and automatically blast the parts clean, therefore freeing up workers for other tasks. The machine has capacity for 2.62 cubic feet of parts per load with a cycle time of 10 to 15 minutes.</p> <p><b>Where:</b> SUBASE Bangor IMF Bldg 7000 Shop 71A Paint Shop<br/> <b>When:</b> Installed 29 May 2002<br/> <b>Who:</b> IMF Shop 71A Dan Halverson or Dean Rosen (360) 315-1395</p> <p><b>Environmental/Safety &amp; Mission Improvements</b></p> <ul style="list-style-type: none"> <li>Approximate 23,400 lb/yr reduction in purchase of new grit and a corresponding 23,400 lb/yr reduction of waste grit</li> <li>Reduced labor involved in clearing parts by approximately 8.5%</li> </ul>  |      |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| <p><b>Annual Environmental/Cost Savings:</b></p> <p><b>Total Annual Cost Savings: \$13,930/yr      Equipment Payback Period: 1.5 yr</b></p> <p>Equipment cost was \$19,570, installation cost \$832</p> <p><b>Labor Savings:</b> Parts which are typically blasted with the tumbler include septum plate washers, pipe brackets, sound mount parts and miscellaneous small to medium sized parts which are not governed by critical dimensional tolerances. Previous practices utilized the old glovebox blast unit which was a laborious process. Currently, the shop is able to load an appropriate quantity of parts in the barrel, start the cycle, and walk away to accomplish other tasks. Labor savings are estimated at approximately 7 hrs/wk.</p> <p><b>Material/Waste Minimization:</b> The tumbler recycles the grit very efficiently. Previously to blast the same parts, roughly 500 lb/wk of grit were expended. Currently, about 50 lb/wk of grit are used to blast corresponding parts which constitutes a 90% reduction in hazardous waste minimization and material acquisition.</p> <p><b>Technological Significance:</b> This equipment is an engineering control device to meet NAVOSH and environmental requirements. The grit is efficiently recycled so less media is purchased. Parts can be cleaned of corrosion and paint with 85% less labor.</p> <p><b>Equipment Description:</b> The Kelco Model T2430N Pressure Blast Tumbler is a small automated blast unit designed to clean small and medium sized parts using various dry abrasive mediums, such as steel shot, glass bead, aluminum oxide, and garnet. Parts that are controlled to tight dimensional tolerances should not be used in the tumbler. The unit contains nozzles directed into both ends of the barrel that provide a randomized blasting pattern and uniform coverage. The unit includes a container exit kit which prevents dust and abrasive grit from escaping into the work environment, a vortex style abrasive separator, and a dust collector which has an automatic vibratory cleaning mechanism.</p> <p><b>Field Performance Results:</b> The Paint Shop finds the tumbler a useful and efficient machine. They have learned to ensure that delicate parts do not go into the tumbler since they will sustain damage. A single problem was experienced where the set screw backed out and the impeller came off. The shop easily and promptly made the repair with technical assistance provided by Kelco. No other problems have occurred.</p> <p><small>Acknowledgments: Thanks to CNO, PACFLT and NAVAIR Labhurst for approving, funding and contracting for this equipment.<br/>           For further information, please feel free to contact Greg Levoun, Navy Region NW Pollution Prevention Mgr, (360) 476-6692 or Carol MacKenzie, SUBASE Bangor Pollution Prevention Mgr, (360) 315-1992.</small></p> |      | <table border="1"> <tr> <td colspan="2"><b>1. CALCULATION OF PREVIOUS OPERATION COSTS</b></td> <td></td> <td></td> </tr> <tr> <td>ANNUAL LABOR COST (Paint shop used to grit blast parts in the old blast booth by hand. 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CALCULATION OF COSTS WITH NEW PPEP EQUIPMENT</b> |  |  |  | ANNUAL LABOR COST (Enter 0 here since labor savings are calculated above) |  | \$ |  | ANNUAL HAZARDOUS MATERIAL PURCHASE COST |  | \$ |  | ANNUAL NON-HAZARDOUS MATERIAL PURCHASE COST (50 lb/wk of glass bead media x 52 wk/yr x \$80/ton x 1 ton/2000 lb = \$104) |  | \$ | \$104.00 | ANNUAL HAZARDOUS WASTE DISPOSAL COST |  | \$ |  | ANNUAL NON-HAZARDOUS WASTE DISPOSAL COST (50 lb/wk x 52 wk/yr x \$22/ton x 1 ton/2000 lb = \$29) |  | \$ | \$29.00 | <b>TOTAL</b> |  | \$ | <b>\$139.00</b> | <b>3. BENEFIT COST SUMMARY</b> |  |  |  | ANNUAL SAVINGS (tumbler \$19,570, installation \$832) |  | \$ | <b>\$19,933.00</b> | EQUIPMENT PURCHASE/INSTALLATION COST |  | \$ | \$20,402.00 | YEARS TO PAY BACK | YRS. |  | 1.5 | 10 YEAR SAVINGS |  | \$ | <b>\$118,826.00</b> | <b>4. 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| <b>1. CALCULATION OF PREVIOUS OPERATION COSTS</b>   |      |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL LABOR COST (Paint shop used to grit blast parts in the old blast booth by hand. They estimate that 7 hr/wk of labor is saved using the tumbler. 7 hr/wk x 52 wk/yr x \$35/hr = \$12,740/yr)  |      | \$   | \$12,740.00         |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL HAZARDOUS MATERIAL PURCHASE COST   |      | \$   |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL NON-HAZARDOUS MATERIAL PURCHASE COST (Estimate 500 lb/wk of glass bead media used. 500 lb/wk x 52 wk/yr x \$80 /ton x 1 ton/2000 lb = \$1040)  |      | \$   | \$1,040.00          |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL HAZARDOUS WASTE DISPOSAL COST (500 lb/wk x 52 wk/yr x \$22/ton disposal cost x 1 ton/2000 lb = \$286)  |      | \$   | \$286.00            |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL NON-HAZARDOUS WASTE DISPOSAL COST  |      | \$   |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| <b>TOTAL</b>  |      | \$   | <b>\$14,066.00</b>  |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| <b>2. CALCULATION OF COSTS WITH NEW PPEP EQUIPMENT</b>  |      |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL LABOR COST (Enter 0 here since labor savings are calculated above)   |      | \$   |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL HAZARDOUS MATERIAL PURCHASE COST   |      | \$   |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL NON-HAZARDOUS MATERIAL PURCHASE COST (50 lb/wk of glass bead media x 52 wk/yr x \$80/ton x 1 ton/2000 lb = \$104)  |      | \$   | \$104.00            |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL HAZARDOUS WASTE DISPOSAL COST  |      | \$   |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL NON-HAZARDOUS WASTE DISPOSAL COST (50 lb/wk x 52 wk/yr x \$22/ton x 1 ton/2000 lb = \$29)  |      | \$   | \$29.00             |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| <b>TOTAL</b>  |      | \$   | <b>\$139.00</b>     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| <b>3. BENEFIT COST SUMMARY</b>  |      |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL SAVINGS (tumbler \$19,570, installation \$832)   |      | \$   | <b>\$19,933.00</b>  |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| EQUIPMENT PURCHASE/INSTALLATION COST  |      | \$   | \$20,402.00         |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| YEARS TO PAY BACK   | YRS. |  | 1.5                 |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| 10 YEAR SAVINGS   |      | \$   | <b>\$118,826.00</b> |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| <b>4. REDUCTION OF HM/HW/AIR &amp; WATER POLLUTION</b>  |      |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL HAZARDOUS MATERIAL REDUCTION   | LBS  |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL NON-HAZARDOUS MATERIAL REDUCTION (500 lb/wk x 52 wk/yr) - (50 lb/wk x 52 wk/yr) = 23,400 lb/yr reduction   | LBS  |  | 23,400              |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL HAZARDOUS WASTE REDUCTION (500 lb/wk x 52 wk/yr) - (50 lb/wk x 52 wk/yr) = 23,400 lb/yr reduction  | LBS  |  | 23,400              |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL NON-HAZARDOUS WASTE REDUCTION  | LBS  |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |
| ANNUAL AIR/WATER POLLUTION REDUCTION  | LBS  |  |                     |   |  |  |  |  |  |    |             |   |  |    |  |  |  |    |            |  |  |    |          |  |  |    |  |              |  |    |                    |  |  |  |  |   |  |    |  |   |  |    |  |  |  |    |          |                                      |  |    |  |  |  |    |         |              |  |    |                 |                                |  |  |  |   |  |    |                    |                                      |  |    |             |                   |      |  |     |                 |  |    |                     |  |  |  |  |                                     |     |  |  |   |     |  |        |  |     |  |        |                                      |     |  |  |                                      |     |  |  |

## 5.2 Biodiesel Roundtable

The Navy (SUBASE Bangor and the NRNW Environmental Office), EPA Region 10, and Washington State Department of Ecology co-host the Puget Sound Biodiesel Roundtable discussions, held once to twice a year. The intent is to promote the availability of a reliable supply of ASTM certified biodiesel in the region for a competitive price. These goals are fast being realized as more users are providing a demand for the product in the region. Biodiesel Roundtables have provided a forum for the numerous testimonies presented by fleet owners who introduced biodiesel with no adverse affects to their vehicles, thus allaying concerns of many potential users. In fact, many benefits have been seen for some users with lower maintenance requirements (reduced frequency of fuel filter changes) and noticeably less noxious vehicle emissions. EPA and Naval Facilities Engineering Service Center have both conducted separate research and found reductions in biodiesel emissions for hydrocarbons, carbon monoxide, and particulate matter, with a slight increase in NOx. The price has dropped for the government consumer, recently reported by NAVSTA Everett as less than regular diesel (77 cents/gal). Graham Noyes from World Energy Alternatives, LLC, a biodiesel supplier noted "Since the seminar (held Nov 2002), several major new users have started utilizing biodiesel including Intercity Transit in Olympia, Bonneville Power Administration in Vancouver and the Oregon Department of Transportation. In this short period, sales have grown by 40-50% and the Washington State Legislature has passed several significant measures to encourage the use and production of biodiesel." Biodiesel case studies are written to document and further the work of the Biodiesel Roundtables in communicating the success stories and lessons learned of those who have implemented it. Case studies prepared by SUBASE Bangor and NRNW Environmental staff are available for Mt. Rainier, Manchester Fuel Department, McChord Air Force Base, and NAVSTA Everett.



## 5.3 Field Activity Support and Technology Transfer Team

The Field Activity Support and Technology Transfer (FASTT) team conducted a follow up survey Aug 2002. They found 61% of their opportunities identified during their 1996 survey were implemented. The collective cost savings to date was \$246,600, minus any implementation costs

The FASTT conducted a full site survey in August 2003. Fifty-seven opportunities were identified by FASTT during the survey. Of those 57 opportunities, 8 were export technologies, such as battery powered pop riveting guns, catchment basin for concrete work, or using acoustics to determine need for bearing maintenance. These new ideas FASTT had not encountered previously and felt they were worthy of transferring to other DOD bases. The FASTT Director commented this was the most export ideas found during a FASTT survey, ever. NRNW plans to implement the top 10 FASTT opportunities from this survey during FY 04 and is currently prioritizing these opportunities.

## 5.4 Storm Water Consortium

SUBASE Bangor and NRNW personnel partner with Kitsap County in this grant-funded multi-year project. The Consortium includes representatives from Kitsap County, 4 cities, and 3 separate Naval activities. The goal is to assess and increase citizen awareness in stormwater issues, including how individuals impact stormwater and how to mitigate those impacts. Tools being developed to meet these goals include a baseline survey, a localized message, a media campaign, and follow-up surveys.

## 5.5 Earth Day Events

SUBASE Bangor celebrates Earth Day every year with the community and its employees. For the 2002 Earth Day, school children visited the US Fish and Wildlife National Salmon Hatchery in Quilcene, WA. Other local schools were visited by environmental personnel and provided environmental presentations, including crafts made from recycled materials. For the 2003 Earth Day, SUBASE Bangor hosted a beach cleanup for local school children. The SUBASE Bangor Game Warden illustrated the different species, life cycles, harvesting techniques and usage of shellfish. The

students met with an elder and a tribal biologist from the Port Gamble/S'Klallum Indian Tribe at SUBASE Bangor's beach to learn tribal perspectives, history, private and ceremonial aspects and various laws on shellfishing. The students were instructed and guided on the seeding of 30,000 shellfish.

#### 5.6 Water Festival

SUBASE Bangor environmental personnel participated at the 2003 Water Festival held at Olympic College in Bremerton, which hosts 1000 local 4th grade students. Presentations showed how individual actions affect water quality and provided stormwater best management practices.

#### 5.7 SUBASE Bangor Recycle Center Tours

Eight Recycle Center tours were given to local kindergarten classes. The students brought objects from home to recycle and witnessed the recycling process in action.

#### 5.8 Vermiculture

The Environmental Department is invited to the elementary schools and asked to demonstrate and explain the purpose and uses of worm farming, also known as vermiculture. A worm box is brought to the schools. After listening to a story about "Wonder Worm" the students are given the "hands-on" opportunity to examine and handle the "red wigglers" as well as the other various contents in the worm box. It is explained that vermiculture is another form of recycling, but there are additional benefits to this type of recycling.

### **6.0 CLOSING REMARKS**

SUBASE Bangor and NRNW environmental staff continue to search for ways to improve their processes. They implement improvements keeping in mind the time critical maintenance turnaround times of the TRIDENT submarines and work hard to ensure environmental compliance and boat schedules coincide.

