

THE NAVY'S ENERGY & ENVIRONMENTAL MAGAZINE

# Currents

summer 2012

CNO Recognizes

## ENVIRONMENTAL EXCELLENCE

Across the Fleet

2011 Award Winners Highlight the Range of  
the Navy's Environmental Commitment

Spotlight on Fleet Environmental Readiness  
NAVSEA Reducing Fleet Energy Consumption  
NESDI Program Evaluates Technologies to Address Puget Opacity Limits







# THE NAVY'S ENERGY & ENVIRONMENTAL MAGAZINE **Currents**

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cover

Winners of the annual Chief of Naval Operations Environmental Awards program have been announced for Fiscal Year 2011. Among the award winners is the natural resources management team at the Pacific Missile Range Facility, Hawaii where, for the first time in over a decade, the threatened green sea turtle successfully nested. These hatchlings were collected and released in a "reverse landing" back into the Pacific Ocean.

*Dennis Rowley*

## CNO Recognizes Environmental Excellence Across the Fleet

2011 Award Winners Highlight the Range of the Navy's Environmental Commitment

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## Seeking Alternative Energy Sources Key to Navy Mission

**AS WE MOVE** steadily towards achieving the five energy goals I established soon after I took office, changes in the energy environment have impacted the conversation on alternative energy. The United States has significantly increased domestic production of oil and natural gas, and oil imports have decreased. Today, the U.S. imports only 45 percent of its oil, down from 57 percent in 2008 and down a million barrels a day from last year.

We can and we ought to pursue any domestic sources of fuel that increase our energy security, but drilling alone will never solve our national security concerns over foreign oil. The U.S. Navy and Marine Corps will still face the same military vulnerability created by our dependence on fossil fuels. We still buy too much petroleum from poten-

have less training time. If we siphon money from procurement, we have fewer funds to purchase new ships and aircraft and other technology. Some have argued that, in these budget constrained times, we must choose between investing in ships and planes and investing in more secure means of powering those platforms. That is a false choice.



We risk having fewer ships and aircraft if we do not develop alternative energy sources.

tially or actually volatile places on earth, and we are still subjected to price shocks in the oil market which directly impact readiness and operations.

Today, the U.S. controls just two percent of known global oil reserves, but we consume over 20 percent of the world's oil. And, even if we could supply all our energy with domestic fossil fuels, oil would still be a global commodity and we would still be subject to price shocks that result from markets that trade on speculation and rumor.

This year, the Navy is facing over a billion dollars additional in fuel costs simply because the price has risen faster than was estimated when the budget was passed. The Navy must find that money in the budget, and there are only a few accounts with funds that can be transferred to pay for this huge price increase: operations and procurement.

If we transfer funds from operations, our planes and aviators spend less time in the air, our ships and Sailors spend less time at sea, and our Marines and Sailors

In fact, we risk having fewer ships and aircraft if we do not develop alternative energy sources. Funds used to pay for unbudgeted fuel price spikes have a direct impact on our ability to power existing platforms, and have the potential to impact our ability to purchase new ones. A readily available and competitively priced domestic alternative fuel source would lessen our dependence on foreign oil and the impact on our budget of a highly volatile oil market.

The key to a viable alternative to foreign oil is price. The Department will not purchase alternative energy for operational use that is not cost competitive with petroleum. There are skeptics who argue that we should not be pursuing alternative energy because any new form of energy will cost more than existing types. If the argument that new technology is too costly had carried the day in the 1850's, the Navy would still be using sails. Nuclear submarines would never exist because they are still far more expensive than conventional submarines.

We already know from experience that new technology will become more cost efficient with increasing demand.



Today, the prices of several alternative energy sources are competitive with traditional energy, and in some cases are going to produce substantial cost savings for the Navy and Marine Corps.

We currently have three power purchase agreements in place at three of our installations in California that are going to save us \$20 million over the 20-year contracts. We are building on that progress by pursuing the production or consumption of one gigawatt of renewable energy generation on or near our installations, and without any additional cost to taxpayers. And demand has already impacted the cost of biofuel. Prices have come down dramatically since the Navy's first purchases for testing and certification.

This July, the Navy will use a mixture of biofuels and marine diesel and aviation gas in a demonstration during the Rim of the Pacific exercise. During the exercise, the largest naval exercise in the world every two years, alternative fuel blends will be used in operational activities such as underway replenishments and refueling of aircraft on the deck of our carrier.

Some have also questioned why the Navy is seeking alternative sources of energy, claiming that the effort is not part of the Navy's mission. I strongly disagree. The Navy is leading in this because it is one of our core competencies and energy security directly impacts our national security and our warfighting capabilities.

Throughout the Navy's history, we have pioneered the way we fueled the fleet. In the 1850's, we moved from sail to coal. In the early 20th Century, we left coal to transition to oil and we led the way to nuclear power in the 1950's. At the time of each energy transformation, there were doubters and naysayers who said trading a known source of energy for an unknown one was too risky and too costly. But the Navy pursued innovation because it improved the capability of the fleet and made us better warfighters.



## The Great Green Fleet will signal to the world America's continued naval supremacy, unleashed from the tether of foreign oil.

This demonstration furthers our preparations to deploy in 2016 a "Great Green Fleet"—named in honor of President Theodore Roosevelt's Great White Fleet—which helped usher in America as a global power on the world stage at the beginning of the 20th Century. The Great Green Fleet will signal to the world America's continued naval supremacy, unleashed from the tether of foreign oil.

It is a goal that becomes more attainable every day as more companies in the U.S. and around the world investigate and invest in biofuel. Several commercial airlines, including the world's largest carrier, United Airlines, recently completed test flights on biofuel. Maersk Line, one of the largest shipping companies in the world, fueled one of its container vessels with 100 percent algal-derived renewable diesel. Increased demand will bring cost-competitive prices, and the Navy can help bring the demand side of the equation.

The critics were wrong then, and they are wrong today. The U.S. military, time and time again, has led in the introduction of new technologies, including the Internet, Global Positioning System, and flat-screen televisions. In each case, we pursued innovation because it strengthened our national security and our capability as a military.

We have to be and we will be relentless in our pursuit of energy goals that will continue to make us a more effective fighting force and our military and our nation more energy independent and energy secure. Our Navy and our nation can afford no less.

I have been extremely proud over the past three years of what you have accomplished and our Navy and our nation depends on your continued success. 🇺🇸

The Honorable Ray Mabus  
Secretary of the Navy

# SUMMER IS time for trimming

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CNO Recognizes

# ENVIRONMENTAL EXCELLENCE

Across the Fleet

2011 Award Winners Highlight the Range of  
the Navy's Environmental Commitment





**W**inners of the annual Chief of Naval Operations (CNO) Environmental Awards program have been announced for Fiscal Year (FY) 2011. The awards recognize Navy ships, installations, and individuals for their exceptional environmental stewardship.

The competition categories for the FY 2011 competition included natural resources conservation (small installation and individual/team), cultural resources management (installation), environmental quality (non-industrial installation, individual/team, and large ship), sustainability (industrial installation), environmental restoration (installation and individual/team), and environmental excellence in weapon system acquisition, large program (individual/team).



Nominations were judged by subject matter experts on accomplishments from 1 October 2009 through 30 September 2011. Vice Chief of Naval Operations Admiral Mark Ferguson recognized the 30 CNO award winners for their exceptional environmental stewardship during the FY 2011 CNO Environmental Awards ceremony held 5 June 2012 at the U.S. Navy Memorial and Naval Heritage Center in Washington, D.C. Accomplishments of the FY 2011 CNO environmental award winners are highlighted below.

## NATURAL RESOURCES CONSERVATION

This award recognizes efforts to promote the conservation of natural resources, including the identification, protection, and restoration of biological resources and habitats; and the sound management and use of the land and its resources.

### SMALL INSTALLATION

#### Pacific Missile Range Facility, Hawaii

Pacific Missile Range Facility (PMRF) has an Integrated Natural Resources Management Plan (INRMP) that has helped forge successful relationships through community outreach and cooperative conservation with organizations



For the first time in over a decade, the threatened green sea turtle (*Chelonia mydas*) successfully nested at PMRF twice in the summer of 2010 and once in the summer of 2011. These hatchlings were collected and released in a “reverse landing” back into the Pacific Ocean.

*Dennis Rowley*

and programs such as federal and state agencies, local conservation organizations, the public as well as native Hawaiians. Resulting accomplishments include raising public support for the Laysan Albatross Surrogate Parenting Program; coordination of monitoring, documenting, and protecting of listed terrestrial and marine species; and participation in several nongovernmental organization and National Oceanic and Atmospheric Administration (NOAA) programs.

Finally, PMRF has closed certain areas to meet Force Protection requirements and protect designated critical habitat for numerous protected species. Doing so has eliminated shoreline harvesting, fishing, and recreational driving. The patrolled beachfront and littoral zone are predicted to return to pre-human conditions.



On 15 September 2011, PMRF sailors teamed with students and faculty from the Ke Kula Niihau O Kekaha Hawaiian Language charter school on a beach sweep and discovered a message-in-a-bottle released by sixth grade students from a school in Japan in 2006. Besides collecting over 400 pounds of ocean debris, the Kauai and Japanese schools have initiated an international exchange project.

*MC1 Jay Pugh*

#### Fleet Logistics Center Puget Sound, Washington (Fuel Department)

During the awards period, the Naval Supply Systems Command (NAVSUP) Fleet Logistics Center (FLC) Puget Sound completed several environmental projects outlined in the Fuel Department’s INRMP. Some examples include removing the last impediments to fish migration as part of the final phase of the Beaver Creek Restoration Project—creating additional breeding habitat for salmon, as well as Sea-run Cutthroat trout for the first time since 1939;



Beaver Creek Restoration Project is nearing completion of Phase Four in a continued effort to restore the creek to natural, pre-World War II, salmon-bearing stream conditions. (Shown here: construction of a replacement culvert.)



completing a study that indicated that the Fuel Department shoreline has become one of the most productive habitats for forage fish in all of Puget Sound; and completing a survey which indicated that the eelgrass population is growing at much deeper depths near the Fuel Department than anywhere else in the Sound.

Environmental projects that were initiated during the awards period include a detailed oil spill contingency plan, and a deer species survey that, after its completion in September 2012, will be one of several samples used to compare the current wildlife population with historical figures. The overall effort will be utilized to develop a wildlife management plan.



FLC Puget Sound Fuel Department is a 234-acre site in eastern Kitsap County, Washington. It contains approximately two miles of Puget Sound shoreline and a 26-acre lagoon.

### Naval Support Activity Panama City, Florida

Naval Support Activity (NSA) Panama City, located along the western shore of St. Andrew Bay on the Gulf of Mexico in Florida's panhandle, has found an innovative way to address years of erosion along the installation by utilizing a living shoreline. This project installed 175 oyster reefs using recycled oyster shells; and planted 22,000 donated marsh grasses. Over 2,800 volunteer hours in a nine-month period helped this project come to fruition. Other conservation programs that support the sustainable multi-purpose use of the environment include the implementation of a successful prescribed fire program inside a wildland-urban interface, and the sustainment of 13 threatened and endangered species where intense commercial and residential development around the installation has fragmented habitat. NSA Panama City also protects and enhances wetlands by enforcing a new 50-foot buffer policy to maintain biological communities while beneficial landscape techniques conserve resources.



The Gulf of Mexico's unique conditions and location make NSA Panama City ideal for fleet training and littoral warfare missions. The installation is also a consolidated site for Navy diving and salvage research, development, testing, and training.

*Jonnie Smallman*



Florida Department of Environmental Protection Ecosystem Restoration Specialists, Zack Schang and Penelope Bishop demonstrate proper grass planting techniques for volunteers from NSA Panama City and students from local high schools during the 2011 Living Shoreline Restoration project event. Two-and-a-half acres of estuarine habitat were created with 2,840 volunteer labor hours at 28 events during a nine-month period.

*Jonnie Smallman*

### INDIVIDUAL/TEAM

#### Naval Base Guam, Marianas (Public Works Department, Environmental Division)

Responsible for the management of natural resources on lands covering approximately 14 percent of the island, the natural resources team at Naval Base Guam (NBG) is responsible for maintaining a variety of significant habitats including limestone forests, ravine forests, wetlands, and coral reefs, as well as several threatened and endangered species, and two ecological reserve areas. NBG has devel-



NBG protects and improves shoreline habitats for a variety of species through ecological studies, beach cleanups, and other conservation projects.

*Kevin Brindock*

oped an INRMP that identifies the overall goal of protecting and improving the natural ecosystem's structure and function on Guam. The natural resources team achieves this goal by identifying and inventorying resources, protecting threatened and endangered species, habitat management and enhancement, invasive species management, soil and water conservation, and education and outreach programs. These efforts have resulted in Navy lands containing some of the best habitat for native, threatened, and endangered species on Guam. The natural resources team has achieved similar accomplishments with marine resources management, with Navy submerged lands identified as containing some of the healthiest reefs around the island.



The marine environment around Guam contains habitat for threatened and endangered sea turtles. Both green and hawksbill turtles use the waters and beaches on NBG for foraging and nesting.

*Kevin Brindock*

### Naval Support Activity Panama City, Florida (Environmental Staff)

The environmental staff at NSA Panama City utilizes limited resources and the cooperation of command and tenant staff to implement and manage numerous proactive

projects. NSA Panama City continues to enhance the biological integrity and diversity of the installation's land through a targeted prescribed fire program, invasive/exotic species elimination, and wetland protection programs. A robust Environmental Management System (EMS) and careful planning ensures that all proposed mission projects and associated work processes are completed on time and with no adverse effects to the environment.



Ken Rudisil, staff horticulturist from the University of Florida Bay County Extension Office, assists Executive Officers Lieutenant Commander Douglas Johnson, NSA Panama City, and Commander Robert Hoar, Naval Surface Warfare Center Panama City Division plant trees on Arbor Day 2011. 2011 marked the 16th year that NSA Panama City has been certified as a Tree City through the national Arbor Day Foundation.

*MC2 David Didier*



NSA Panama City created a Living Shoreline to combat the effects of years of erosion along the shoreline of St. Andrew Bay, one of the few remaining pristine bays in northwest Florida. A Living Shoreline protects and enhances juvenile habitats for fish and birds.

*Jonnie Smallman*





## Pacific Missile Range Facility, Hawaii (Integrated Natural Resources Management Plan Implementation Team)

Successful implementation of PMRF's 2010 INRMP requires the efforts and support from Naval Facilities Engineering Command (NAVFAC) Pacific and NAVFAC Hawaii biologists, and the coordination of a variety of individuals and elements both on and off base. PMRF Sailors, civilians, and contractors work collaboratively to execute several programs and projects, including elimination of feral goat damage at the Makaha Ridge radar and telemetry site; study and subsequent changes to PMRF lighting to reduce harm to protected species; monitoring and protecting nest and basking sites for green sea turtles and Hawaiian monk seals; maintaining and performing requirements for the unique "surrogate parenting" program for Laysan Albatross eggs from PMRF to the North Shore of Kauai; maintaining the integrity of recovering natural resources of secured coastal areas to pre-human condition; and managing the elimination of a target invasive plant species—the Long Thorn Kiawe.



An off-duty PMRF security guard holds the first green sea turtle hatchling found in over a decade at Barking Sands beach. The threatened green sea turtle successfully nested at PMRF twice in the summer of 2010 and once in the summer of 2011.

*John Burger*



In an effort to minimize fallout of protected nocturnal migratory seabirds, lamps at Barking Sands beach are being changed to test the efficacy of Light Emitting Diode (LED) lights. These changes are expected to aid fledgling migration and save energy.

*John Burger*

## CULTURAL RESOURCES MANAGEMENT

This award recognizes efforts to promote the conservation and management of cultural resources, including the identification, protection, and restoration of historic buildings and structures, archaeological sites, and sacred objects and sites.

### INSTALLATION

#### Commander, Fleet Activities Yokosuka, Japan

Commander, Fleet Activities Yokosuka (CFAY) has successfully developed and maintained invaluable relations crucial to the success of the cultural resources program through dedicated support from military and civilian personnel, and partnerships with the Yokosuka City Museum, the Yokosuka Board of Education, the Zushi Board of Education, and the cities of Yokosuka, Zushi, and Yokohama.

Through several efforts, CFAY has developed and maintained a robust cultural resources preservation program. During the awards period, CFAY preserved historically significant fossil shells, railroad bridges, and brickwork; and continued several ongoing efforts, including maintaining curation and preservation agreements with the Yokosuka City Museum. Other cultural awareness initiatives undertaken at the base include recruiting volunteers to support resource protection efforts; coordinating base historical/cultural tours; organizing new environmentally-focused programs and events; and educating personnel via newspaper articles and television advertisements.



CFAY has gone to great lengths to retain the structural framework of historical buildings that are in need of replacement to meet the Navy's changing needs. Three industrial, administrative, and community support buildings were rehabilitated using the original historical structures' frames and foundations. Historical relics were found in the basement of this building, which was constructed in 1929.

*Ryoko Araki*



CFAY manages an Adopt-A-Monument program designed to stimulate greater familiarity with and awareness of the many monuments located throughout CFAY's Area of Responsibility. Participants in the program maintained and cleaned 21 culturally significant monuments throughout Yokosuka Naval Base among other tasks.

*Ryoko Araki*

### Joint Base Pearl Harbor-Hickam, Hawaii

Joint Base Pearl Harbor-Hickam (JBPHH), created in 2009 by combining Naval Station Pearl Harbor and Hickam Air Force Base, is home to the Navy's Pacific Fleet, the Pacific Air Forces' 15th Wing, and more than 20 other Department of Defense (DoD) and government units and partner entities. The base covers 28,000 acres and contains approximately 3,000 historic resources (buildings, structures, artifacts, and archeological sites). In addition to its association with the Japanese attack of 7 December 1941, the base also contains a wealth of important cultural resources ranging from ancient Hawaiian fishponds to Cold War era intelligence facilities.

Significant milestones include establishing the Navy's first historic preservation division at the installation in 2010; developing a programmatic agreement to support the Pearl Harbor Naval Shipyard Modernization Plan (a 25-year long-range plan, completed in 2011); and sharing cultural activities with the local community, including the ongoing maintenance of a Native Hawaiian burial vault.



Carrying on a centuries-old tradition, the annual Makahiki (festival) reaffirms JBPHH's role in respecting the Native Hawaiian heritage.



Founded in 1997 to serve as a permanent resting place for ancient Hawaiian remains, the Fort Kamehameha Burial Vault is a testament to the collaborative efforts of JBPHH staff and local Native Hawaiian groups. Several times a year, a wide variety of residents from the base and surrounding community gather to help maintain this important cultural site.

### Naval Base Guam, Marianas

NBG's cultural resources management program oversees more than 2,000 historical properties in coordination with government and private agencies. Despite recent significant growth in operations including the upcoming military







The NBG cultural resources program oversees and manages archaeological recovery. Work was initiated during FY11 to investigate the chemical composition and dating of this cave art painting.

*Lon Bulgrin*

buildup on the island, NBG planned and budgeted projects will meet the increased demand without compromising the integrity of its cultural resources or jeopardizing compliance with environmental laws and regulations. During FY11, the program efficiently executed over 300 project consultations. Accomplishments included developing and signing the programmatic agreement for historic preservation oversight of the Defense Policy Review Initiative program; completing the Historical American Engineering Record for the Maanot Reservoir (possibly the oldest reservoir on Guam, to keep historic record of the site and as mitigation in the event of demolition); and finalizing consultations under the National Historic Preservation Act to construct a 15.7-mile pipeline that is crucial to the upcoming military buildup.



This outdoor movie theater, one of the historic sites maintained by NBG, was constructed by Japanese Prisoners Of War during WWII.

*Zerlene Cruz*

## ENVIRONMENTAL QUALITY

This award recognizes efforts to ensure mission accomplishment and protection of human health through implementation of EMSs that promote sound environmental practices.

### NON-INDUSTRIAL INSTALLATION

#### Commander, Fleet Activities Sasebo, Japan

Commander, Fleet Activities Sasebo (CFAS) is a small naval installation located on the western coast of Kyushu Island in Nagasaki Prefecture, Japan. The installation serves as a logistic support center for forward deployed units and visiting operational forces of the U.S. Pacific Fleet and its tenant activities. CFAS is homeport to nine U.S. Navy ships and consists of ten non-contiguous areas totaling 1,238 acres.



CFAS treats and disposes of ship-borne waste fluids with contracted treatment barges. Through recycling efforts during FY10 and FY11, the base recycled 755,000 gallons of waste oil, contaminated fuel, and the extracts of oily wastewater which saved the Navy \$3.19 million in disposal costs.

CFAS has implemented many programs designed to minimize environmental impacts and reduce operational costs, including capturing and treating ship's wastewater; recycling petroleum, oil, and lubricants; filtering oily wastewater for treatment; converting cooking oil to biodiesel fuel; recycling used oil for energy recovery; and processing 34 waste streams through its Qualified Recycling Program. CFAS has also reduced hazardous waste disposal costs while increasing solid waste diversion rates by initiating new processes. Energy conservation efforts include: installation of photovoltaic panels; replacing air conditioning systems with new energy-efficient models; joining boiler systems; and upgrading street lights with efficient low-wattage bulbs. These initiatives have dramatically reduced installation utilities cost in excess of \$287,000 each year.



CFAS has launched a program to recycle mattresses, plastic, wood pallets, textile, and scrap clothing. These materials are used as ingredients for the production of Refuse Paper and Plastic Fuel (RPF). In FY11, CFAS recycled 1,420 tons of RPF and realized savings of \$171,000 in disposal costs.

### Commander, Fleet Activities Yokosuka, Japan

Commander, Fleet Activities Yokosuka (CFAY) maintains strong relationships with on- and off- base organizations and consistently coordinates efforts to establish quick and thorough alternatives to environmental degradation and destruction. With dedicated support from military and civilian personnel, base residents, and their Japanese neighbors, team members have successfully developed and maintained invaluable partnerships crucial to the success of its environmental program.

Team members take pride in leading environmental education and community initiatives, including cultural and historical resource tours, environmental/safety fairs, monument cleanup/base beautification events, eelgrass planting and flounder releasing events, and the implementation of an Adopt-A-Monument program. CFAY's environmental web site, newspaper articles, newsletters, and television/movie theater advertisements help support this effort.



CFAY offered 30 Japanese and English spill prevention and response courses in FY10 and FY11 in alignment with CFAY's EMS goals.

*Hideomi Kakimoto*



CFAY's Adopt-A-Monument program allows Commands and organizations to adopt specific monuments to maintain throughout the year.

### Naval Base San Diego, California

Naval Base San Diego (NBSD) has significantly reduced its impact of operations on the environment with the introduction of new ideas and equipment to reduce waste, capture pollutants, and otherwise mitigate environmental impacts.



Used electronics were turned in at NBSD, including televisions, refrigerators, microwave ovens, fax machines, copiers, coffee makers, and other materials. All items were sent to recycling.

Environmental initiatives and programs at NBSD include community outreach, transforming NBSD into a pedestrian-friendly base with walking paths, bike lanes, and bike racks; promoting a base-wide "Plant a Tree" program; continuing successful electronic recycling events; collecting trash and diverting waste from landfills; achieving a return on investment in water; and eliminating fertilizer and pesticide use (and their associated runoff) through the use of xeriscaping.





## INDIVIDUAL/TEAM

### **Awni Almasri, U.S. Naval Support Activity Bahrain, Bahrain**

Mr. Almasri is a well-respected representative of U.S. Forces in the Bahrain region. He promotes U.S. Navy and host nation relations at numerous environmental conferences within the Arabian Gulf. His management abilities are responsible for the successful integration of pollution prevention programs across diverse civilian and military activities at NSA Bahrain, reducing costs and increasing the environmental compliance of the facility.



An average of over 1.5 tons of plastic bottles were collected from NSA Bahrain for recycling. Plastic bottles are ground into granules at Crown Industries prior to being sent to other counties for recycling.

*Sunilkumar Pillai/Layla Turabi*

The U.S. Navy's annual Oil Spill Response Preparedness Table Top Exercise and Workshop, which he started in 2003, continues to evolve into a premier event where spill response and mitigation issues with regional impact are discussed and exercised in realistic scenarios.



As part of the NSA Bahrain celebrations of Earth Day, Mr. Almasri set up an environmental booth providing guidance on environmental protection and energy conservation. Participants of the week-long celebrations include DoD Dependent Schools kids, and host nation and coalition forces.

*Layla Turabi*

### **Naval Supply Systems Command Fleet Logistics Center Pearl Harbor Environmental Quality Team, Hawaii**

The Environmental Quality Team at Naval Supply Systems Command Fleet Logistics Center Pearl Harbor (NAVSUP FLC Pearl Harbor) has addressed a number of significant environmental issues by partnering with Navy experts, regulatory agencies, and community resources. The team ensured that the command met all applicable regulations and requirements necessary to protect the fragile environment in Hawaii. This was done through monitoring of operations, conducting assist visits to help shop supervisors maintain compliance, and educating the workforce.

Accomplishments include reducing energy and water consumption, increasing recycling, replacing incandescent



NAVSUP FLC Pearl Harbor Fuel Department personnel deploy a Weir skimmer during an oil spill response exercise at a Pearl Harbor wharf. This drill was conducted to ensure that the team is ready to quickly and safely respond to oil spills.

light sources with high-efficiency fluorescent lamps, eliminating toxic and hazardous waste from the workplace, and properly disposing of electronic products. Educating and encouraging participation by all NAVSUP FLC Pearl Harbor personnel helped promote environmental stewardship through increased awareness of the fragile Hawaiian ecology.



Team member Ben Fegurgur (right), conducts a quality assurance test at the Fuel Oil Reclamation Facility. These tests assure that the water can be properly discharged into the installation sewer system. In the past, the wastewater was discharged to the industrial waste treatment plant at a higher cost.

### Navy Region Center Singapore Environmental Sustainment Team, Singapore

Navy Region Center Singapore's (NRCS) Environmental Sustainment Team has an important role in maintaining compliance with U. S. environmental guidance and applicable local laws and regulations, as well as enhancing the quality of life of the facility population.

In FY09, the team became the first in the Navy to achieve EMS conformity with zero deficiencies (major or minor). This effort continues today. Under the program, the team fully evaluated all aspects of processes and developed/established 17 management procedures. With all the checks and balances implemented, the system continues to find ways to reduce operational impacts. Significant accomplishments include achieving EMS self-certification, offloading over 444,000 pounds of shipboard-generated industrial waste, implementing an effective solid waste qualified recycling program, and conducting numerous training sessions and drills to greatly enhance response capability. These programs continue to contribute significantly to the command's strategic plan and improve command readiness.



In FY10 and FY11, NRCS assisted in the collection and disposal of over 444,000 pounds of shipboard-generated industrial waste. By eliminating the need to retrograde these materials to Japan or the Continental U.S., the programs enhanced personnel safety and minimized spills.



The first ever backflow prevention assembly tester training was held at NRCS in June 2011. Fifteen personnel completed the class, passed all the exams, and were certified in the State of California.

### LARGE SHIP

#### USS Carl Vinson (CVN 70)

Nicknamed the "Green Machine," Carl Vinson (CVN 70) is dedicated to generating policy, practices, and partnerships to measure and improve overall environmental impact afloat and ashore related to trash processes, recycling methods, transportation-related carbon emissions, and fuel consumption. Environmental accomplishments by Carl Vinson's crew include diversion of 760,000 pounds of waste cardboard and aluminum while underway in 2011; donation of about 3,000 pounds of aluminum cans to two separate charities; participation in six San Diego area beach cleanup events by the "Green Machine" and family members; and utilization of bulk recycling bins at Carl





Vinson's homeport of Naval Base Coronado pier. From July to September 2011, the crew recycled over 12,000 pounds of aluminum, plastic, and glass, thereby saving the ship \$6,600 in waste processing costs.



USS Carl Vinson crew members helped with a beach cleanup along San Francisco Bay.

*MC3 Timothy A. Hazel*

### USS Enterprise (CVN 65)

USS Enterprise (CVN 65), the world's first nuclear-powered aircraft carrier, provides prompt, sustained combat operations from the sea while ensuring environmental stewardship through an exceptional environmental management program. Homeported in Norfolk, Enterprise has a total crew complement of 4,400 Sailors and Marines, which includes 3,100 ship's company and 1,300 air wing and staff personnel.

Enterprise is committed to supporting the Navy's environmental program goals through the elimination and control of pollutants. Environmental policy is integrated into applicable ship instructions, and included in indoctrination and safety-related training presentations. Program accomplishments include partnering with personnel from NAVFAC to plan and organize a pier environmental compliance training DVD; completely refurbishing the ship's solid waste incinerator to ensure the ship was able to properly dispose of thousands of tons of hazardous trash and classified material; and maintaining a nationally certified asbestos laboratory with three analysts to ensure safe and proper asbestos lagging removal, storage, and disposal in three successful emergent underway repairs.



The aircraft carrier USS Enterprise (CVN 65) departs Naval Station Norfolk for the ship's 22nd and final deployment.

*MC Seaman Harry Andrew Gordon*



The aircraft carrier USS Enterprise (CVN 65) is underway with the Enterprise Carrier Strike Group in the Atlantic Ocean.

*MC Seaman Harry Andrew Gordon*

## USS Ronald Reagan (CVN 76)

USS Ronald Reagan's (CVN 76) crew has demonstrated naval environmental stewardship both while underway and in port despite the ship's high operational tempo. In an effort to improve oil spill compliance and response, the ship coordinated with local and regional environmental contacts to create tailored ship contingency spill plans for U. S. and foreign ports. Ronald Reagan also increased training attendance and qualifications in the oil pollution abatement course; increased the number of personnel qualified to operate and maintain oil process, and the transfer and disposal of equipment; and increased the number of personnel qualified as Spill Response Clean-Up Supervisors.



The aircraft carrier USS Ronald Reagan transits San Diego Bay.  
*MC Seaman Derek Stroop*

Other environmental accomplishments include conducting 11 over-the-side spill drills in 2011; working with various commands on decontamination policies and efforts while in support of humanitarian assistance and disaster relief operations following the Japanese tsunami; conducting a combined total of 11,199 radiological surveys on mission essential items, areas, and personnel; and minimizing environmental impact through more than 50 training exercises using the Protective Measures Assessment Protocol to identify natural resources and protective control for endangered species and marine mammals.



SH-60S Sea Hawk helicopters fly above the aircraft carrier USS Ronald Reagan as it returns to homeport after conducting routine training exercises.  
*MC2 Michael Russell*

## SUSTAINABILITY

This award recognizes efforts to prevent or eliminate pollution at the source through efficient and sustainable use of energy, water, and raw materials.

### INDUSTRIAL INSTALLATION

#### Naval Weapons Station Seal Beach, California (including Detachments Fallbrook and Norco)

Naval Weapons Station (NWS) Seal Beach and its Detachments Fallbrook and Norco, California, covers an area of approximately 14,000 acres, including numerous endangered and sensitive habitats. NWS Seal Beach employs its EMS as the primary framework to achieve Executive Order (EO) goals and overall sustainability. The cross-functional team's accomplishments included a 63 percent solid waste diversion rate, overall energy reduction of over



A total of almost 400 kilowatts of rooftop renewable energy photovoltaic systems went online at NWS Seal Beach in FY11. These systems have created an annual savings of over \$90,000.

*Matt Duke*

18 percent, and reduction of water consumption by approximately 35 percent. The installation holds several community outreach and special events, the centerpiece of which is the annual Sustainability FairE (the "E" stands for Environment), which engages all base personnel to actively support sustainability. FairE participants include regulatory and resource agencies, non-governmental organizations, volunteer groups, green vendors, and the local elementary school.





On 29 September 2011, NWS Seal Beach participated in a collaborative event in support of the release of 15 endangered light-footed clapper rail birds into the Seal Beach refuge.

*Edgar Espinoza*

### U.S. Naval Ship Repair Facility and Japan Regional Maintenance Center, Yokosuka and Detachment Sasebo, Japan

U.S. Naval Ship Repair Facility and Japan Regional Maintenance Center (SRF-JRMC), located at Yokosuka and Sasebo, recognizes the environmental challenges associated with performing ship repair and maintenance on the waterfront in the host country of Japan. To mitigate environmental impacts to Japan's natural resources while upholding the Navy's mission, SRF-JRMC executes a comprehensive environmental program.

Some of the program's accomplishments include the establishment of an International Organization for Standardization (ISO) 14001 Navy EMS. An external EMS inspection team found zero nonconformance findings during the program's first EMS audit.

Additionally, SRF-JRMC completed the required external environmental compliance assessment with NAVFAC Pacific in 2010 with significantly fewer findings than the previous assessment and a 90 percent decrease in environmental discrepancies compared to 2005. The team also achieved a 41 percent reduction in oily wastewater tank cleaning costs and a savings of over \$140,000 by using technology to improve the in-house wastewater treatment capability.



SRF Yokosuka, Japan.

*Photographer's Mate 2nd Class John L. Beeman*

### Navy Fleet Readiness Center East, North Carolina

The success of virtually every environmental program is dependent upon managing hazardous materials properly. To that end, the Materials Engineering Group at the Fleet Readiness Center East (FRC East) has dedicated themselves to improving hazardous material use and finding environmentally preferred substitutes for products. Much of the hazardous materials packaging is managed through the recycling program. Currently, FRC East recycles metal, wood, cardboard, toner cartridges, plastic, and paper. In FY09 and FY10, over 3.8 million pounds of solid waste were recycled. The FRC East hazardous materials program enables FRC East to operate an EMS that is mature, effective, and continually improving. FRC East is the only Federal facility registered to the four major management standards: Quality (ISO 9001); Aircraft Quality (SAE AS9100); Environmental (ISO 14001); and Safety (OHSAS 18001).

### ENVIRONMENTAL RESTORATION

This award recognizes efforts to protect human health and the environment by cleaning up identified DoD sites in a timely, cost-efficient, and responsive manner.



Most of the hazardous materials received at FRC East are shipped in outer cardboard boxes. These boxes are sold to an off-site recycler. During the award period, FRC East recycled over 600,000 pounds of cardboard.

David Hooks



The dispensing operation for FRC East's hazardous materials transfers chemicals from larger, more economical containers to the numerous sizes preferred by artisans. By customizing the sizes, FRC East is able to reduce the amount of product wasted.

David Hooks

## INSTALLATION

### Naval Air Weapons Station China Lake, California

Naval Air Weapons Station (NAWS) China Lake is the Navy's largest single landholding, representing 85 percent of the Navy's land for research, development, acquisition, test, and evaluation use and 34 percent of the Navy's land holdings worldwide, encompassing 1.1 million acres of land that varies from flat, dry lake beds to rugged pine-

covered mountains. The vast majority of the land is undisturbed and provides habitat for more than 340 species of wildlife and 650 plant types.

Because the weapons system development activities conducted at NAWS China Lake for the past five decades have been widely distributed throughout the installation, the environmental restoration requirements for these disparate sites present unique challenges. NAWS China Lake has 89 installation restoration (IR) program sites and five military munitions response program sites.

Some of China Lake's IR accomplishments include completion of a remedial action to install two landfill caps at a propellant/explosives burn area located in sensitive species habitat within the controlled area of an ordnance test facility; installation of solar-powered fuel skimmers at groundwater extraction wells; successful initiation of a monitored natural attenuation groundwater remediation remedy; and other regulatory and small business initiatives.



Although this burrow was found to be inactive during construction, many species, such as the burrowing owl (*Athene cunicularia*) might use such burrows in the future. This landfill cap was tied into an existing soil bank, and rocks were placed on the side to reduce erosion so as not to disturb the burrow.

James McDonald





## Naval Base Ventura County, Point Mugu-Port Hueneme-San Nicolas, California

Naval Base Ventura County (NBVC) is composed of three operating facilities located on the Pacific Ocean: Point Mugu, Port Hueneme, and San Nicolas Island. During FY10 and FY11, the NBVC environmental restoration program was extremely successful in meeting its objectives. One of the program's notable accomplishments was the Port Hueneme dredging project, which used a confined aquatic disposal cell to isolate contaminated sediment, allowing future maintenance dredging to proceed without contaminated sediment issues.

Other accomplishments include: achieving site closure at six IR sites and one munitions response site at Point Mugu; achieving remedy-in-place for four other IR sites at Point Mugu; completing one removal action at Port Hueneme; removing 6,600 cubic yards of benzene contaminated soil; removing 3,400 cubic yards of contaminated sediment from the Calleguas Creek Watershed; and safely excavating and removing suspected chemical agent identification sets from Point Mugu military family housing without evacuating residents.



Slag and ash residue is removed from a NBVC Point Mugu lagoon. It took six weeks to remove the ash and slag residue, which totaled almost 2,000 cubic yards.

*Steve Granade*

## Portsmouth Naval Shipyard, Maine

The Portsmouth Naval Shipyard (PNSY), established in 1800, is now a maintenance installation for nuclear-powered submarines. The PNSY IR program promotes



After soil sampling activities were completed at PNSY, each area was backfilled with gravel, lined with geotextile fabric, and top dressed with loam and seed. Final backfilling, landscaping, and fence replacement were completed during fall 2010 and spring 2011.

*Frederick Matthew Thyng*

environmental stewardship while supporting the military mission. The accelerated pace and expanded scope of cleanup efforts under the program has been possible only through cooperation and collaboration among the PNSY team and regulatory and community stakeholders. Specific environmental accomplishments include accelerated timeline for two records of decision; completing significant soil removal actions in a residential area and a historic building to support upcoming adaptive reuse; finalizing a land-use design to support the remedial action objectives of the Jamaica Island Landfill site; and enhancing public outreach for more effective stakeholder communications and involvement through the quarterly Restoration Advisory Board (RAB) meetings, Community Involvement Plan updates, and annual Site Management Plan updates.



PNSY's Building 184, a former galvanizing plant, is considered a historically significant building, which required a consultation with the Maine State Historic Preservation Office prior to the building's adaptive re-use. As part of this consultation, a historic architectural photographer documented the features of the brick-lined vault.

*Frederick Matthew Thyng*

## INDIVIDUAL/TEAM

### Mare Island Investigation Area H1 Restoration Team, Naval Facilities Engineering Command Base Realignment and Closure Program Management Office, California

The environmental restoration team for the former Mare Island Naval Shipyard (MINS) turned a former landfill (Investigation Area H1) into a recreation area and wildlife refuge. Despite time pressure from critical removal actions occurring concurrently at five other installation restoration sites, the team, with the aid of community members, regulators, and contractors, successfully executed the landfill cap placement and opened the area to the public in 2010.

The project realized disposal cost and cap cover construction savings of \$42 million; avoided more than 9,000 tons of carbon dioxide emissions; and generated \$20 million for small and disadvantaged businesses in a local commu-



Members of the MINS restoration team and RAB members, contractors, and community members at the San Pablo trail on the former landfill site.  
*Carolyn Hunter*

nity that was severely impacted by base closure. Also notable were the use of green remediation techniques such as wetlands surface water replenishment from land fill cap runoff and onsite fuel storage, carpooling and use of local vendors; successful partnering with stakeholders to address such concerns as the protection of the salt marsh harvest mouse, a state and federally listed endangered species; improving 120 acres of existing wetlands; and creating 8.7 acres additional wetlands.



A 7,300-foot long slurry wall surrounding the Investigation Area H1 containment area prevents contamination from migrating into the surrounding groundwater.

*Delia Sanchez*





## Silver Strand Training Complex Navy Installation Restoration Site II Team, Naval Base Coronado, California

The Silver Strand Training Complex (SSTC) South, Naval Base Coronado, is one of the Navy's premier training facilities for Naval Special Warfare (NSW) forces. The discovery of asbestos contamination at SSTC South forced training at certain locations to stop in 2009. The site was entered into the Navy's IR program and a Time-Critical Removal Action (TCRA) was implemented, in an effort to return the site for NSW training as soon as possible.



Pre-removal activity-based sampling mimicking Navy training exercises on concrete pads with asbestos-containing tiles.

*Simon Wilson*

The TCRA posed several challenges, including preventing asbestos releases during sampling and removal actions, minimizing costs, and meeting an aggressive schedule to resume training exercises within 15 months. Navy staff applied innovative practices to overcome these challenges, and SSTC South was able to resume training Navy personnel in record time. At the conclusion of activities, a Technical Memorandum was written with a human health risk assessment of Navy trainee and instructor scenarios, and an evaluation of Occupational Safety and Health Administration occupational exposure. These lessons learned can be applied at other asbestos sites throughout the Navy.



Sampling personnel mimic a game of Frisbee, a potential future recreational activity at SSTC.

*Thomas Cook*

## Vieques Naval Installation, Puerto Rico (Project Management Team)

Initial assessments estimate that up to 9,000 acres of Vieques Naval Installation may be contaminated by munitions and explosives of concern (MEC) resulting from over 50 years of training operations. In 2005, Vieques was placed on the National Priorities List, initiating the development of a Project Management Team which was formed to address cleanup issues. During the award period, the team conducted two major removal actions, destroying over 500 munitions items, and excavating 1,000 subsurface MEC items from roads and beaches. The team also initiated the installation of a barrier system to restrict recreational boaters from anchoring and trespassing into the former bombing range. An extensive underwater biological assessment was conducted to ensure the barrier installation would not impact the endangered coral and marine mammal species found in the area.



In an effort to locate subsurface MEC, a geophysical instrument (in background) is used to identify the location of metallic anomalies that may be indicative of munitions. Technicians then dig out the anomalies to identify and remove (or detonate) the munitions.

Other environmental remediation initiatives include enhancing native soil and vegetation as cover for the 41-acre municipal landfill, resulting in a cost savings of over \$11 million and the preservation of a vegetative habitat; recycling 1.6 million pounds of munitions scrap; and installing solar panels and wind turbines to operate air monitoring and communications equipment. Finally, the team conducted a comprehensive bilingual community involvement program, including quarterly RAB meetings with simultaneous translation, site visits to observe the cleanup progress, and educational workshops.



Prior to the installation of the water barrier system at the Vieques Naval Installation, a magnetometer was used to identify potential buried munitions.

## ENVIRONMENTAL EXCELLENCE IN WEAPON SYSTEM ACQUISITION, LARGE PROGRAM

This award recognizes efforts to incorporate environmental, safety, and occupational health (ESOH) requirements into the weapon system acquisition program's decision-making process.

### INDIVIDUAL/TEAM

#### F/A-18E/F and EA-18G Program Office (PMA-265) Green Hornet Team, Maryland

PMA-265, which manages the variants and subsystems of the F/A-18A-D Hornet, F/A-18E/F Super Hornet, and EA-18G Growler aircraft, has cut its carbon footprint and improved safety through proactively seeking to mitigate any potential environmental problems in the initial design stage. As the premiere tactical aircraft of the U.S. Navy, the F/A-18E/F Super Hornet is the focal point of various energy and environmental initiatives. The F/A-18



The Blue Angels successfully demonstrated the use of the blended biofuel at NAS Patuxent River's Labor Day Weekend 2011 Air Show.

Mike Rudy

Green Hornet was the first aircraft to fly on a 50/50 blend of camelina-based biofuel and conventional petroleum-based JP-5 jet fuel. Its demonstration flight on Earth Day 2010 was followed by other successful flights, including the Blue Angels' demonstration performance at the Naval Air Station (NAS) Patuxent River 2011 Labor Day Air Show.

PMA-265 is also committed to pursuing viable technologies to reduce personnel and community exposure to jet engine noise (a long-standing occupational health risk associated with high-performance tactical aircraft), and air emissions. The PMA-265 Green Hornet Team also continues to successfully research and implement alternatives for reducing hazardous materials usage and pollution.



PMA-265, in partnership with Office of Naval Research and General Electric Aviation, is implementing a Rapid Technology Transfer project for mechanical chevrons, a viable solution to reduce jet engine noise for the F414/F404 engines. Testing has demonstrated an approximate 2.5 to three decibels (dB) reduction over much of the frequency range, and up to nine dB reduction in the three to six kilohertz frequency range.

#### PMA-290 Environment, Safety, and Occupational Health Team, Maryland

The Maritime Patrol and Reconnaissance Aircraft Program Office (PMA-290) ESOH team has employed innovative, highly effective strategies in its legacy aircraft acquisition programs. The team has effectively managed compliance by integrating ESOH considerations into the overall



systems engineering process, thereby minimizing risks and reducing costs.

Notable accomplishments of the PMA-290 ESOH team include reducing solid waste at the Boeing P-8A Poseidon production sites; participating in training that resulted in time and cost savings to the program (estimated three years and \$2.75 million); increasing energy efficiency—for example, the P-8A Poseidon engine (CFM56-7BE), will provide annual reductions of two percent carbon emission and four percent maintenance costs compared to the CFM56-5C engine; and establishing ESOH training with the Boeing team to ensure consistency among maintenance crews.



P-8A production aircraft will be configured with new CFM56-7BE engines, which is now standard on all next generation 737s. Boeing officials say that this process combined with drag reduction improvements will result in lower fuel consumption and maintenance cost savings.

*Jim Anderson*

### Virginia Class Test and Evaluation Environmental Team, Washington, D.C.

The major responsibilities of the Virginia Class Test and Evaluation Environmental team consist of identification and mitigation of ESOH risks, and extensive coordination and documentation to ensure compliance with NEPA and EO 12114. The team has achieved major accomplishments during the awards cycle, including implementing an ESOH risk management process that included mechanisms for identification, documentation, and mitigation of associated risks; as well as implementing a strategic and thorough process for addressing NEPA/EO 12114 compliance requirements before the system is delivered; including identifying potential risks, analysis of potential impacts, coordination with the appropriate regulatory agencies and legal counsel, and production of the appropriate documentation.



The Test and Evaluation Environmental Team coordinated marine mammal observer (MMO) support for the Virginia Class Submarine Diver Recall during operations in Key West, Florida. MMO support is crucial to prevent impacts to the environment during test exercises.

*Josh Frederickson*



In October 2009, USS Texas (SSN 775) completed an historic exercise in the Arctic region. Texas became the first vessel of its class not only to operate in the Arctic, but also to surface through the ice during developmental testing. Texas is one of three Virginia-class submarines to be stationed in the Pacific.

*Sonar Technician (Submarines) 1st Class Hamilton Felt*

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# REPI Program Protects Atlantic Test Ranges from Urban Sprawl

## Cooperative Conservation Prevents Encroachment of Test & Training Areas

**THE NAVY'S ATLANTIC** Test Range (ATR) has partnered with land conservation non-governmental organizations (NGO) to preserve land that will protect the mission while bringing benefit to the environment and local community.

Before 2004, Navy testers may have wondered if they could protect their mission while at the same time protect the environment and improve the quality of life for people living near their ranges. Thanks to the Readiness and Environmental Protection Initiative (REPI), such a scenario is now possible, and is playing out at the Navy's ATR. There, the Navy and its non-federal partners are ushering in a new era of cooperative conservation through REPI.

Located over the mid-Chesapeake Bay, the 2,360-square mile ATR inner range has been used since 1943 to conduct flight tests and training to ensure that military aircraft and their associated weapons systems perform to design and safety specifications before being delivered to the warfighter. Aircraft such as the F/A-18 Hornet, V-22 Osprey, and F-35 Lightning could not have been developed

without the full cradle-to-grave support services provided by the ATR.

The inherent risks associated with flight testing, as well as noise generated from aircraft, have been major drivers in the Navy's desire to limit population growth around the ATR. Historically, this has been accomplished by using Air Installation Compatible Use Zone (AICUZ) studies and working closely with community planners to avoid land development projects under critical test areas. These capabilities

expanded in 2004 when REPI was added to the Navy's "encroachment toolkit" to address incompatible development through cooperative conservation partnerships.

Launched under the Department of Defense Sustainable Ranges Initiative, REPI provides funding for the military to work with state and local governments, NGOs, and willing land owners to secure conservation easements that will help prevent encroachment of test and training areas. The easements allow landowners to maintain



Aerial view of the ATR complex.





A section of the Nanticoke River which closely borders many of the REPI project areas.  
*Nanticoke Watershed Alliance*

## REPI has proven to be an encroachment tool that provides permanent protection from incompatible development.

—Tony Parisi

ownership of their property as a farm, forest, or ranch but prevent future residential, commercial, or industrial development that could impact the ATR mission. “Before REPI, we relied solely on local government zoning entities to protect the mission from encroachment. Because zoning regulations can change or may not be compatible with operations, REPI has proven to be an encroachment tool that provides permanent protection from incompatible development,” said Tony Parisi, Head of the Naval Air Systems Command Ranges Sustainability Office (SO).

With REPI in its toolkit, the encroachment team from the SO, Naval Air Station (NAS) Patuxent River, Maryland and the Naval District Washington Community Planning Liaison Office reached out to land trusts, conservation organizations, and the

State of Maryland to establish a partnership to protect valuable open spaces and conserve habitat around the ATR. These efforts were rewarded when The Nature Conservancy (TNC), The Conservation Fund, and the Maryland Department of Natural Resources (DNR) answered the call. The partnership was formally established by a Multi-Year Encroachment Protection Agreement that was signed by the Navy and its partners in September 2009. This signed agreement, which, among other things, stipulates cost-sharing arrangements among the partners (usually 50/50), gave the Navy and its partners the green light to start securing conservation easements on properties within the ATR Inner Range. “We look forward to working with the U.S. Navy through the REPI program,” said Maryland DNR Secretary John Griffin.

“The program presents a unique opportunity to implement Governor Martin O’Malley’s agricultural, ecological, and water quality goals for the Chesapeake Bay; support the continued viability of the Navy’s facilities; and stretch our conservation funds further. The Navy has a large impact on Maryland’s economy, and the REPI program is an excellent way to protect that investment and keep our State moving forward.”

The challenge to developing a successful REPI program is identifying land parcels whose protection is both critical to preserving the range mission and meeting the conservation goals of the partner. In the ATR, an area of intersection was identified on Maryland’s Eastern Shore along the Nanticoke River in the Nanticoke Rural Legacy Area (RLA). This RLA is part of a State of



An F-18 Green Hornet flies over NAS Patuxent River.



An F-35 Lightning soars in the skies over the ATR Inner Range.



MH-60 Seahawks fly over the Solomons Island bridge.

Maryland program that designates target areas for preservation using state rural legacy grant funds. In the case of the Nanticoke RLA, it is also located in the heart of the ATR restricted airspace.

When a REPI project begins, parcels of Navy interest and land preservation value are identified. The next step is to find a landowner that is willing to enter into a conservation agreement. This is where having energetic partners such as TNC and The Conservation Fund is critical. These partners have people on the ground that share a vested long-term interest in the target properties and have developed relationships with the property owners. “Communication and trust are keys to convincing a land owner that conserving their land is the right thing to do, from both a stewardship and a financial perspective. We have been lucky within the Nanticoke Region because of the community

connectedness, commitment to an agricultural lifestyle, and willingness to work with TNC and the Navy,” said Liz Zucker. Zucker and her counterparts at The Conservation Fund possess the local knowledge, state contacts, and years of practical experience in land conservation that is key in securing an easement.

Through the efforts of TNC, REPI funds have been used to support the purchase of conservation easements on four properties (670 acres total) in the Nanticoke River watershed. REPI funding has allowed TNC to close on more properties and nearly double the acres of area protected in the region. Close coordination among the Navy and its partners was an important factor in bringing these projects to closure.

Some of the aircraft that utilize the ATR Inner Range for tests or operations.





Swans are just one of the many species that call the Nanticoke River and surrounding waters home.  
*Nanticoke Watershed Alliance*

These four properties are of significant value in protecting the region's environmental resources and controlling sprawl in the Nanticoke River watershed. The Nanticoke is one of the most ecologically significant watersheds in the Mid-Atlantic region due to its range of high-quality freshwater to brackish wetland communities and more than 270 rare plant and animal species. The watershed also provides internationally important habitat for migratory waterfowl and neotropical birds, and makes a significant contribution to the aquatic health of the Chesapeake Bay.

Because of its close proximity to the Washington, DC/Baltimore urban corridor and its attractive waterfront areas, the Nanticoke watershed is subject to sprawl development that threatens the ATR mission as well as the watershed's farms, forests and globally significant natural resources. Acquisition of easements on these REPI properties helps control sprawl by adding to the greenbelt of working farms and forests along the Nanticoke River, which in turn

creates a growth boundary around the rural village of Vienna. This innovative approach makes the Nanticoke RLA an outstanding model of comprehensive planning to prevent sprawl development.

Closer to home, the Navy is working with its partners to identify suitable REPI projects in St. Mary's County to limit urban growth in areas impacted by airfield operations at NAS Patuxent River and Outlying Field (OLF) Webster. The highest priority properties are those located near helicopter operating areas, runway approach and departure routes, and areas identified by the AICUZ studies as high noise or accident potential areas. Kitts Point, a 985-acre undeveloped property adjacent to OLF Webster, was approved for REPI funding in 2009. This property is strategically located to protect the unmanned aircraft testing and training that occurs at OLF Webster and the surrounding area. REPI funds were approved for this project, but ultimately Maryland DNR decided to acquire the property using its own funding. Nevertheless, the effort is considered a win for the Navy. The

Kitts Point land will remain undeveloped, thereby helping to preserve the OLF Webster mission. The approved REPI funds will remain in escrow for use on future projects.

Five new REPI projects totaling over 2,000 acres have been proposed for fiscal year 2012. The proposed properties will support a system of buffers and fill gaps in continuous tracts of land on the Maryland Eastern Shore near the Nanticoke and Wicomico Rivers and Quantico Creek. In addition, properties have been identified near the airfields at NAS Patuxent River and OLF Webster in St. Mary's County. The Navy will continue working with its partners to complete these new projects in the ongoing effort to protect the ATR mission at NAS Patuxent River. ↴

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#### CONTACT

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# Landfill to Lighting

## Closed Pendleton Landfill Becomes Home to Solar Arrays

**RIDING THE CREST** of a recent renewable-energy siting wave, Marine Corps Base (MCB) Camp Pendleton is developing solar photovoltaic (PV) systems on otherwise unusable land—a closed landfill. Naval Facilities Engineering Command (NAVFAC) Southwest has completed one project and awarded the contract for a second installation at the 30-acre Box Canyon Installation Restoration (IR)

Site Seven. Once both projects are online, the system is projected to supply enough power for 700 homes.

For all of its benefits, finding suitable sites for solar power generation can be problematic. The solar array systems require open, minimally shaded space and proximity to roads and power transmission lines. Closed landfills that are otherwise unavail-

able for development often meet PV-siting requirements.

### The Arrays

MCB Camp Pendleton and NAVFAC Southwest celebrated the opening of the first array at Box Canyon on 3 February 2011. The project, completed on 17 December 2010, is the largest PV array at a west coast

Once both projects are online, the system is projected to supply enough power for 700 homes.

The PV array consists of 6,300 modules producing 235 watts installed on 225 panels at a 15 degree tilt. Each panel has 28 modules sitting on a racking system, which is anchored with four ballasts.





Marine Corps base. It is estimated that it will save the Marine Corps \$336,000 per year in electricity costs. This first PV array covers approximately five acres and includes 225 panels, each holding 28 modules for a total of 6,300 modules. The size of the system is 1.485 megawatts of direct current and will generate 2,400 megawatts per hour (MWH) annually, enough to power 400 homes. The project feeds into the Camp Pendleton electric grid.

As Bernadette Rose, NAVFAC Southwest's Regional Officer in Charge of Construction Command construction manager at Camp Pendleton, noted at the opening of the first array, "The Box Canyon PV project makes use of a previously unusable piece of real estate, provides renewable energy, and helps MCB Camp Pendleton meet its onsite renewable energy generation goals. It is also one of the largest PV systems in San Diego County."

Approximately four additional acres at Box Canyon will soon host a second array. NAVFAC awarded the contract for the second array in July 2011. The new array will include 5,136 solar modules, each rated at 280 watts, for an estimated annual production of 2,100 MWH, enough for 315 homes. The system will be equipped with a performance monitoring system able to pinpoint with precision the location of any defective single solar module or defective string of solar modules.

The existing panels are installed on an aluminum and steel racking system that is secured by 3,500-

pound concrete ballasts. The ballasts are placed on gravel pads to allow rainwater to flow through without affecting the landfill cap. The ballasts ensure that wind will not disrupt the tilted panels. The PV panels are tilted at 15 degrees to maximize sun exposure and elevated five feet from the ground to prevent native landscaping from growing tall enough to shade the panels.

## Have Landfill, Want Solar? Here are Some Things to Consider

**SO YOU'RE THINKING** about putting a solar array atop your own landfill? In general, landfills can offer suitable settings for solar installations. Nevertheless, there are some things to consider before you start.

### 1. Lay of the Land

Slope, orientation to the sun, wind and potential shading can influence solar productivity.

#### a. Slope

Flat or minimal grades are better suited for fixed rack installations, like Camp Pendleton's installation. Flexible solar panels that are fixed to landfill cap membranes have been installed at some landfills that had steep slopes.

#### b. Orientation

Rack-mounted arrays can be installed to maximize sun exposure. Is there anything that would prevent this?

#### c. Wind

Tilted and elevated rigid panels must be secured to prevent shifting. Can the landfill closure configuration support necessary ballast?

#### d. Potential Shading

Evaluate the surroundings for structures or vegetation that could shade the panels.

### 2. Existing Infrastructure

Are there roads in place for establishing and maintaining the arrays? How close is the location to three-phase power lines?

### 3. Adjacent Properties

Is there potential for future, potentially conflicting, development near the site? Are there environmental restrictions on nearby lands?

### 4. Landfill Properties

Age, closure configuration, contents and water runoff can affect the viability of solar on a landfill.

#### a. Age

How old is the landfill and how is it capped? What is the condition of the cap? Is settling still occurring?

#### b. Type of Closure

Can the landfill support the weight of racked solar panels mounted onto concrete ballasts? What kind of gas emissions exist and how are they vented? Would another type of solar installation be suitable?

#### c. Contents

Does the site include toxic wastes for which additional investigations and permits might be required?

#### d. Runoff

How will solar panels that concentrate rainfall shedding affect landfill runoff patterns?

### 5. Regulatory Restrictions

What local or state regulations might apply to landfill development?

## Siting Power Generation on a Landfill

Although making productive use of otherwise unusable land offers an appealing solution for power generation, it can be challenging. Any solar installation must account for the slope and orientation to the sun, available development and transmission infrastructure, and potential for future use

conflicts. Closed landfills add potential environmental restrictions, including ensuring that the cap is protected, runoff does not comprise the landfill and that settling does not disrupt the solar panels.

MCB Camp Pendleton's round one installation worked through many of the issues. "The project was extremely innovative, utilizing a site

that otherwise would be undevelopable and was equally challenging given the environmental restrictions of working on an inactive/closed landfill and IR site," said Navy Capt. Martin Smith, Deputy Officer in Charge of Construction. "Per regulatory requirements, the ground surface, meaning the upper six feet of the landfill cap, was not to be penetrated



The official ceremony featured flipping the main switch of the photovoltaic system by Marine Corps Installations West (MCIWEST) commanding general Maj. Gen. A. L. Jackson, Camp Pendleton commanding officer Col. Nicholas F. Marano, MCIWEST deputy officer-in-charge of construction CAPT Martin Smith, Synergy Electric president Diane Keltner, and Camp Pendleton energy manager Jeff Allen.





The size of the system is 1.485 mega-watts of direct current and will generate 2,400 mega-watt hours annually, enough to power 400 homes. The project feeds into the Camp Pendleton electric grid.

The project was extremely innovative, utilizing a site that otherwise would be undevelopable and was equally challenging given the environmental restrictions of working on an inactive/closed landfill and IR site.

—Capt. Martin Smith

at all during the execution of the project. Even survey stakes could not be put into the ground while aligning the panels . . . and still the panel alignments are square and plumb. The regulatory bodies were initially hesitant to grant permission to build the project. Regional Water Quality Control Board personnel visited this project as it was nearing completion and stated they were very happy with the results and would have no qualms in approving future PV projects on this site.”

### The Road Ahead

NAVFAC Southwest expects work on the second Box Canyon PV array to be completed by August 2012. The two arrays will help MCB Camp Pendleton to meet Marine Corps’ renewable energy goals and reduce its carbon footprint. It also expands NAVFAC’s capabilities. “This project

provides new opportunities for NAVFAC’s expertise and offers engineering innovation by installing the new utility-scale solar photovoltaic systems in an old landfill area, by means of studying the impact of the solar system on the utility power distribution grid, by implementing effective methods to construct these types of facilities, and by utilizing more efficient solar technologies,” said Jorge Perez, NAVFAC Southwest Desert Integrated Product Team construction manager. [↴](#)

*Photos by Larry Nuzum*

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# SOME OF MY Best Shots



Black-necked stilt.

**T**he pearl of the Caribbean, Naval Station (NS) Guantanamo Bay is awash with wildlife and natural beauty like the stunning sunsets of Glass Beach. NS Guantanamo Bay is located on the southeastern coast of the island of Cuba bordered by the Caribbean Sea. The station contains a variety of natural ecosystems that include salt flats, mud flats, marshes, estuaries, mangroves, tropical dry forest, palm woodlands and scrub habitat to name a few. This mixture of natural habitats is home to a diverse population of wildlife including a spectacular mixture of native and migrant bird species such as the black-necked stilt and American kestrel.

For the black-necked stilt shot, I used a Nikon D70 with a Nikon 300mm lens, and my exposure was 1/500th of a second at f/4. For the Glass Beach shot, I used a Nikon D70 with a Tamron 88-70mm lens, and my exposure was 1/2 of a second at f/22. For the American kestrel shot, I used a Nikon D70 with a Nikon 300mm lens, and my exposure was 1/350th of a second at f/4.

Paul Block ● Ecologist ● Naval Facilities Engineering Command Atlantic ● paul.block@navy.mil

Submit your own Best Shot to Bruce McCaffrey ● *Currents'* Managing Editor ● brucemccaffrey@sbcglobal.net





Glass Beach.



American kestrel.



Dolphins play in the wake of the forward-deployed amphibious dock landing ship USS Tortuga (LSD 46) during Baliġatan 2012, an annual bilateral exercise designed to improve interoperability between the U.S. Navy, Marines and Armed Forces of the Philippines.

*MC2 Eric Crosby*



## U.S. Fleet Forces Command and U.S. Pacific Fleet Coordinate Their Efforts to Maintain Compliance for At-Sea Training and Testing



We're almost mirror images—not identical, but the Fleet environmental offices are similar in many ways.

—Gary Edwards



I

**IN THE SPOTLIGHT** for this issue of *Currents* is Larry Foster, division director of the Fleet Environmental Readiness Division for Commander, U.S. Pacific Fleet (PACFLT), and Gary Edwards, division director for the Environmental Readiness Division for U.S. Fleet Forces Command (USFF). On 14 May 2012, Kenneth Hess from the public affairs staff at the Chief of Naval Operations Energy and Environmental Readiness Division (N45) and Bruce McCaffrey, managing editor of *Currents* magazine, conducted this interview to gain insights into the Navy's efforts to ensure continuous compliance during testing and training activities.

**CURRENTS:** Thanks for taking the time to speak with us today gentlemen. Could you describe your current roles?

**LARRY:** We serve as principal advisors to the Commander and the Deputy Commander on all matters relating to environmental compliance, planning documentation for Fleet training, range capabilities, sustainment, and homeporting decisions when applicable. We also cover the shipboard environmental programs such as pollution prevention and oil spill pollution abatement equipment.

**GARY:** We're almost mirror images—not identical, but the Fleet environmental offices are similar in many ways.

**CURRENTS:** Talk for a moment about how you and your staff interface with the Navy warfighter and operator community.



Larry Foster.



Gary Edwards.

**GARY:** We directly and regularly communicate with Fleet operational commands, whether they're the Type Commanders, or Strike Group Training and Commander Task Force TWO ZERO (CTF 20). (Note: CTF 20 plans, supports, schedules and conducts training and exercises of assigned maritime forces and provides combat-ready naval forces to support Service missions and global requirements.) We've merged Second Fleet into USFF, and have direct communication with them on a regular basis. We're able to look ahead to their training evolutions and plans over the next 18 to 24 months, and work with them to make sure we can meet their requirements and provide environmental coverage. We also have military officers embedded in the environmental division, and part of their job is to work with the training community and ensure there is a linkage, so we understand what's going on in the operational world and the operators understand what's going on in the environmental world. That helps tremendously as we work to support training requirements.

It's the balance between protecting the environment and ensuring our Sailors are trained.

—Larry Foster

**LARRY:** Our Third Fleet and Seventh Fleet haven't merged into our staff. They're still stand-alone three-star commands reporting to PACFLT. But we work very closely with them on exercise planning and training. We're part of the numbered Fleet planning conferences for major exercises. We ensure that they have the requisite environmental compliance coverage, and permits if required. It is part of our environmental planning process to ensure they can go out and do what they need to do to meet their requirements. Several years ago, we stood up what's now called the PACFLT operational and environmental team. It meets regularly, typically every other week, to discuss operational and environmental issues and where they overlap.

**GARY:** Both of the Fleets also have dedicated groups that work directly with the operational community and the ranges on day-to-day requirements. It's called the Range

Complex Support Team for USFF, and Larry's is called the Range Complex Sustainment Coordinators. These groups help us identify daily requirements and maintain that linkage.

**CURRENTS:** Talk to us about the Navy's environmental planning and permitting process for training and testing. What are we really trying to accomplish?

**LARRY:** Bottom line, we have to go through the planning and permitting process to comply with the National Environmental Policy Act (NEPA), the Marine Mammal Protection Act (MMPA) and other laws. But we still have to maintain, train and equip our combat forces as needed. It's the balance between protecting the environment and ensuring our Sailors are trained.

Sailors aboard guided-missile destroyer USS Paul Hamilton (DDG 60) conduct a morning brief during integrated maritime exercise Koa Kai 12-2. Koa Kai is a semiannual exercise in the waters around Hawaii designed to prepare independent deployers in multiple warfare areas and provide training in a multi-ship environment.  
MC2 Daniel Barker



According to MMPA rules, permits are issued by the National Marine Fisheries Service (NMFS), and they're good for five years. We're on a five-year cycle with the permits and environmental impact statements (EIS), and the concept here is to get the next round of NEPA documents completed in time for our expiring permits—the first of which will come due in January 2014. We're on track to meet those deadlines.

**CURRENTS:** How is NMFS involved in this process? Are other federal or state agencies involved?



**GARY:** NMFS is a cooperating agency with us in the development of Hawaii-Southern California Training and Testing (HSTT) and Atlantic Fleet Training and Testing (AFTT) EISs. They provide technical expertise and regulatory oversight of the potential environmental impacts of Navy testing and training. Our expectation is that NMFS will ultimately adopt Navy documentation in their rule-making process. So it's critical that they be directly involved in the development of the documentation, not only from a regulatory standpoint, but also to address any challenges that arise. They are the ones that give us the permits, so they have to be able to support the documentation that is prepared. We are also consulting with the U.S. Fish and Wildlife Service (USFWS) to address endangered species under their jurisdiction. For AFTT we work with the states up and down the East Coast and through the Gulf of Mexico to comply with the Coastal Zone Management Act and other applicable state laws.

**LARRY:** Everything is almost identical here for the PACFLT range complexes. We are also starting environmental planning for two additional areas—the Marianas and Pacific Northwest. In our case, we also are consulting with USFWS as needed for species under their jurisdiction. The Pacific Northwest regional Fish and Wildlife office has asked to be a cooperating agency, so that's a first for us. We are also including NMFS staff at our upcoming public meetings in Hawaii and Southern California for HSTT.

**CURRENTS:** I understand that we first started this process back in 2001, after the Navy's at-sea environmental compliance policy was promulgated (Compliance with Environmental Requirements in the Conduct of Naval Exercises or Training At Sea, 28 December 2000). I believe that policy was the driver that led us to start the cycle of EISs for our at-sea training. Could you talk about that process (Phase 1), and what we learned from it?

**LARRY:** We had started looking, even before that policy, at doing what we used to call environmental compliance evaluations at our land-based ranges, which turned into our Range Sustainability Environmental Program Assess-

ment (RSEPA) program. This was before 2000. But when the at-sea policy came out, it was a perfect driver. It gave us a high-level directive to develop those Phase 1 comprehensive programmatic documents for our Fleet at-sea training ranges. We had some environmental coverage for our land-based ranges, and even out in Guam in the Marianas. We had completed the Marianas Training Plan EIS, again primarily for Farallon De Medinilla, not so much the ocean side, so when the at-sea policy came out it led us into Phase 1 and the Program Objectives Memorandum (POM) process.



The Virginia-class attack submarine Pre-Commissioning Unit Mississippi (SSN 782) conducts alpha trials in the Atlantic Ocean.

*Courtesy of General Dynamics Electric Boat*

**GARY:** I think it's important to understand that we didn't just start doing environmental documentation in the Fleets because of the at-sea policy or the Bahamas stranding. Those did affect what we were doing and the way we were doing it. But on the East Coast, we had been preparing environmental documentation at Vieques since the 1980s. And that covered at-sea environmental documentation as well, so the Fleet was already preparing at-sea environmental documentation when I arrived here in 1991.

The big switch was when we shifted from doing a qualitative to a quantitative analysis, where we started to input modeling into the process as we got into Phase 1. That came from the at-sea policy. We had to do more documentation up and down the East Coast when we moved out of Vieques for training. And we also had to find ways to cover training at the Cherry Point, Jacksonville and Virginia Capes (VACAPES) operational areas.

**CURRENTS:** Speak to the lessons learned from Phase 1, if you would.

**LARRY:** One of the key lessons we learned was that the operational interface piece is critical—although I thought we did a pretty good job in Phase 1. During our work on the Phase 2 documentation we interfaced much more regularly and closely with the operational community, identifying

Let's figure out what we might need in the long-term and get full coverage for anything that could come along.

—Gary Edwards

their training requirements. We also learned that we need to put more flexibility and coverage into our documents.

Obviously they are much more complex and robust, and what we cover is significantly more than what we covered in Phase 1. As you know Phase 2 includes the systems commands (SYSCOM) as well. We're merging more geographic areas into our larger stand-alone documents.

**GARY:** We need to have early and ongoing communication with NMFS and other agencies we work with. If they understand what we're trying to do, they are better prepared to defend it. And we will learn what they can support and what they need to have modified before they can support it. That's been helpful for Phase 2. We've also learned that we need to work closely with our Navy commands and our operators earlier in the process and focus on future training requirements.

In Phase 1, the Fleets were focused on "Let's get the coverage for what we're doing today." We weren't really thinking about everything we needed to do through 2014. We got hamstrung in a couple of areas where the Navy made a decision to cap the number of takes we requested for our permits. In some cases, that resulted in having to cut back on or stop certain types of training altogether because we didn't get the coverage we needed for everything we'd be doing through 2014. So for Phase 2, we're much more focused on, "Let's figure out what we might need in the long-term and get full coverage for anything that could come along."



An E-2C Hawkeye lands on the flight deck aboard the Nimitz-class aircraft carrier USS Carl Vinson (CVN 70) during the Malabar Exercise with ships and aircraft from the Indian Navy.  
*MC Apprentice Andrew Haller*

**CURRENTS:** How do you estimate what your future training requirements are going to be?

**GARY:** There are a couple of things we learned in Phase 1 and have integrated into Phase 2. We have a better process of working with the operators to truly define their requirements. We have what we call the Warrior Review Process, where we get together and go through what they might need to do over the next six or seven years. (For more insights, see our sidebar entitled "The Basics About the USFF Warrior Review Process.") We need to make sure we get those requirements covered. We're working with the acquisition community and the Type Commanders about what's coming down the line. We're better focused, plus we've asked for flag-level validation of the require-



ments as they've been developed in this process. So we have a much better handle on what our requirements will be long-term than we did for Phase 1.

**CURRENTS:** Any last words on that particular topic?

**LARRY:** Just as we're getting a better understanding of their needs, I think the Navy training community and the operators now have a better understanding of what they need to do to enable the environmental team to help them succeed. There's more awareness of what's going on and the need to help interface with us. For instance, prior to the Rim of the Pacific (RIMPAC) exercise in 2006, a temporary restraining order was issued which caused us to stop the exercise. We were able to get that order lifted pretty quickly, but it took a couple of days. Then here at the Hawaii Range Complex (HRC) in 2010, NMFS wasn't able to process our annual renewal in time. So the Deputy Chief of Naval Operations (N3) issued a message to cease the use of sonar and explosives for training. So the operational community is well aware of the link between our permitting requirements and their ability to train.

**CURRENTS:** What are the differences between Phase 1 and Phase 2 environmental planning efforts, and what led us to make those changes?

An F/A-18C Hornet prepares to launch from USS Dwight D. Eisenhower (CVN 69) during a composite training unit exercise in the Atlantic Ocean.  
*MC1 Nathanael Miller*



**LARRY:** Phase 1 was our initial effort at completing large-scale at-sea environmental planning, focusing on MMPA/Endangered Species Act (ESA) compliance. Phase 1 was focused on training. Phase 2 incorporates not only Fleet training, but also SYSCOM testing. Another big difference in PACFLT is that we didn't cover pierside sonar maintenance and testing in Phase 1. We're including that this time. The reasons for all this are to improve efficiency. By consolidating, we're creating fewer documents, and the

## The Basics About the USFF Warrior Review Process

**U.S. FLEET FORCES** Command (USFF) developed and implemented a "warrior review process" to prepare accurate and comprehensive at-sea training data for analysis in the Atlantic Fleet Testing and Training Environmental Impact Statement/Overseas Environmental Impact Statement (AFTT EIS/OEIS). In the summer of 2010, USFF initiated an extensive data collection effort to compile a list of all current and future off-shore training expected to occur during the permit renewal period of 2014-2019. Working with training subject matter experts from Naval Surface Forces Atlantic, Naval Air Forces Atlantic, Naval Submarines Forces Atlantic, Navy Expeditionary Combat Command, Strike Force Training Atlantic, Naval Mine and

Anti-Submarine Warfare Command detachment Norfolk and U.S. Marine Corps Forces Command, USFF compiled a spreadsheet of future training requirements broken down by primary mission areas. This process resulted in the development of a "warrior matrix" that includes the type and number of events to be conducted, platforms, training locations, type and amount of ordnance, targets, sonar hours, flight hours, and additional information needed to inform environmental planning documentation and preparation of permit applications. Information within the warrior matrix was then vetted back through each command and validated at the Flag Officer level, thus providing accurate and complete training requirements for the AFTT Draft EIS/OEIS.

permitting process is simplified. For NMFS, it reduces their workload and the number of documents they have to process. Another thing we're incorporating in Phase 2 is a binning approach, where we establish bins (categories) for our acoustics and explosives sources. That way, if we have a new system, platform, training or test event that we didn't cover specifically, and if it's similar enough to fit in one of the bins, we don't have to modify permits. This is the flexibility we mentioned earlier.

The operational community is well aware of the link between our permitting requirements and their ability to train.

—Larry Foster

**GARY:** Along with a specific sonar document for Atlantic Fleet Active Sonar Training, we've moved from preparing multiple EISs for Cherry Point, Jacksonville, the Gulf of Mexico, VACAPES and an environmental assessment for Key West training to a single, broad-based document for the East Coast. We're working with PACFLT on the way we develop and coordinate requirements for AFTT and HSTT. So our Phase 2 draft EIS is a more comprehensive product. In Phase 1, there were two different acoustic effects models used to estimate effects on marine mammals. Now one consistent model is being used across the Navy. We have a better understanding of how to determine what's coming over the long term and get validation of those requirements from both the acquisition community and through our training folks to better understand what we need to obtain permits for. We're giving the Navy the compliance documentation it needs across all lines.

We've got to be able to build flexibility into our process. There were a couple of things we didn't completely understand in Phase I. Maybe it was just a breakdown in communication between the operational community and the environmental community where we felt we were providing coverage for certain training requirements, and then NMFS looks at it and says, "Whoa, that's not covered here." So we had to go back and redo some coverage for certain types of training and suspend some activities until we got that coverage in place. We have to be able to better define what we're doing, and I think we're doing that in

Phase 2. We're also analyzing new sound sources, and are looking at increased sonar training and testing this time.

**CURRENTS:** Are there significant differences in the Navy's environmental planning approach for the East Coast versus the West Coast and Hawaii?



Aviation Ordnanceman 3rd Class Nicole Whitby mans a .50-caliber machine gun on the fantail of the Nimitz-class aircraft carrier USS John C. Stennis (CVN 74) during fleet replacement squadron carrier qualifications.  
MC3 Kenneth Abbate

**GARY:** There are no differences. Our goal is to ensure consistency between Fleet planning efforts and to work together to present a clear story to the public. The collaborative approach among the Fleets, our supporting commands and everyone else we've been working with has been to develop and apply the robust analysis we need to present a clear picture of our training and testing. We're working off of the same talent pool. It's a broad Navy team now working on both documents together, and we're doing this consistently across both Fleets.

**LARRY:** Along that consistency theme, we briefed the chain of command up through the Secretary of the Navy (SECNAV) on both documents prior to their release. It was a joint brief for both AFTT and HSTT done by the team. Jene Nissen from USFF provided the SECNAV brief. We were aligned all the way up, and our approach is identical.



**CURRENTS:** Larry, you briefed them on the documents in progress, correct? And they're still under development.

**LARRY:** Absolutely. The joint brief was on the public release to get approval to release the draft EISs. We publish notices in the Federal Register to let the public know of their availability. Over the next year or so, we will be holding meetings and collecting comments from the public. We will also gather comments from the regulatory community and input from other federal agencies. All of this will be folded into final versions of our EISs.

**CURRENTS:** Are we increasing the geographic areas in which we train and test?

**LARRY:** We are increasing the HSTT study area slightly so it aligns with the International Date Line. And we added a notional corridor between San Diego and Pearl Harbor, which our ships transit along on their way toward the Western Pacific. So we included some coverage for that transit corridor.

**GARY:** For Fleet Forces, we're now covering an additional 30 percent or so by area. We're going north to the Arctic

An F/A-18C Hornet lands aboard the aircraft carrier USS Dwight D. Eisenhower (CVN 69) during a composite training unit exercise in the Atlantic Ocean.

MC1 Nathanael Miller



Circle and south to include the Gulf of Mexico and the northern edge of the Caribbean Sea. We did not go any farther east.

**CURRENTS:** It sounds like we're estimating a lot more marine mammal takes in Phase 2. First, for readers who may not be as familiar with these terms, what is meant by a marine mammal take?

## A "Take" By Any Other Name

### Basic Definitions

The Endangered Species Act (ESA) defines the term "take" as follows: "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

The Marine Mammal Protection Act (MMPA) includes a similar definition of "take": "to harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." For a military readiness or scientific research activity conducted by or on behalf of the Federal government, the MMPA (as modified under the National Defense Authorization Act (NDAA) of 2004) further defines harassment as follows:

■ **(Level A Harassment)**

Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild; or

■ **(Level B Harassment)**

Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration,

surfacing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered.

### Incidental Takes

In 1981, Congress amended the MMPA to provide for "incidental take" authorizations for maritime activities, provided the National Marine Fisheries Service (NMFS) found the takings would be of small numbers and have no more than a negligible impact on those marine mammal species not listed as depleted under the MMPA (i.e., listed under the ESA) and not having an "unmitigable adverse impact" on subsistence harvests of these species. NMFS defined "negligible impact" as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates or recruitment or survival." The NDAA of 2004 modified the MMPA by removing the "small numbers" and "specified geographic region" limitations. "Incidental take" authorizations, also known as Letters of Authorization (LOA), require that regulations be promulgated and published in the Federal Register.

Sources: [www.nmfs.noaa.gov](http://www.nmfs.noaa.gov) and [www.epa.gov/lawsregs/laws/esa.html](http://www.epa.gov/lawsregs/laws/esa.html)

**GARY:** The term take means there has been some type of effect to an animal. These effects can range from a behavioral reaction to injury or mortality. For example, a marine mammal hears a noise, turns his head to see where the noise came from, then goes back to the activity it was doing—this is considered a take. Almost all takes associated with Navy activities are behavioral reactions.

**LARRY:** An example we use is this: a sea lion is sitting on a channel marker or a buoy, a vessel passes by, and he's mildly disturbed so he jumps back in the water and hauls back out again. That's considered a take.

Although we are estimating more takes, we do not anticipate any more harmful effects on marine life.

—Larry Foster

**CURRENTS:** Why are we requesting more marine mammal takes in Phase 2? Do we anticipate more effects on marine life?

**LARRY:** We are not expecting more of an effect on the animals. But yes, there are more estimated takes. There are several reasons for that. We are using a more conservative model than we used for Phase 1. Again, it's a single Navy model—the Navy Acoustic Effects Model (NAEMO). (For more information about NAEMO, read our sidebar entitled “The Latest About NAEMO.” You can also read our article entitled “Environment in a (High-Tech) Box: Navy Model Simulates Undersea Sound Fields & Marine Mammal Locations to Plan Training & Testing Activities” in the winter 2011 issue of *Currents*. To subscribe and browse the magazine's archives, visit the *Currents* page on the Department of the Navy's Energy, Environment and Climate Change web site at <http://greenfleet.dodlive.mil/currents-magazine>.)

We're using better science with updated marine mammal density estimates. The densities for some animals are

higher and the criteria for the low-level behavioral takes have been lowered. So the predicted takes are higher than they were for Phase 1. We also have more sound sources reflected in our draft Phase 2 documentation, since the SYSCOMs have been added. I think we have gone from about 30 to 300 sources.



Sailors heave mooring lines on the fantail of the aircraft carrier USS John C. Stennis (CVN 74) after successfully completing fleet replacement squadron carrier qualifications.  
MC3 Kenneth Abbate

Remember, these numbers do not reflect the positive impacts of any mitigation. Once we implement our various mitigation measures, we expect those take estimates to go down. So although we are estimating more takes, we do not anticipate any more harmful effects on marine life. There's been no history that we are impacting marine life with our permitted activities, especially across a general population of marine mammals. We'll have an individual take every now and then, but have no impact on the general population.

**GARY:** Our increase in takes is mostly based on adding SYSCOM testing (almost doubling the number of takes for AFTT). Also, on the Atlantic Fleet side we are approximately doubling the training analyzed, however, this only results in a 10 percent increase in takes.

**CURRENTS:** How many ship shock trials will we do, and what will the impact be on the environment?

**GARY:** I think the Navy plans to conduct four ship shock trials over the five year period. (Note: The Navy has been



relying on ship shock trials for many decades to ensure that newly designed ships can withstand the rigors of war. Ship shock trials involve the detonation of explosive charges near the ship, along with a detailed analysis and evaluation of the effects of that detonation on the ship.) Because of the charge size and potential for harm to protected species, we implement very extensive mitigation measures, including aerial and vessel-based surveys to maximize the probability that protected species are not present in the possible harm zone. These measures have been effective in previous tests. The models come up with a number, but again that's not what we expect to actually occur because we implement extensive mitigation—particularly for shock trials—which gets us very close if not actually to nil on impacts to marine mammals.

**LARRY:** Ship shock trials are conducted by the Naval Sea Systems Command, and all occur on the East Coast. And no marine mammals were harmed during any of them. Our mitigation measures are very, very effective.

**CURRENTS:** What are we doing to avoid harming marine mammals during our training and testing?



Sailors prepare to do the final checks before launching an F/A-18F Super Hornet aboard the aircraft carrier USS Dwight D. Eisenhower (CVN 69) during a composite training unit exercise in the Atlantic Ocean.

MC3 A.J. Jones

**LARRY:** We're implementing protective measures such as posting trained lookouts and reducing sonar levels when animals close within certain distances. That's the power down scheme—at 1,000 yards we power down by six decibels. If an animal is sighted within 500 yards of a vessel using mid-frequency sonar, we power down an additional four decibels. If the animal closes within 200 yards, we turn off the sonar. We also use passive listening devices to listen

## The Latest About NAEMO

**THE NAVY ACOUSTIC** Effects Model (NAEMO) is the Navy's latest and most sophisticated approach for analyzing the effects of proposed actions on marine mammals. NAEMO was developed by personnel from the Naval Undersea Warfare Center in Newport, Rhode Island and is comprised of seven basic components:

1. Scenario Builder
2. Environment Builder
3. Acoustic Builder
4. Marine Mammal Distribution
5. Scenario Simulator
6. Post Processor
7. Report Generator

The first two units are Graphic User Interface (GUI) modules that define where and when an activity is taking place, and factor in oceanographic environmental data based on these inputs.

The Acoustic Builder uses this information to assist the user in defining a set of acoustic propagation analysis points. The Marine Mammal Distribution module creates a GUI three-dimensional field of marine mammals, by species and by season (when available), for the specific geographic region.

The Scenario Simulator module executes the simulation. Some scenarios are broken down by platform (e.g., ship, submarine, helicopter, other source), while others involve multiple platforms. The Post Processor computes the estimated exposures of marine mammals by species based upon the entire scenario, which may include several weeks of daily training operations. Users may introduce changes to the harassment criteria or sound sources within a scenario without having to re-run the entire simulation.

Finally, the Report Generator provides a mechanism for assembling all of the individual species exposure data files created by Post Processor and computing annual exposure estimates.

for vocalizing marine mammals. We require that all of our lookouts view the Marine Species Awareness Training video, which was approved by NMFS, prior to being assigned as a lookout during active sonar training.

On the research and development side, the Navy funds about \$20 million in marine species research every year to help us better understand the impacts of our activities. For the explosive events, we worked with NMFS to establish zones that are clear of marine mammals before our explosive teams conduct underwater demolition training.

We implement extensive mitigation, which gets us very close if not actually to nil on impacts to marine mammals.

—Gary Edwards

**CURRENTS:** How do we determine whether our protective/mitigation measures are effective? And how do we interact with NMFS in this regard?

**GARY:** We work with NMFS to develop and implement a comprehensive monitoring program. In Phase 1, we began monitoring representative training events with contract support, academia, and Navy marine biologists to determine reactions of any animals sighted during major training events. We then collect and evaluate the marine mammal sighting data. We have commissioned new scientific efforts to collect marine resource data outside of those scheduled events, such our Behavioral Response

Studies. We provide data on our training activities to NMFS via our annual reports. We review these data as well as any other scientific developments annually with NMFS to determine if we need to make any changes to our mitigation measures. That's part of our ongoing Adaptive Management Process (AMP).

**CURRENTS:** So it's possible, based on data that you collect or feedback that you get from NMFS, for NMFS to suggest that we need to take additional measures?



Guided-missile frigate USS Vandegrift (FFG 48) performs maneuvers off the coast of Hawaii during integrated maritime exercise Koa Kai 12-2. MC2 Daniel Barker

**GARY:** Yes. It's also possible we could determine that some measures that we're implementing now add no value, and we would stop doing those.

**CURRENTS:** Has that happened in either case?

**LARRY:** One of the things we did was to shift our aerial surveys during RIMPAC. The exercise is so complex and large, with so many aircraft and ships underway, that getting our contractor aircraft in the air to safely conduct visual

## The Basics About the Navy's Marine Mammal Mitigation Measures

**THE NAVY EMPLOYS** 29 measures to minimize contact with marine mammals while training with active sonar. These measures include the following:

1. Marine mammal awareness training for key shipboard personnel
2. Multiple lookouts aboard sonar-equipped ships during exercises
3. Special operating procedures, including safety zones for reducing power or shutting off sonar at specified distances from marine mammals
4. Coordination and reporting requirements for marine mammal strandings, beachings, mortalities or unusual behavior

The measures were developed in cooperation with the National Marine Fisheries Service, the regulatory agency that oversees the protection of marine life for U.S. entities. In addition, the Navy funds about half of the marine mammal research conducted world-wide. Much of the over \$20 million that the Navy spends annually goes toward studying the effects of sound on marine life.



surveys for marine mammals before, during and after the exercise was problematic. So during the adaptive management meeting with NMFS we explained that difficulty and we shifted away from aerial surveys during major training events like a RIMPAC to our Submarine Commanders Course (SCC). SCC is a much smaller event, but still allows us to collect monitoring data and work with NMFS in determining the effectiveness of our mitigation. So there's an example of our shifting the priority while working with NMFS. Another one I mentioned is underwater detonation training. We worked with NMFS over the course of a year and did just that. We increased our mitigation and monitoring areas to support underwater detonation training.

**CURRENTS:** What else can you tell us about the AMP?

**LARRY:** The AMP is part of our permit. As such, we are required to hold an annual meeting with NMFS to review our mitigation measures. We've been meeting in October of every year since the permit was issued. Dr. Frank Stone (OPNAV N45) coordinates that meeting. We bring our teams to Washington to meet with NMFS and review the past year's efforts. We incorporate lessons learned and any other input from the scientific community to move our monitoring and mitigation programs forward. We want to ensure that we're doing the best we can to protect the marine environment. (For more insights into AMP, read our sidebar entitled "The Basics About the Adaptive Management Process.")

**CURRENTS:** What is the Navy's timeline for completion of these projects? And what's next?

An F/A-18F Super Hornet lands on the flight deck of USS Dwight D. Eisenhower (CVN 69) during a composite training unit exercise in the Atlantic Ocean.

MC2 Julia Casper



**GARY:** We need to have the AFTT and HSTT EISs, as well as the ESA and MMPA compliance permits, in place by late calendar year 2013 to ensure that our authorizations remain current. Our existing MMPA authorizations expire in January 2014. Following release of the draft EISs that were announced in the Federal Register on 11 May 2012, we are allowing for a 60-day public comment period, versus the minimum required 45-day public comment period. The public comment periods for both AFTT and HSTT end on 10 July. We want to make sure the public has ample time to provide their comments. We are on a very tight timeline to complete these documents so our training authorizations do not expire. That is the primary goal and driver for the Fleets—to get our authorizations in place prior to expiration of our current permits beginning in January 2014.

## The Basics About the Adaptive Management Process

**AS REQUIRED UNDER** Marine Mammal Protection Act (MMPA), the Navy is responsible for monitoring and reporting on activities involving active sonar and/or detonations from underwater explosives. The Integrated Comprehensive Monitoring Program (ICMP) provides the overarching framework for coordination of the Navy's monitoring program. The ICMP is evaluated annually through an Adaptive Management Review (AMR), during which the Navy and the National Marine Fish-

eries Service (NMFS) jointly consider the prior year goals, monitoring results, and related science advances to determine if modifications are needed to more effectively address monitoring program goals. The results of the AMR will determine whether (and under what conditions) NMFS will renew the Navy's Letter of Authorization for the coming year.

In 2011, a Monitoring Workshop was added to the AMR to review cumulative

monitoring results from 2009 and 2010. The workshop included marine mammal and acoustics experts and other interested parties. The primary objective of the workshop was to develop a framework for evaluating all Navy range complexes under the ICMP and to formulate objective, expert scientific recommendations for addressing top-level goals of the ICMP.

Sources: [www.nmfs.noaa.gov/pr/pdfs/permits/social\\_hrc\\_icmp.pdf](http://www.nmfs.noaa.gov/pr/pdfs/permits/social_hrc_icmp.pdf) and [www.cascadiaresearch.org](http://www.cascadiaresearch.org)

**CURRENTS:** So after all of this is done, is there a Phase 3?

**LARRY:** In Phase 2 we still have other documents to complete, including documentation for the Marianas, the Northwest, and the Gulf of Alaska. But yes, there will be a Phase 3. Our plan would be to supplement the current EISs should things be consistent and not require significant changes. This assumes that NMFS is willing to agree to such an approach. We'd like to be able to supplement our Phase 2 EISs and not have to generate entirely new documents for Phase 3 and beyond.

EISs. That brief made it all the way up to the Secretary of the Navy. He essentially said, 'I think this is important enough, I need to know about it.' So he was briefed personally. We didn't have this level of interest in Phase 1.

Sailors assigned to the Visit, Board, Search and Seizure (VBSS) team aboard guided-missile destroyer USS Halsey (DDG 97), transit toward Halsey via rigid hull inflatable boat after a VBSS training exercise. Halsey was participating in Malabar, a regularly scheduled naval field training exercise conducted to advance multinational maritime relationships and mutual security.

MC3 Christopher Farrington



There has been unprecedented and excellent cooperation among Navy commands to produce these comprehensive documents.

—Gary Edwards

**GARY:** There will be a Phase 3, and probably a Phase 4 and 5 after that. We're on a five-year re-authorization cycle and until that cycle changes, we will revisit our documentation according to that schedule. How we do it may change, but we still have to have to undergo re-authorizations every five years.

**CURRENTS:** Anything else that you would like *Currents* readers to know?

**GARY:** Yes. I want readers to know that there has been unprecedented and excellent cooperation among Navy commands to produce these comprehensive documents.

When the SYSCOMs added their testing requirements, it took them a while to figure out how to approach this—just like it took us a while in Phase 1 to figure out what we were doing. But now we're working very well together. We've received a lot of support across the Navy from the Naval Undersea Warfare Center Newport to the Naval Facilities Engineering Command that support us, to the regions, the Space and Naval Warfare Systems Command and beyond. Everybody is working together to meet existing requirements. I don't think the Navy's ever undertaken anything this broad in scope before.

Between Phase 1 and Phase 2, there has been a much greater awareness, communication, and support of these efforts throughout the chain of command. Larry mentioned the senior leadership briefings on the release of our draft

Some of the impacts we had from Phase 1—where we either had to stop or come very close to stopping our training—have raised the level of awareness throughout the chain of command. Leadership now appreciates how important this documentation is. They understand that it's got to be done well and be supported up and down the chain of command. And we need to get our story out to the public.

I think our Navy environmental program, and specifically the folks who support the Fleet, are a diverse, competent, passionate group of people that are committed to supporting the Fleet. They understand that we need to allow the Fleet to train and they support the operational Navy with excellence.

**LARRY:** I agree. We have an incredible group of people working our environmental programs—supporting the Fleet and Fleet training. ⚓



# Currents Voted Best Navy Magazine

*Magazine Honored with Top Honor for the Third Time*

The Chief of Naval Information (CHINFO) announced the results of its 2011 Merit Awards program—its internal media award competitions for exemplary achievements in internal media print and broadcast products by Navy Commands and individuals. And for the third time in its history, *Currents* magazine was honored with a first place Merit Award in the “Magazine Format Publication” category.



The CHINFO Merit Awards Program encompasses some 24 print and 21 broadcast categories. Other print media categories include newspapers, feature, news, sports writing, photography, familygrams, web publications and cruisebooks.

The editors and staff of *Currents* would like to thank all of our *Currents* readers turned *Currents* authors—it’s your stories that make the magazine a winner.



# NESDI Program Evaluates Technologies to Address Puget Opacity Limits

## Cutting Technologies & Enclosures Offer the Most Viable Options for Shipbreaking

**PUGET SOUND NAVAL** Shipyard and Intermediate Maintenance Facility (PSNS&IMF), Bremerton, Washington—the Navy’s shipbreaking and recycling activity for nuclear powered submarines and ships—needs new metal cutting technologies to meet its mission. The standard and most efficient technology for metal cutting on submarines and ships is oxy-fuel cutting. This technology, however, generates visible particulate matter (PM) that has the potential to exceed local air quality limits on opacity (the

gies for future on-site demonstrations. The resultant Initiation Decision Report (IDR) developed by the Naval Facilities Engineering Service Center (NAVFAC ESC) Port Hueneme, California, in a joint effort with Naval Surface Warfare Center Carderock Division (NSWCCD), Bethesda, Maryland, and PSNS&IMF, presents technology recommendations to help alleviate opacity concerns. As emissions regulations across the country become more stringent, other shipyards could benefit from these efforts.

Navy’s shipbreaking and recycling activity for preparing Reactor Compartment Disposal Packages.

Since the beginning of the vessel recycling program in 1986, PSNS&IMF has processed and packaged reactor compartments from 106 submarines and eight cruisers. The majority of this work involved hand-held oxy-fuel torches, a form of hot metal cutting. In 2008, the facility was recycling a 1950’s vintage nuclear submarine that posed unique problems compared to

Since the beginning of the vessel recycling program, PSNS&IMF has processed and packaged reactor compartments from 106 submarines and eight cruisers.

visual density of smoke or particulate emissions). To meet its shipbreaking mission within the opacity limits, PSNS&IMF needs a new approach.

The Navy Environmental Sustainability Development to Integration (NESDI) Program sponsored a study of existing and developing technolo-

### Background

As nuclear powered submarines and ships leave active service, they must be dismantled. Reactor compartments are removed intact and disposed of at the Department of Energy’s Hanford site in Washington State. PSNS&IMF’s proximity to the Hanford site contributes to its designation as the

the newer submarines that the facility typically dismantles. The coatings and heavy rust on the older submarines caused the cutting operation to be particularly smoky. During that operation, the facility briefly exceeded the Puget Sound Clean Air Agency’s (PSCAA) daily opacity limit. PSNS&IMF submitted a deviation report to PSCAA



and received a written warning to address the issue. PSNS&IMF initiated mitigation measures (ventilated enclosures) to ensure that there would not be any additional failures that might result in Notices of Violation or fines.

## Interim Measures

To prevent exceeding opacity limits without sacrificing the work schedule, PSNS&IMF is using a combination of both hot cutting within smoke capturing enclosures and cold cutting methods. Steps being followed include:

1. Cutting smaller vessels (i.e., submarines) in enclosures to contain the visible PM emissions.
2. Using oxy-fuel cutting on high-tensile strength steel, referred to as High-yield 80 (HY80), and plasma arc cutting on stainless steel.
3. Cutting larger vessels like carriers and cruisers using cold cutting processes until work pieces are small enough to be sold to scrappers or transported to indoor facilities for special demolition tasks.

Unfortunately, this strategy is not sustainable over the long-term—it is expensive, inefficient, and can pose risks to worker safety.

While the current enclosures at PSNS&IMF are estimated to capture 98 percent of non-smoke particulates during regular cutting practice, the remedy does not prevent emissions at the source; further, the workers are hampered by spatial limits and other activity constraints.

Initially installed in 2009, the tension fabric tents (enclosures) are just large enough to sufficiently envelop the sections of submarines. Their exhaust systems actively capture PM emissions (or smoke). However, the enclosures preclude the use of cranes, and are vulnerable to wind damage. It takes up to six minutes for the PMs generated by working torches to be captured before enclosures can be open again for transport of workers and substrates. PSNS&IMF has spent up to \$2.5M in one year on the outdoor tensile fabric enclosures and its associated infrastructure equipment, including smoke collectors, vent ducting, and crane rails. These enclosures cannot be used for much larger surface ships, and the site personnel do not anticipate the availability of financial



Puget Sound area.

resources in the near future to fund customized orders for nuclear cruisers or carriers.

Cold cutting technologies are generally slower and pose increased risks for workers. Despite provisions for some user convenience, heavy, hand-held cold cutting tools have been linked to increased risks for repeated movement injuries including carpal-tunnel syndrome and Raynaud's phenomenon (blood vessel spasms that block blood flow to the extremities (i.e., fingers, toes, ears, and nose)).

In sum, these interim measures are insufficient to accommodate the projected workload increase at PSNS&IMF.

## Urgent Need for New Technologies

At least eight submarines are to be dismantled at PSNS&IMF by 2016. Larger ships also are scheduled to be dismantled in the near future—the ex-USS Long Beach (CGN 9), an 800-foot cruiser beginning in 2013, and the aircraft carrier USS Enterprise (CVN 65) to begin in 2018.



Puget Sound Naval Shipyard.  
MC2 Jesus Uranga

## This NESDI project is critical for maintaining environmental compliance and addressing the opacity abatement problem for the Ship Inactivation and Recycling program at PSNSY&IMF.

—Kurt Doehnert

Several Navy organizations associated with ship disposal have voiced their support for demonstrating new technologies because they recognize the urgency involved. As Kurt Doehnert, Naval Sea System Command, stated, “This NESDI project is critical for maintaining environmental compliance and addressing the opacity abatement problem for the Ship Inactivation and Recycling program at PSNSY&IMF. This project is especially vital, timely and relevant given the upcoming significant ship recycling workload at PSNSY&IMF, particularly for application to the extraordinary opacity abatement challenges that will be presented by the ex-Long Beach and ex-Enterprise. In addition to environmental compliance, these NESDI projects offer substantial cost and schedule improvement benefits to PSNSY&IMF and our primary Ship Inactivation and Recycling program customers (PMS 392 and PMS 312). These opacity abatement NESDI demonstration projects are the highest priority in our corporate Naval Shipyard technology program project portfolio.”

This position was reinforced by Christopher Knoble, PMS 392 Program

Manager. He said, “PMS 392 also strongly endorses continued NESDI efforts in advancing cutting technologies that address the opacity abatement issues facing hull recycling projects. The compliance requirements associated with the traditional cutting techniques currently employed have significantly increased the cost to recycle hulls, which ultimately diverts funding that could be used in the maintenance accounts that sustain the active fleet. The development of less costly technologies is crucial to regaining cost control in these areas.”

In addition to the above endorsements, Lee Bowersox, Director of Process Excellence for Program Executive Office (Carriers) expressed his ongoing support for this effort.

### Researching the Possibilities

While the oxy-fuel torch technology is difficult to replace, the experience of PSNSY&IMF highlights that its use must be modified, reduced or eliminated. The goal of the NESDI-sponsored investigation was to identify the best available alternatives to oxy-fuel

cutting to bring daily opacity levels at PSNSY&IMF below the PSCAA limit and recommend technologies for on-site demonstrations. While PSNSY&IMF is the only organization currently affected by the opacity limit, the emerging trend of increasing stringency on regulatory enforcements for environmental compliance is expected to involve more organizations in

### Metal Cutting Technologies—Hot Versus Cold

A METAL CUTTING technology can usually be distinguished as either cold or hot. Oxy-fuel, plasma arc, and laser are examples of hot cutting technologies. These generally have high lineal cutting speed, but tend to have high levels of visible PM emissions and can cause heat affected zones that lead to re-fusion, hampering demolition work. Mechanical cutting instruments are usually synonymous with cold cutting, and are generally slower than hot cutting; however, they benefit from little or no PM emissions.



similar predicaments. The results from this IDR and its follow-on projects are expected to be useful for mitigation at other locations down the road.

The investigation team applied a series of refining criteria first to identify possible technologies then to sort possible technologies before recommending a subset for demonstration.

Three primary criteria guided the investigation:

1. Limit visible PM emissions to the environment
2. Maintain or increase cutting efficiency
3. Ensure worker safety

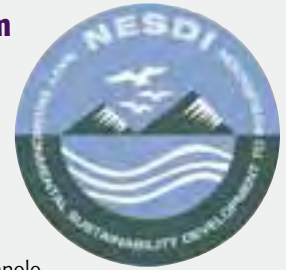
Options to address the first criterion can include containing the emissions (e.g., working within enclosures) and preventing emissions via other fuels or cutting technologies.

Characteristics required of alternative technologies to meet the first two criteria include:

- Capacity to cut either HY80 high-tensile steel or stainless steel
- Kerf width (cutting width) of at least 3/4-inch
- Opacity below the limit set by PSCAA and also lower than the norm of oxy-propane torch cutting

## The Basics About the NESDI Program

**THE NESDI PROGRAM** seeks to provide solutions by demonstrating, validating and integrating innovative technologies, processes, materials, and filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Fleet readiness. The program accomplishes this mission through the evaluation of cost-effective technologies, processes, materials and knowledge that enhance environmental readiness of naval shore activities and ensure they can be integrated into weapons system acquisition programs.



The NESDI program is the Navy's environmental shoreside 6.4 Research, Development, Test and Evaluation program. The NESDI technology demonstration and validation program is sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division and managed by the Naval Facilities Engineering Command. The program is the Navy's complement to the Department of Defense's Environmental Security Technology Certification Program which conducts demonstration and validation of technologies important to the tri-Services, U.S. Environmental Protection Agency and Department of Energy.

For more information, visit the NESDI program web site at [www.nesdi.navy.mil](http://www.nesdi.navy.mil) or contact Leslie Karr, the NESDI Program Manager at 805-982-1618, DSN: 551-1618 or [leslie.karr@navy.mil](mailto:leslie.karr@navy.mil).

### TYPES OF MITIGATION TECHNOLOGIES

Mitigation Type (Impact on Visible PM Emissions)	REDUCTION Thermal "Hot" Cutting	ELIMINATION Non-Thermal "Cold" Cutting	CONTROL Enclosures
Emissions	Metals and visible particulates (opacity)	Barely any emissions	Some emissions may escape → variance in total release
Special Requirement	Required; restricted space – some work pieces may be too big (e.g., early stages of a carrier or a cruiser)	Many require clean-up of solid debris. Cutting can be conducted outdoors.	This mitigation must accompany a cutting technology.
Speed	Good, 10–12 inches per minute on two-inch HY80 at PSNS&IMF	Wide range of speed	N/A (This is not a cutting technology.)
Substrate Compatibility	Carbon steel No stainless steel	Can be applied to any substrate as long as the mechanical strength exceeds material resilience	N/A (This is not a cutting technology.)
User Flexibility	Barely any restrictions- torches are the most convenient tool for the workers	Often cannot handle long, horizontal cuts (i.e., along the length of the submarines)	May cause some special restrictions for workers

- Lineal cutting speed of 10 inches per minute or better on two inches thick, HY80 sheet (same speed or much higher on thinner work pieces)
- Acceptable preparation and set-up time, take down/ clean-up time, and cutting speed in terms of true productivity (e.g., feet/workday)

The table on the previous page describes relevant technologies by their categorization (in relation to their impact on opacity)—Reduction, Elimination, and Control. Reduction refers to cutting technologies of comparable performance but less visual PM emissions.

Cold cutting technologies have little or no opacity and would therefore result in the elimination of opacity once those technologies have been substituted for oxy-fuel cutting. (Note: Cold cutting technologies that are priced below \$1M are generally slower than oxy-fuel cutting technology.) Their consumable components (e.g., cutting blades, bits, etc.) add to the monthly maintenance cost that is often orders of magnitude

greater than the propane gas acquisition required for oxy-fuel torches. Complete replacements of the current technology will likely affect both the shop economics and workflow.

Control technologies, such as enclosures, are not cutting technologies themselves, but are important in their ability to prolong the use of high performance cutting technologies by capturing their visible emissions.

Ultimately, the NESDI team identified nearly twenty relevant metal cutting technologies to review. Most were introduced to the team through a Federal Business Opportunities Solicitation issued by NAVFAC ESC, while others were introduced internally by the organizations involved in this study (NAVFAC ESC, PSNS&IMF, National Center for Manufacturing Sciences, and NSWCCD).

Each competing alternative was ranked as either Potential or Deprioritized based on the following criteria:

- Visible particulate emissions (lower is ranked higher)

- Speed of cutting (faster is ranked higher)
- Capital cost (lower is ranked higher)
- Cost for operation and maintenance (lower is ranked higher)

Additional considerations during the review included:

- Availability of technology for use by Navy employees. (All of the respondents offering full service scrapping were considered irrelevant.)
- Current involvement in laboratory testing of various torch gases for opacity readings.
- Applicability to metal cutting or to control of emissions. This was a preference in the design focus.
- Continued interest in pursuing partnership with the Navy for metal cutting at PSNS&IMF.
- Capital equipment costs.
- Technology maturity, i.e., need for further development, to harness advantages in a metal cutting

## RECOMMENDED TECHNOLOGIES FOR DEMONSTRATION

Technology	Type	Comments
MagneGas™	Hot Cutting Technology	<ul style="list-style-type: none"> <li>• Alternative fuel for the torch cutting infrastructure (smaller tips)</li> <li>• Equivalent speed to oxy-propane cutting</li> <li>• Disadvantage to investigate: Equivalent actual opacity in comparison with that from propane or gasoline, cost</li> </ul>
Submarine Hull Cutting System	Cold Cutting Technology	<ul style="list-style-type: none"> <li>• Capital Equipment: Latest order was sold at \$345,000 for submarines. PSNS&amp;IMF may get a unit at a lower price if cutting will be restricted to work pieces of only 1/2-inch thickness.</li> <li>• Hydraulic reciprocating saw module</li> <li>• Up to eight inch stroke</li> <li>• Straight and circumferential rail mounting</li> <li>• Final product is open to customization</li> </ul>
Travel-L-Cutter Model E	Cold Cutting Technology	<ul style="list-style-type: none"> <li>• Capital Equipment: 200 pounds, approximately \$120,000 per unit</li> <li>• Accessories: Track with clamping system for the capital unit, \$1,000 per foot. This is a portable infrastructure system.</li> <li>• Cutting speed around 1.5 to two inches per minute on 2-inch thick steel. Demonstration will need to test for speed on 1/2-inch thickness hulls of cruisers.</li> </ul>





Puget Sound Naval Shipyard.  
Rick Chaffee

application. (Successfully adapted technologies will be re-evaluated for their potential at PSNS&IMF)

## Recommendations

At the time the IDR was completed in January 2012, the team recommended three technologies listed on the previous page for immediate demonstration. (Note: These companies and their technologies were selected only for further consideration, are not funded or scheduled for demonstration, and are not endorsed by the Navy.) To ensure effective reduction of visible PM emissions at PSNS&IMF by the start of the breaking of USS Long Beach in 2013, NAVFAC ESC recommended an immediate NESDI demonstration on at least one cold cutting application.

As a result, the NESDI program is sponsoring two new projects—*Controlling Opacity During Ship Hull Cutting & Demolition* (project #481) to demonstrate the Submarine Hull Cutting System cold cutting technology and *Alternative Metal Hot Cutting Operations for Opacity* (project #480) to demonstrate the MagneGas hot cutting technology.

Additional technologies are not currently appropriate for demonstration but may warrant consideration in the future depending upon technology refinements. These are presented as secondary recommendations:

### 1. Motion Assisted Environmental Enclosure (MAEE)

The MAEE is a modular enclosure with semi-autonomous motion. It uses electrical signals to detect proximity on aerial work. It is designed to capture overspray during ship hull painting and would need adapted to accommodate metal plumes.

### 2. MobiWeld™

This device manufactured by the Robotic Institute of Tennessee is a trackless, automated welding application. With design adaptations it has the potential to complement metal cutting operations. It may help to address worker safety concerns, particular if used with the Beam of Life (see following entry).

### 3. Beam of Life Device

This battery-powered laser gun is suitable for short and quick breaking through steel in emergency situations (similar use as the Jaws of Life). Prototypes are not fitted to the workload capacity of ship-breaking and recycling. This was developed through the Military to Market (M2M) program.

## Conclusion

NAVFAC ESC recognizes that the current use of enclosures to contain

visible particulate emissions from oxy-fuel and plasma arc cutting technologies is the best, immediate response to avoid any future opacity limit violations. This solution will temporarily allow for the continued regularity of work on submarines. However, PSNS&IMF will ultimately need a new cutting protocol comprising alternative cutting technologies for the long-term. The last cruiser will soon arrive for recycling, followed by carriers. An aircraft carrier is about 15 times larger than a submarine—it would be extremely expensive and laborious to customize and fit an enclosure for it. Therefore a cold cutting technology or a hot cutting technology with opacity that is significantly lower than for currently used oxy-fuel technologies will need to be identified to justify outdoor cutting activity. In short, the final cutting protocol will need to comprise both hot and cold technologies to both maintain regularity of work flow and prevent ongoing violation of the PSCAA opacity limit. ⚓

*Note: Edwin Chiang and Christine Ahn, NAVFAC ESC and Jim Howell, NSWCCD made significant contributions to this IDR.*

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# NAVSEA Reducing Fleet Energy Consumption

## Shipboard Efficiencies Include Hybrid Electric Drive

**IN ANY DRIVEWAY** across America, it's not uncommon to see two vehicles: one shiny and new with the latest technology and efficiencies; the other older, and a bit of a gas-guzzler.

While it would be ideal to always have two new cars, economically, it doesn't

able assets that must be maintained, modernized, and operated as efficiently as possible. During 2011, the Naval Sea Systems Command (NAVSEA) enterprise explored a number of initiatives targeted at improving efficiencies and reducing energy consumption of the U.S. Navy Fleet. These initiatives directly support

the Navy's energy goals to ensure combat capability, and reduce dependence on foreign oil.

### The Hybrid Electric Drive

In 2011, NAVSEA's Surface Warfare Directorate (SEA 21), Program Executive Office for Ships (PEO Ships)

*We're maturing and transitioning a number of technologies to support our ships' future power and energy needs more affordably.*

*—Dr. Timothy McCoy*

work. The older model is still meeting the family's needs, and represents a significant investment. Instead, most invest in regular maintenance; add on systems, such as Global Positioning System; and use recommended driving techniques to make the vehicle operate more efficiently.

It's not that different for the Navy's Fleet. Newer ships joining the Fleet have the latest engineering advancements and efficiencies, but aging ships are equally valu-



HEDs intended for operation in DDG 51-class destroyers have the potential to save the Navy more than \$250 million in fuel costs over a 40-year service life of an individual ship.





USS Makin Island was the first U.S. Navy ship with an HED.

*MC1 Douglas Bedford*

and NAVSEA's Engineering Directorate (SEA 05) continued explorations into propulsion and power system variants designed to reduce ships' fuel consumption with a land-based proof-of-concept test for a Hybrid Electric Drive (HED) system intended for operation in DDG 51-class destroyers.

"Hybrid drive doesn't denote any one particular system. The term just means a combination of two things—such as the system found on LHD 8; steam and sail on the USS Trenton; or even the paddle wheel, screw propeller, and sails of the SS Archimedes built in Britain back in 1839," explained Dr. Timothy McCoy, PEO Ships Electric Ships Office program manager. "We're maturing and transitioning a number of technologies to support our ships' future power and energy needs more affordably."

USS Makin Island (LHD 8) was the Navy's first big deck amphibious ship

to replace steam boilers with gas turbines, and the first U.S. Navy ship with an HED. LHD 8's particular HED-system has an electric motor attached to the mechanical drive's main reduction gear, and uses ship service generator power at low ship speeds, where gas turbines are least efficient. Over her 40-year-service life, Makin Island is expected to save the Navy more than \$250 million in fuel costs. The LHA 6-class will use this same HED system.

NAVSEA's latest HED system for DDG 51-class ships also seeks to reduce total fuel consumption, and uses the Ship Service Gas Turbine Generators (SSGTG) to power a motor attached to a main reduction gear. At low speeds, SSGTGs provide propulsion instead of the LM 2500 main engines. Using HED-mode, DDGs are expected to achieve six percent fuel savings. Naval Surface Warfare Center Carderock Naval Ship Systems Engineering Station (NAVSSSES) is supporting efforts to design, integrate, test, and

provide logistics for an at-sea demonstration of the system.

"In addition to HED proof-of-concept work, NAVSSSES completed a trade study comparing various different types and sizes of HED solutions for capability and cost savings," said Patricia Woody, NAVSSSES Machinery Research and Engineering department head. "Working with NAVSEA Technical Warrant Holders, NAVSSSES led the development effort that resulted in the technical specification for a DDG-51 HED back-fit solution."

### The Energy Storage Module

Another energy initiative that made significant progress in 2011 is the Energy Storage Module (ESM).

In most cases, DDG 51's electrical energy needs can be supplied by a single generator set. However, because crews cannot afford the risk of waiting for a second generator set to power up should the first fail, two sets are typically operating underway

## Using HED-mode, DDGs are expected to achieve six percent fuel savings.

to ensure power reliability. To improve efficiency, NAVSEA began testing an Energy Storage Module prototype developed by the Office of Naval Research (ONR).

ESM is a large, uninterruptible power supply that provides a reliable source of backup power. When multiple units are installed as a system, ESMs provide enough backup emergency power to support the ship's electrical bus following a loss of generator casualty and ensure the system fault does not result in a "dark ship," or loss of all onboard electrical power. (Note: The ship's electric bus is the backbone of a ship's electrical distribution system and connects the main electrical generators to the ship's electrical loads.)

ESMs are not intended as a replacement for existing generator sets. Instead, they provide backup power to ship's systems, giving the crew time to start up another generator set in the event the primary set fails.

"The ESM proof of concept is a 600 kilowatt

AC/DC, bi-directional advanced power converter with associated battery strings," said Woody. "Under a joint effort between ONR, PEO Ship's Electric Ships Office and NAVSEA's Fleet Readiness Research and Development Program (FRR&DP), the equipment was delivered and installed in a modi-

fied ISO shipping container. The system is being tested at NAVSSES to simulate shipboard conditions as close as possible and demonstrate ESM over a range of scenarios that could exist on a DDG 51 electrical plant."

By enabling single generator operations, ESMs are projected to provide



MC2 Michael A. Lantron



Paul Farley

Energy Dashboard proof-of-concept systems were installed in USS Chafee (top) and USS James E. Williams (right) in 2011.





Advanced Solid State Lighting uses Light Emitting Diodes (LED) to replace conventional fluorescent and incandescent lights. LED replacements require less than 20 percent of the power of equivalent incandescent bulbs, and last close to 100 times longer. Compared to fluorescent lights, LEDs are 50 percent more energy efficient, last seven to ten times longer, and are not considered hazardous waste.

the Fleet with a potential annual fuel savings of more than 5,000 barrels per ship/year. An ESM prototype is anticipated to be tested on a destroyer in 2012. NAVSEA has started planning for a production ESM to be delivered to the Fleet in 2016.

### Training the Fleet on Sound Fuel Consumption Practices

While innovative engineering advancements are improving shipboard efficiencies, the manner in which ships are operated by the Fleet also has a significant impact on fuel consumption.

Since the 1990s, the Incentivized Energy Conservation (i-ENCON) program has trained ship crews how to modify operational procedures, strategies, and techniques to reduce energy consumption.

The Smart Voyage Planning Decision Aid (SVPDA) and Shipboard Energy Dashboard are two tools NAVSEA is testing to give Sailors that valuable information. These tools are similar in concept to the computer displays found

in most new cars today that give drivers visual feedback on the best navigation routes and how to operate the vehicle to get the best miles per gallon.

SVPDA, a computer software module that uses the ship's Electronic Chart Display and Information System—Navy (ECDIS-N) and available capabilities from the Naval Meteorology and Oceanography Command, takes advantage of optimized route planning whenever missions allow. NAVSEA is analyzing an SVPDA solution that will reduce energy consumption by exploiting real-time knowledge of the physical environment such as weather, waves, currents, and ship-specific hydrodynamic and propulsion data.

The application will be used by the Navy's Fleet Weather Centers in Norfolk and San Diego to push optimized routes to Navy ships for maximum fuel efficiency and safety. Fleet-wide use of SVPDA is expected to save 373,000 barrels per year for a four percent annual fuel savings.

Along with SVPDA, NAVSEA also continued field development tests on the Energy Dashboard in 2011. The dashboard is a computer software update installed in the

## No single technology will enable the Navy to achieve its energy goals.

—Rear Admiral Thomas Eccles

existing Integrated Condition Assessment Systems (ICAS) that provide Sailors a real-time assessment of energy usage and recommended actions to reduce fuel consumption. The dashboard also tracks and displays instantaneous and daily energy consumption rates.

“Energy Dashboard is similar to the systems in today’s newer vehicles that show drivers their instantaneous miles per gallon, allowing drivers to modify their driving behaviors to maximize fuel efficiency,” said Glen Sturtevant, Team Ships director for Science and Technology. “Energy Dashboard ties into other shipboard computer software systems to tell Sailors the same thing about their ship.”

“Energy Dashboard will raise shipboard situational awareness of how certain engineering plant line-ups and equipment affect fuel consumption rates, and will build ownership in energy conservation efforts by showing how the actions instantly and dramatically affect consumption rates,” said Bob Steele, director, Fleet Readiness Engineering Office.

“NAVSES has been supporting Energy Dashboard efforts by collecting energy-related ICAS data to understand how

ships operate so we can create energy baselines,” explained Woody. “The primary focus has been on DDG 51-class Flight IIA, and we have created energy summary data reports for our In-Service Engineering Agents (ISEA) and other subject matter experts.”

Energy Dashboard proof-of-concept systems were installed in USS James E. Williams (DDG 95) and USS Chafee (DDG 90) in 2011. These systems will measure propulsion gas turbine, gas turbine generator, and AC plant energy consumption. Additional dashboard testing is anticipated in other ships in 2012, and is expected to be fielded in other Surface Ships.

In addition to these efforts, SEA 21 plans to install stern flaps on three ships, solid state lighting in five ships, combustion trim loop in five ships, and coat two ship propellers with advanced coatings in 2012. SEA 05 and PEO Ships continue to perform research, development, and testing on new initiatives including upgrades to LM2500, a bow bulb for DDG-51s, and thermal management control systems.

NAVSEA’s engineering collaborations in 2011 also supported the Navy’s smaller vessels.

For Special Operations Forces, Naval Surface Warfare Center Panama City continued development of a small-boat outboard engine providing operators the option to burn JP-5, JP-8, diesel, bio-diesel, or gasoline. Such flexibility reduces strategic, operational and tactical vulnerabilities in wartime environments.

“No single technology will enable the Navy to achieve its energy goals,” said NAVSEA’s Chief Engineer and Deputy Commander for Naval Systems Engineering, Rear Admiral Thomas Eccles. “Instead a collection of technologies is being researched, developed and fielded synergistically.” ↴

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### For More Information

FOR MORE INFORMATION on NAVSEA’s ongoing energy initiatives, visit <http://www.navsea.navy.mil/OnWatch/energy.html>.





## SERDP & ESTCP Announce Plans for Annual Symposium

This Year's Program to Feature 15 Technical Sessions & Three Short Training Courses

**THE PARTNERS IN** Environmental Technology Technical Symposium and Workshop, sponsored by the Strategic Environmental Research and Development Program (SERDP) and the Environmental Security Technology Certification Program (ESTCP), will be held 27–29 November 2012, at the Washington Hilton. The Symposium will offer a dynamic opening plenary session, 15 technical sessions, three short courses, approximately 450 poster presentations, and a variety of networking opportunities for attendees from the government, academic, and private sectors.

### Preliminary Technical Program

- Climate Change, Fresh Water, and Installation Sustainability
- Defense Coastal/Estuarine Research Program (DCERP): Past and Future
- Marine Mammal Research: Next Steps
- Transferring Emerging Energy Efficiency Technologies to Department of Defense (DoD) Buildings
- Smart, Secure, and Integrated Installation Energy Management for Energy Security and Cost Savings
- Distributed Generation in Support of DoD Energy Security and Renewable Energy Goals
- Waste-to-Energy Conversion for Overseas Contingency Operations
- Implementation of Sustainable Surface Engineering Technologies on Weapons Systems
- Lead-Free Electronics: Challenges and Solutions
- Future Options for Site Closure of Contaminated Groundwater Sites
- Vapor Intrusion from Contaminated Groundwater Sites: Understanding the Groundwater to Indoor Air Pathway
- Emerging Contaminants: Fate, Transport, and Treatment
- Management of Contaminated Sediments: Innovations and Future Perspectives
- Detection and Classification of Munitions Underwater
- ESTCP Live Site Classification Demonstrations



### Training Opportunities

- Passive Sampling Methodologies for Monitoring Contaminated Sediments
- Best Management Practices for Controlling Munitions Constituents on Operational Ranges
- Decision Support System for Matrix Diffusion Modeling


### The Sponsors

SERDP and ESTCP are DoD's environmental research programs, harnessing the latest science and technology to improve DoD's environmental performance, reduce costs, and enhance and sustain mission capabilities. SERDP and ESTCP promote partnerships and collaboration among academia, industry, the military Services, and other Federal agencies. Both manage investments in five program areas, each of which focuses on a specific component of DoD's environmental responsibilities:

1. Energy and Water
2. Environmental Restoration
3. Munitions Response
4. Resource Conservation and Climate Change
5. Weapons Systems and Platforms

They are independent programs managed from a joint office to coordinate the full spectrum of efforts, from basic and applied research to field demonstration and validation. For more information, visit [www.serdp-estcp.org](http://www.serdp-estcp.org).

### Additional Information

For additional information, please visit <http://symposium2012.serdp-estcp.org>, send an e-mail to [partners@hgl.com](mailto:partners@hgl.com), or call the Symposium Contact Line at 703-736-4548. If you would like to receive the Symposium and technical program brochure and are not yet in the SERDP and ESTCP mailing database, please subscribe at [www.serdp-estcp.org](http://www.serdp-estcp.org) or send an e-mail to [partners@hgl.com](mailto:partners@hgl.com). 

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## Army Draws on Navy Process to Reduce Greenhouse Gas Emissions

Aviation & Missile Command Adopts Helium Leak Detection Process

**THE ARMY HAS** leveraged technology originally implemented by the Navy at the Fleet Readiness Center (FRC) East aboard Marine Corps Air Station (MCAS) Cherry Point, NC to significantly reduce greenhouse gas (GHG) emissions at aviation maintenance facilities.

The Army Aviation and Missile Command (AMCOM) G-4 Technology Integration Branch (TIB), based out of Redstone Arsenal, AL, was tasked with researching possible replacements for Sulfur Hexafluoride (SF<sub>6</sub>) gas used in leak checking H-60 helicopter rotor blades on Army installations. In conducting this research, G-4 TIB personnel learned of a new process being used at FRC East. This process had replaced SF<sub>6</sub> with Helium and a specialized leak detector for use in H-60 rotor blade leak checks. G-4 TIB personnel spoke with Jack Fennell at FRC East to discuss the specific applications and nuances of such a switch.

SF<sub>6</sub> is the most potent GHG identified by the Intergovernmental Panel on Climate Change. By way of comparison, carbon dioxide has a Global Warming Potential (GWP) of 1 which pales in comparison to the GWP of SF<sub>6</sub> which is 23,900. SF<sub>6</sub> is on the Department of Defense's (DoD)



CCAD shop artisan testing the cuff of an H-60 blade.



CCAD artisan testing around the pressure release valve and Blade Inspection Method.

### For More Information

**FOR MORE INSIGHTS** into DoD's Strategic Sustainability Performance Plan, read our article entitled, "Going Green While Going Strong: DoD's Ambitious Sustainability Plan" in the winter 2012 issue of *Currents*. For more information about DoD's SF<sub>6</sub> management strategy, read our article entitled, "Sulfur Hexafluoride—The Good, the Bad & the Future: Managing a Mission-critical Greenhouse Gas" in our spring 2010 issue. To browse the magazine's archives, visit the *Currents* page on the Department of the Navy's Energy, Environment and Climate Change web site at <http://greenfleet.dodlive.mil/currents-magazine>.





## Rotor Blades are Hollow?

**YES—ROTOR BLADES** are, in fact, hollow. H-60 rotor blades are made from a long titanium spar that runs the length of the blade. The spar is a hollow beam that is surrounded by layers of honeycomb material and an outer composite skin that combine to form a strong, rigid and lightweight rotor blade.

The spar is pressurized with 15 pounds of Nitrogen during normal operation. The Nitrogen within the blades acts as a desiccant to prohibit water intrusion and corrosion. The rotor blades are also fitted with a Blade Inspection Method (BIM) regulator that provides indication of a leaking blade and thus its airworthiness. If a blade spar has a crack, the BIM will change color and artisans will begin the work of trying to identify the source of the leak. This is where the Helium and Helium detector comes in.

Emerging Contaminants Action List due to the risks related to potential cost increases, restrictions, or production bans.


Under Executive Order (EO) 13514, federal agencies were required to establish FY2020 reduction targets for non-tactical GHG emissions, measured from a FY2008 baseline. The EO requires separate targets for direct and indirect emissions from sources controlled by DoD (Scopes 1 and 2), and emissions from sources not owned or directly controlled by DoD (Scope 3). The Department set an aggressive 34 percent goal for Scopes 1 and 2 emission reductions by FY2020 in the DoD Strategic Sustainability Performance Plan established under EO 13514. Corpus Christi Army Depot (CCAD), aboard Naval Air Station Corpus Christi, reported using 500 pounds of SF<sub>6</sub> during the FY2008 timeframe.

In order to achieve a transition to the Helium and a Helium-specific leak detector, a demonstration/validation of the technology and process was coordinated by AMCOM G-4 between the vendor and the CCAD Blade Shop. This demonstration was carried out on 16 June 2010, with two different Helium detection technologies in order to assess the preferences of the blade shop artisans. The demonstration proved to be highly successful as all of the leaks typically seen were detected at a faster rate than could previously have been achieved with SF<sub>6</sub> and Halogen detection technologies. This increase in testing

and detection rates will allow for faster throughput of blades within the blade shop.

To help implement the new Helium technology and process, AMCOM G-4 TIB personnel, in coordination with CCAD, have developed new maintenance testing processes that allow for 100 percent Helium to be introduced to the blades in place of the 5-to-1 Nitrogen to SF<sub>6</sub> mixture that was used previously. These changes have been issued in the form of Maintenance Engineering Orders (MEO). AMCOM G-4 TIB personnel also developed and submitted requests for approval of these MEOs to the Army's Aviation Engineering Directorate (AED). AED has since approved this conversion and the detection technology.

This technology implementation will reduce CCAD's SF<sub>6</sub> usage by 95 percent and provide compliance with all policies and orders focused on SF<sub>6</sub> reduction.

This technology implementation will reduce CCAD's SF<sub>6</sub> usage by 95 percent and provide compliance with all policies and orders focused on SF<sub>6</sub> reduction. Faster throughput of blades will increase CCAD's mission in support of the warfighter. This transition will also provide a cost savings of \$16,303 per year as the cost of SF<sub>6</sub> is substantially greater than the cost of Helium. CCAD has procured two Helium detection units and is training maintainers in the blade shop on the proper use of the technology. Both the 1108th and 1109th Theater Aviation Sustainment Maintenance Groups (TASM-G) have also committed to upgrading to the Helium detection process at their facilities. Efforts are underway for the 1107th TASM-G to incorporate this technology as well. 

*Photos by Casey Yeary*

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## NESDI Program Launches Annual Call for Fleet Needs

FY13 Effort Includes a Rapid Response to Address Emergent Needs

**ONCE AGAIN, THE** Navy Environmental Sustainability Development to Integration (NESDI) program is launching its needs collection process—this time for Fiscal Year 2013—including a streamlined process to provide a rapid response to your emergent needs.

Although you can submit a need at any time, the program’s formal needs collection process runs from the beginning of June until the beginning of August each year. For the NESDI program, a “need” defines a requirement to eliminate or reduce an environmental constraint that:

1. Addresses a Fleet operational challenge
2. Identifies an existing gap in knowledge, technology, and/or capability
3. Is associated with an environmental constraint or regulatory driver

Needs are the fundamental basis of the NESDI program as all of its technology investments are based on recommended solutions to the need.

When submitting a need, you are encouraged to provide as much information as you can about your existing challenge. What is the challenge? How big is it? Is it due to a current or impending regulatory requirement that now makes your job more difficult? Is it a technology gap? Is it a Fleet operational challenge? Is the problem unique to your facility or is it applicable across the Navy? How urgent is the need? If the need is truly urgent, the NESDI program can respond quickly with the resources and expertise necessary to address the need.

To submit your need for consideration by the NESDI program, visit the “Environmental Needs” section on the NESDI web site at [www.nesdi.navy.mil](http://www.nesdi.navy.mil) by 1 August 2012. Once there, click on the “Submit A Need Now” button. This will take you to the “NESDI Environmental Needs Submission Form.”

### The Basics About the NESDI Program

**THE NESDI PROGRAM** seeks to provide solutions by demonstrating, validating and integrating innovative technologies, processes, materials, and filling knowledge gaps to minimize operational environmental risks, constraints and costs while ensuring Fleet readiness. The program accomplishes this mission through the evaluation of cost-effective technologies, processes, materials and knowledge that enhance environmental readiness of naval shore activities and ensure they can be integrated into weapons system acquisition programs.



The NESDI program is the Navy’s environmental shoreside 6.4 Research, Development, Test and Evaluation program. The NESDI technology demonstration and validation program is sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division (N45) and managed by the Naval Facilities Engineering Command (NAVFAC). The program is the Navy’s complement to the Department of Defense’s Environmental Security Technology Certification Program (ESTCP) which conducts demonstration and validation of technologies important to the tri-Services, U.S. Environmental Protection Agency and Department of Energy.





To submit your need for consideration by the NESDI program, visit the “Environmental Needs” section on the NESDI web site at [www.nesdi.navy.mil](http://www.nesdi.navy.mil) by 1 August 2012.

Use this on-line form to tell NESDI program personnel everything you know about your need. Once you submit your need, technical experts assembled by NESDI program management will assess, validate, and rank it. You will be notified about the ultimate status of your need once this ranking process is complete.

For more information, download the program’s Reference Guide: Submitting and Evaluating Needs from the NESDI web site by clicking on the “Environmental Needs” button from the home page. Direct any questions about the use of the program’s web site to Eric Rasmussen at 732-323-7481 and [eric.rasmussen@navy.mil](mailto:eric.rasmussen@navy.mil).

For more insights into the NESDI program’s needs submittal process, contact Leslie Karr, the program manager, or members of the Technology Development Working Group—the program’s management team. 



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## N45's Living Marine Resources Program Launches First Solicitation for Needs

Deadline for Submittals is 31 August 2012

The Living Marine Resources (LMR) program is soliciting for Fleet and System Commands (SYSCOM) needs. And if you want your need to be considered in the Fiscal Year (FY) 2014 evaluation cycle, it must be submitted by 31 August 2012.

Sponsored by the Chief of Naval Operations Energy and Environmental Readiness Division (N45), the LMR program seeks to develop, demonstrate, and assess data and technology solutions to protect biological marine resources by minimizing the environmental risks of Navy at-sea training and testing activities while preserving core Navy readiness capabilities. This mission is accomplished by:

1. Providing science-based information to support Navy environmental effects assessments for at-sea training and testing.
2. Improving knowledge of the ecology and population dynamics of marine species of concern.
3. Developing the scientific basis for the criteria and thresholds to measure the biological effects of Navy generated sound.
4. Improving understanding of underwater sound and sound field characterization unique to assessing the biological consequences of underwater sound (as opposed to tactical applications of underwater sound or propagation loss modeling for military communications or tactical applications).
5. Developing technologies and methods to mitigate and monitor environmental consequences to living marine resources resulting from naval activities on at-sea training and testing ranges.

In an effort to identify ongoing challenges in the Fleet and SYSCOMs, the LMR program is opening up its needs collection process. All LMR program decisions and investments are based on environmental needs which meet the following conditions:

- Identifies an existing gap in knowledge, technology, and/or capability
- Is associated with an environmental constraint or regulatory driver
- Can be categorized under one of the program's investment areas

To have your need considered in the FY 2014 evaluation cycle, it must be submitted by 31 August 2012.

Anyone within the Navy may submit their needs for consideration by the LMR program. (For more information about submitting a need, see our reference guide entitled "Submitting and Evaluating Need" available via the LMR web site.)

To submit a need to the program, visit the LMR program web site at [www.lmr.navy.mil](http://www.lmr.navy.mil) then select "Needs" from the navigational menu on the left. You will be taken to the following page:





Once on the “Environmental Needs” page, select “Submit Your Need Now” and you will be taken to the following page where you can actually submit your need:

Once you have provided all of the above information, select “Spell Check” to correct any data entry errors then select “Submit Need.”



Once a need is submitted, it is evaluated by technical experts assembled by program management—the program’s requirements advisory committee or LMRAC. After reviewing the needs, the LMRAC makes recommendations to the LMR program manager and N45 resource sponsor who make the ultimate decision about which needs will move forward to the next stage in the process—the solicitation for proposals to address priority needs.

In order to complete this needs submission form, you will need to enter the following information about your need:

- Contact information for the need originator
- Title of the need
- Detailed description of the need
- Explanation of the ramifications if the need is not met
- Key Navy policy and regulatory drivers
- Suggested solutions to the need

For help submitting your need, contact your corresponding LMRAC member at the phone numbers and email addresses listed below.

For more information about the LMR program and its needs solicitation process, contact Bob Gisinier, acting LMR program manager. [↕](#)

### CONTACT

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## NAVAIR Develops New Environmentally Compliant Solvent Cleaning Unit

Unit Designed for Use on Bearings & Other Critical Components

**DUE TO THE** obsolescence of the existing platform degreaser units in the fleet and the transition to the new class of solvents, the Naval Air Systems Command (NAVAIR) has field tested a new environmentally-friendly closed-loop solvent parts cleaning unit—the PCS-10. This unit is specifically designed for use on bearings and other critical components that cannot be exposed to water. NAVAIR's Maintenance of Aeronautical Antifriction Bearings for Operational, Intermediate and Depot Level Maintenance (NAVAIR 01-1A-503) manual stipulates that certain steps must be adhered to during the cleaning process.

The Clarus PCS-10 is manufactured by Clarus Technologies of Bellingham, Washington, and is designed to clean bearings and other small parts through agitation in a turbulent solvent bath. Variable timed cleaning allows for cleanliness to be achieved through a range of geometries and contamination levels. This unit is designed to provide a greater degree of versatility for solvent cleaning compared to existing units through the use of vertical agitation, spray jets, and variable timing.

Existing degreaser units are used in both land-based and shipboard activities. Consequently, the PCS-10 has been designed and tested to meet shipboard shock, mechanical vibration, and electromagnetic interference requirements. The unit is being installed to support 500 Division (Tire and Wheel Shop) operations on ships and at Fleet Readiness Centers.

Perhaps the most challenging testing that the unit had to undergo was the Volatile Organic Compound (VOC) testing to meet emission requirements for solvent cleaning units.



The PCS-10 undergoing contractor testing.

At the inception of the PCS-10 project, the air quality control district in the Central Valley of California had the most stringent requirements. This organization, formally known as the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD), is the controlling regulatory body for the air pollution standards that Naval Air Station Lemoore must meet. To regulate the emissions from organic solvent degreasing operations, SJVUAPCD developed Rule 4662.

SJVUAPCD Rule 4662, entitled "Organic Solvent Degreasing Operations," provides the requirements for cold cleaning degreasers, open top vapor degreasers, and non-cold cleaning degreasers. In order for the PCS-10 to comply, it had to meet the VOC capture and control efficiency requirements of 85 percent efficiency by weight. Also, the overall emissions could not exceed those that would result from the use of a solvent with a VOC content of 25 grams VOC per liter (g-VOC/l) in the unit's emission control system. This meant that the MIL-PRF-680 solvent used for testing, with a VOC level of 770 g/l, required a control efficiency of 96.75 percent.

The PCS-10 utilizes a carbon filter assembly to control Total Gaseous Organic Concentration (TGOC) emissions. Capture Efficiency was determined using U.S. Environmental Protection Agency (EPA) Test Method 204 to verify that the washer meets the criteria for a Permanent Total Enclosure. To establish the Control Efficiency, total hydrocarbons concentrations were measured at the inlet

and outlet of the carbon filter to determine the percent reduction of TGOC emissions attributable to the filter. TGOC were measured using EPA Method 25A. TGOC concentrations were measured as propane, using a flame ionization analyzer. Testing was performed simultaneously at the inlet and outlet of the carbon filter.

Several filter designs and filter media types were tested to establish a media bed design that would provide the required emission control over the prescribed number of operational hours before reaching saturation. The first media to be tested was coconut-based activated carbon.

Several filter designs and filter media types were tested to establish a media bed design that would provide the required emission control over the prescribed number of operational hours before reaching saturation. The first media to be tested was coconut-based activated carbon.



This media failed to achieve the requisite emission control. Potassium permanganate was added to the filter media to enable molecular breakdown, thereby allowing the activated carbon to absorb more of the VOCs than it would otherwise. However, this filter media also failed in testing. Finally, a specialty type of wood-based activated carbon was used to meet the test requirements. This activated carbon was specifically designed for solvent vapor recovery operations. Unlike the coconut-based activated carbon, the wood-based activated carbon filter media absorbs the exhaust gases from the bottom up. This filter media was able to meet the SJVUAPCD Rule 4662 requirements. The final filter media configuration that provided the correct balance was a pelletized form of the wood-based activated carbon. With this filter media configuration, the unit was able to achieve a control efficiency of 99.8 percent.

Many often conflicting variables had to be reconciled in determining the final filter bed configuration for the PCS-10 unit. The amount of media necessary to achieve the requisite emission control had to be determined based on the stipulated preventive maintenance interval to minimize the need for frequent filter replacement. The arrangement/geometry of the media within the filter bed had to be designed to optimize functionality. A greater

amount of surface area exposure for each pellet would lead to greater absorption from the same amount of media. Similarly, the media had to be arranged in such a way to avoid “channeling” of the media whereby a minimal amount of the media is exposed to most of the exhaust gases. Finally, the amount of available space for the filter media within the unit was a limiting factor. The PCS-10 had to have a small overall envelope to minimize the amount of space used for shipboard installation.

While the above testing was done using a MIL-PRF-680 compliant solvent, it is not the only option for safe, effective use of the PCS-10 machine. The MIL-S-32295 class of solvents can also be used in the PCS-10. Fleet testing has shown that the unit will thoroughly clean a bearing in less than an hour using MIL-PRF-680 compliant solvents. Prewashing generally is not necessary.

The PCS-10 has been installed on land-based and shipboard activities beginning in August 2011. 

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## BE PART OF OUR WINTER LINE-UP!

### Submit Your Article by 19 October

It's not too late to join the *Currents* team. If you want to be in the line-up for our Winter 2013 issue, you need to submit your text and images by 19 October 2012.

brucemccaffrey@sbcglobal.net. Bruce is also available at 773-376-6200 if you have any questions or would like to discuss your article.

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### CURRENTS DEADLINES

- Winter 2013 Issue: Friday, 19 October 2012
- Spring 2013 Issue: Friday, 18 January 2013
- Summer 2013 Issue: Friday, 19 April 2013
- Fall 2013 Issue: Friday, 19 July 2013

You can also refer to your *Currents* calendar for reminders about these deadlines.



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