

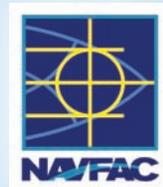


# A Year of Transition: 2009

Accomplishments of the Navy Environmental  
Sustainability Development to Integration  
Program in Fiscal Year 2009

# A Year of Transition: 2009

Accomplishments of the Navy Environmental Sustainability  
Development to Integration Program in Fiscal Year 2009



## WELCOME

### **Welcome to the Fiscal Year 2009 Year in Review report for the Navy's Environmental Sustainability Development to Integration (NESDI) program.**

**A Year of Transition.** Fiscal Year (FY) 2009 was a year of transition for the NESDI program. After nearly five years as Program Manager, Scott Mauro accepted another position at Headquarters, Naval Facilities Engineering Command. During his tenure, Scott was instrumental in addressing a range of efforts, from improving program operations to enhancing the scope and reach of the program. We wish him well in his new assignment.

In August 2009, Leslie Karr was appointed the new manager of the NESDI program. Leslie will bring a fresh perspective to the program, having been a Principal Investigator on an Initiation Decision Report (IDR) on the sustainability of Navy training lands and the program's efforts to develop a new technology to monitor leaks for the Navy's unique bulk fuel storage tanks—the world's largest. In her new capacity, Leslie Karr is already making her mark by developing a long term strategic plan and updating the Standard Operating Procedures for the program. Welcome Leslie!

This year's annual report highlights several great program-sponsored products that are transitioning to the Fleets. We are confident that the NESDI program will continue to respond to the environmental needs and concerns of the Navy with innovative solutions. The technologies, guidance documents and studies highlighted in this report help the Navy protect the environment and support the Fleet through the efficient and effective execution of environmental programs.

***The technologies, guidance documents and studies highlighted in this report help the Navy protect the environment and support the Fleet through the efficient and effective execution of environmental programs.***

We are very enthusiastic about the progress made by the NESDI program this past year. One of our recently completed projects involves a high priority request by the Naval Facilities Engineering Command's Water Media Field Team concerning the increase in Safe Drinking Water Act (SDWA) Notices of Violation (NOV). Our potable water quality management project analyzed this issue and provided guidance that helped to address the SDWA NOVs received by the Navy. This did not involve the transfer of any technology to the Fleet, but it did have a direct impact on the well being of shoreside service members and their families.

In one of our other ongoing efforts, we are developing a comprehensive data set on the toxicity of munitions constituents to regulator-approved marine species, as well as conclusively define potential bioaccumulation, cellular level impacts and trophic transfer. Other recent efforts include studies regarding laser effects on marine life, the long term disposition of seafloor cables and IDRs concerning global climate change and shipyard environmental sustainability. We hope that this report will help to promote these and other NESDI projects and the innovative, cost-effective approach with which they are executed.

*(continued on the next page)*

## **WELCOME** *(continued)*

---

**Why This Program is Important to the Navy.** Due to ever increasing resource demands and a focus on cleaner, more green and efficient processes that support greenhouse gas emission reductions and global climate change initiatives, the NESDI program provides critical Research, Development, Testing and Evaluation with a focus on demonstration and validation and technology integration support to the environmental shore community. The NESDI program will continue to strengthen its outreach and remain flexible to address the evolving needs coming from the Fleets, Commander, Navy Installations Command as well as other organizations. The NESDI program will work to improve the integration and procurement of environmental technology to meet the Fleet's needs.

**What You Can Do.** Technology integration is a tough undertaking. Fortunately, you can help us to be even more successful. The NESDI program relies on all Navy personnel to help identify environmental concerns and support the implementation of resultant solutions. We ask that, wherever possible, you find a way to use NESDI products. Participate in our process—you play a vital role by:

- Submitting and validating environmental needs,
- Reviewing technologies already in development,
- Supporting transition efforts in your organization or at your installation,
- Acting as a Principal Investigator on one of our projects,
- Providing demonstration sites for our various projects, and
- Staying up-to-date by regularly visiting our web site.

**Down the Road.** Looking ahead, several issues will shape our focus and define the NESDI program agenda. We will explore alternative methods to increase your participation in NESDI program efforts. In FY10, an Action Officer will be in place at our sponsor organization to help further integrate the program into other research and development programs and strategic initiatives. NESDI program efforts will increasingly involve the impact of climate change on Navy operations and the interface between energy efficiency and the environment.

Wherever possible, the NESDI program reaches into its user community and other program sponsors to leverage project resources appropriately. The results of these efforts were impressive in FY09 with a total cost sharing of nearly \$2.1 million. This is a testament to the ongoing need for and urgency of the program's investments.

On behalf of the NESDI program sponsor—the Chief of Naval Operations Environmental Readiness Division (N45)—we'd like to thank all of the System Command program participants including the Technology Development Working Group (TDWG) representatives, Functional Working Group members, and project Principal Investigators, engineers, scientists and technicians that support the NESDI program. If you would like to participate in the NESDI program, please contact our new Program Manager, Leslie Karr, or your TDWG representative. And, as always, you can visit the program's web site at [www.nesdi.navy.mil](http://www.nesdi.navy.mil).

We look forward to closer interaction among the NESDI program and the new leadership, managers and staff at N45. We hope the content in this report encourages you to participate in the program in FY10 and for years to come.

# CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	1
Significant Progress .....	2
High Priority Fleet Needs .....	4
FY10 Project New Starts .....	5
<b>INTRODUCTION</b> .....	7
Mission .....	7
Primary Program Objectives .....	8
Priority Investment Areas .....	9
<b>CASE STUDY:</b> Assessing Climate Change-Related Impacts on U.S. Navy Installations .....	10
<b>ACCOMPLISHMENTS</b> .....	12
Made Investments Based on Fleet Requirements .....	12
Maintained a Collaborative Management Approach .....	13
Conducted In-Progress Reviews to Ensure Successful Project Execution .....	15
<b>CASE STUDY:</b> Advanced Anodizing Aircraft Parts Using Process Control Technology .....	16
Made Significant Progress on a Critical Mass of Projects .....	18
IDRs Provide Insights & Guide Decision Making .....	20
Technology Integration .....	22
Made In-Roads Into the Range Community .....	23
Began to Understand Climate Change Impacts on the Navy Shore Community .....	23
<b>CASE STUDY:</b> Potable Water Quality Management .....	24
Improved the Efficiency of the Program .....	26
Expanded the Collection of Needs & Proposals .....	28
Leveraged Resources & Expertise of Other Technology Demonstration Programs .....	31
<b>CASE STUDY:</b> Toxicity & Bioaccumulation of Munitions Constituents in the Marine Environment .....	32
<b>METRICS</b> .....	39
<b>CASE STUDY:</b> Prohibited & Controlled Chemical List .....	40
<b>FINANCIAL REVIEW</b> .....	43
<b>THE ROAD AHEAD: PLANS FOR FY10 &amp; BEYOND</b> .....	44
<b>FY10 SCHEDULE</b> .....	46
<b>FOR MORE INFORMATION</b> .....	48



Accomplishments of the  
Navy Environmental Sustainability Development  
to Integration Program in Fiscal Year 2009:

## A Year of Transition



# 2009



## EXECUTIVE SUMMARY

---

### **Milestones achieved in the NESDI program in FY 2009 include:**

- **Made investments based on Fleet requirements,**
- **Maintained a collaborative management approach,**
- **Conducted program reviews to ensure successful project execution,**
- **Made significant progress on a critical mass of projects,**
- **Made in-roads into the range community,**
- **Began to understand climate change impacts on the Navy shore community,**
- **Improved the efficiency of the program through enhanced web site functionality,**
- **Expanded the collection of needs and proposals, and**
- **Leveraged resources and expertise of other technology demonstration programs.**

## EXECUTIVE SUMMARY

### Significant Progress

In FY09, significant progress was made on the following NESDI projects:

No.	Project	Description
1.	<b><i>Assessing Climate Change-Related Impacts on U.S. Navy Installations Initiation Decision Report (IDR)</i></b>	This report provides an assessment of climate change impacts on Navy installations and provides recommendations to support Navy readiness.
2.	<b><i>Potable Water Quality Management</i></b>	<p>The first NESDI project in this area resulted in the publication of The Potable Water Quality Management Guidance Document which provides Navy drinking water program managers with the direction and information for meeting compliance goals contained in the new disinfection byproducts rules.</p> <p>A follow-on project is validating a real-time contamination detection system that continuously monitors drinking water supplies to ensure that high quality drinking water is being delivered and provides water security surveillance to guard against the threats of terrorist attacks on water systems.</p>
3.	<b><i>Prohibited &amp; Controlled Chemical List</i></b>	This project provided the Navy with standard chemical inventories for both weapon system program and facility operations managers to use to improve their hazardous material management and minimization efforts.
4.	<b><i>Toxicity/ Bioaccumulation of Munitions Constituents in the Marine Environment</i></b>	This project resulted in the development of a comprehensive data set on toxicity of munitions constituents to regulator-approved marine species and the definition of potential bioaccumulation, cellular level impacts and trophic transfer.
5.	<b><i>Advanced Anodizing Aircraft Parts Using Process Control Technology</i></b>	This project successfully demonstrated and integrated technologies to optimize the application of anodized coatings, thereby reducing labor and waste.

#### ***Effective Alternative Technologies for Radome Repair.***

*This project validated the use of epoxy resin as a viable alternative to polyester for radome repair and corn hybrid polymer media for radome paint stripping.*



No.	Project	Description
6.	<b><i>Environmental Effects of Lasers on Biota in the Marine Environment</i></b>	This study assessed the extent and diversity of the laser-based systems being used in an underwater environment which may have an effect on the biological community and marine life.
7.	<b><i>Web-Based Model Server</i></b>	This project increased the accessibility of joint/interagency environmental models through a common user interface with web-based model simulation architecture.
8.	<b><i>Direct-Push and Point-and-Detect, In Situ Sensors for Perchlorate</i></b>	This project is validating the use of direct push and point-and-detect sensor systems, for use in the field, to measure perchlorate either for rapid screening and monitoring purposes or for contaminant source characterization of perchlorate in groundwater or surface waters.
9.	<b><i>Containment and Long-Term Monitoring Strategies for Contaminated Sediment Management</i></b>	This project is generating a suite of integrated containment and monitoring strategies for remediating contaminated sediments and assessing the long-term effectiveness of remedial actions.
10.	<b><i>Underwater Ordnance Casing Corrosion</i></b>	This project will result in an underwater corrosion prediction model for unexploded ordnance (UXO) which will predict time to penetration of UXO items in the marine environment, and will produce a user's guide.



## EXECUTIVE SUMMARY

### High Priority Fleet Needs

In FY09, the NESDI program's needs collection and evaluation processes resulted in the following 12 high priority needs:

1. Chemical Safety—Environmental Management System—Enterprise
2. Beneficial Use of Dredged Sediments
3. Evaluation of In-Situ Toxicity Testing in Developing Risk-Based Clean-Up Goals at Environmental Restoration Sites
4. Application Of Multi-Incremental Sampling During Ecological Toxicity Testing to Establish Site-Specific Clean-Up Goals at Environmental Restoration Sites
5. Test and Validation of Best Management Practices for Use in Total Maximum Daily Load (TMDL) Compliance
6. Municipal Separate Storm Sewer System (MS4) Compliant Storm Drain Inlet High Surface Area Filter
7. Strategic Environmental Sustainability Assessment of Navy Regions
8. Climate Change Risk Assessment Initiative
9. Climate Change Adaptation Initiative
10. Climate Change Mitigation Initiative
11. Multi-trophic Level Toxicity Test
12. Demonstration and Evaluation of Low Impact Development Technologies & Best Management Practices

It should be noted that the process generated far more needs than the program can financially support. NESDI increasingly relies on the leveraging of efforts to meet the needs of our community. Additionally, the program does not always meet the need with a technically proficient solution in the current year. Those needs are reconsidered by the NESDI program in the following fiscal years as funding allows.



#### **NoFoam System For Aircraft Hangar Fire Suppression System & Automotive Fire Apparatus Vehicles Foam Discharge Checks.**

*These projects demonstrated and validated the effectiveness of the NoFoam System technology to minimize or eliminate the Aqueous Film Forming Foam-generated wastewater from aircraft hangar fire suppression foam system annual discharge checks and during the annual testing of automotive fire apparatus vehicles.*



## **FY10 Project New Starts**

**NESDI program management personnel selected the following projects for either end-of-year late starts or new starts in FY10:**

- 1. Demonstration of Physical & Biological Conditioning of Navigational Dredge Material for Beneficial Reuse.**  
This project will evaluate the effectiveness of conditioning methods on weathered and freshly dredged marine sediment to enhance its beneficial reuse potential.
- 2. Chemical Safety—Environmental Management System.**  
This project will result in the development of the Chemical Safety—Environmental Management System—Enterprise (CS-EMS-E) for Commander Navy Region Mid-Atlantic in Norfolk, VA. CS-EMS-E is a web-based hazardous waste management system that will track and report state and federal regulatory compliance as well as billing information on associate cost rendered for the management, storage, transportation, treatment and disposal of hazardous waste.
- 3. Mitigation of Environmental Impacts from the Venting of Full-Scale Practice Bombs at Navy Ranges.**  
Practice, full-scale inert (FSI) bombs are used extensively at most of the Navy's land-based test and training ranges. After range clearance operations have been completed, these bombs are lined up in a designated area for venting. This project will result in the development of Best Management Practices and guidance to all Navy activities that will ensure munitions constituents resulting from the venting process does not migrate off site.



## EXECUTIVE SUMMARY

In addition to the FY10 new start projects mentioned on the previous page, the NESDI program provided seed funding to support the initiation of the following four Environmental Security Technology Certification Program (ESTCP) projects:

1. **Evaluation of Re-suspension Associated with Dredging, Extreme Storm Events and Propeller Wash.**

This ESTCP project will leverage NESDI resources to demonstrate and validate innovative methods to quantify the resuspension and recontamination potential of contaminated sediments affected by propeller wash and utilize the validated methods to evaluate and quantify the resulting effects from propeller wash on the effectiveness and stability of sediment capping.

2. **Water Conservation: Tertiary Treatment and Recycling of Wastewater.**

This ESTCP project will leverage NESDI resources to demonstrate and validate an innovative on-site wetland-based wastewater treatment system that produces non-potable water from gray water.

3. **Smart Water Conservation Systems for Irrigated Landscapes.**

This ESTCP project will leverage the NESDI program to demonstrate and validate the retrofitting of existing landscape irrigation systems with smart water conservation systems that reduce the costs of water used for landscape irrigation and that can more efficiently irrigate the landscape surrounding DoD buildings.

4. **Concentrated Solar Air Conditioning for Buildings.**

This ESTCP project will demonstrate and evaluate a solar air conditioning system that includes a parabolic solar energy collection system linked to a dual effect absorption chiller.

## INTRODUCTION

---

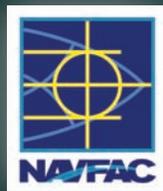
The execution of the Navy Environmental Sustainability Development to Integration (NESDI) program in Fiscal Year (FY) 2009 was defined by the following significant efforts and events:

- Made investments based on Fleet requirements,
- Maintained a collaborative management approach,
- Conducted program reviews to ensure successful project execution,
- Made significant progress on a critical mass of projects,
- Made in-roads into the range community,
- Began to understand climate change impacts on the Navy shore community,
- Improved the efficiency of the program through enhanced web site functionality,
- Expanded the collection of needs and proposals, and
- Leveraged resources and expertise of other technology demonstration programs.

### Mission

The mission of the NESDI program is 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 seeks to accomplish 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 (RDT&E) program. The NESDI technology demonstration and validation program is sponsored by the Chief of Naval Operations 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.



## INTRODUCTION

### Primary Program Objectives

The NESDI program is focused on three primary objectives:

1. **Collect, Validate & Rank Environmental Research and Development (R&D) Needs.**  
The NESDI program expands awareness of opportunities within the Navy shoreside community to encourage and facilitate the submittal of well-defined environmental needs and requirements.
2. **Resolve High Priority Needs.**  
The NESDI program seeks to ensure that program investments and the resulting RDT&E projects maintain a direct and consistent link to the defined needs.
3. **Integrate Solutions & Validate Benefits.**  
The NESDI program also works to maximize the number of program-derived solutions that are successfully integrated into the Fleet and future weapons system acquisitions and verify that the solutions provide the anticipated benefits.



***Environmental Effects of Lasers on Biota in the Marine Environment.***

*This study assessed the extent and diversity of the laser-based systems being used in an underwater environment which may have an effect on the biological community and marine life.*



## Priority Investment Areas

The NESDI program makes its primary investments in the following areas and Environmental Enabling Capabilities (EEC) in order of priority:

### 1. Range Sustainment (EEC-2).

Innovations that address environmental impacts and restrictions at Navy ranges to ensure that naval training ranges and munitions testing/manufacturing ranges are fully available and efficiently utilized.

Example projects in this area are:

- a. A study to assess the potential effects of lasers on marine life, and
- b. Development of a comprehensive data set on the toxicity of munitions constituents to regulator-approved marine species and the definition of their potential for bioaccumulation, cellular level impacts and trophic transfer.

### 2. Ship-to-shore Interface (EEC-4).

Innovative techniques to manage ship hazardous material/waste offload to shore facilities.

Example projects in the ship-to-shore interface area are:

- a. An ongoing effort to select, procure and integrate proven technologies that collect and concentrate solids and fine particles from dry dock floors, pump wells, cross connection channels, trenches, rail tracks and adjacent areas to the dry dock, and
- b. An effort to demonstrate and integrate a low-cost, modular device that combines semi-autonomous motion with portable containment to maximize operator productivity while capturing the paint overspray before it can contaminate the dry dock.

### 3. Weapon System Sustainment (EEC-3).

Solutions for the organizational- and intermediate-level Fleet maintainer to reduce the cost of compliance and increasing Fleet readiness. Example projects include:

- a. Validating the use of alternative technologies (including corn hybrid polymer) for the effective repair of aircraft radomes, and
- b. Demonstrating and validating the use of High Velocity Oxygen Fuel coatings as a replacement for hard chromium plating on helicopter dynamic components.

### 4. Air and Port Operations (EEC-4).

Approaches for addressing issues pertaining to air and port operations that ensure Fleet readiness.

Example projects in this area include:

- a. Validating a cathodic protection system to achieve effective corrosion prevention while reducing environmental impacts of caisson and floating dry dock ballast discharges, and
- b. Assessing the feasibility of coatings and other material advancements for permanent oil booms that mitigate biofouling accumulation and enhance compliance through increased reliability, extended life and a reduced maintenance burden.

### 5. Regulatory and Base Operations (EEC-5).

Cost-effective methods for identifying, analyzing and managing environmental constraints related to current and projected regulatory impacts. Example projects include:

- a. Establishing guidelines and limitations for the use of biodiesel with ground tactical vehicles and equipment, and
- b. Quantifying Navy contaminant loads by demonstrating and validating contaminant source tracking technologies and developing a technical framework that enables water program managers to attribute existing contamination loads to support their compliance programs.

## Global Climate Change & the Navy: A First Step for What's Next

Climate change is no longer a distant threat to our planet—year by year it is becoming a reality. Of all the services, the Navy is especially vulnerable to the destructive effects of climate change, due to its large coastal presence, low-lying airfields, and naval training exercises in cold, mountain and hot, humid regions. It is imperative that the Navy and all branches of the Department of Defense (DoD) learn what they can do to better prepare themselves for climate change.

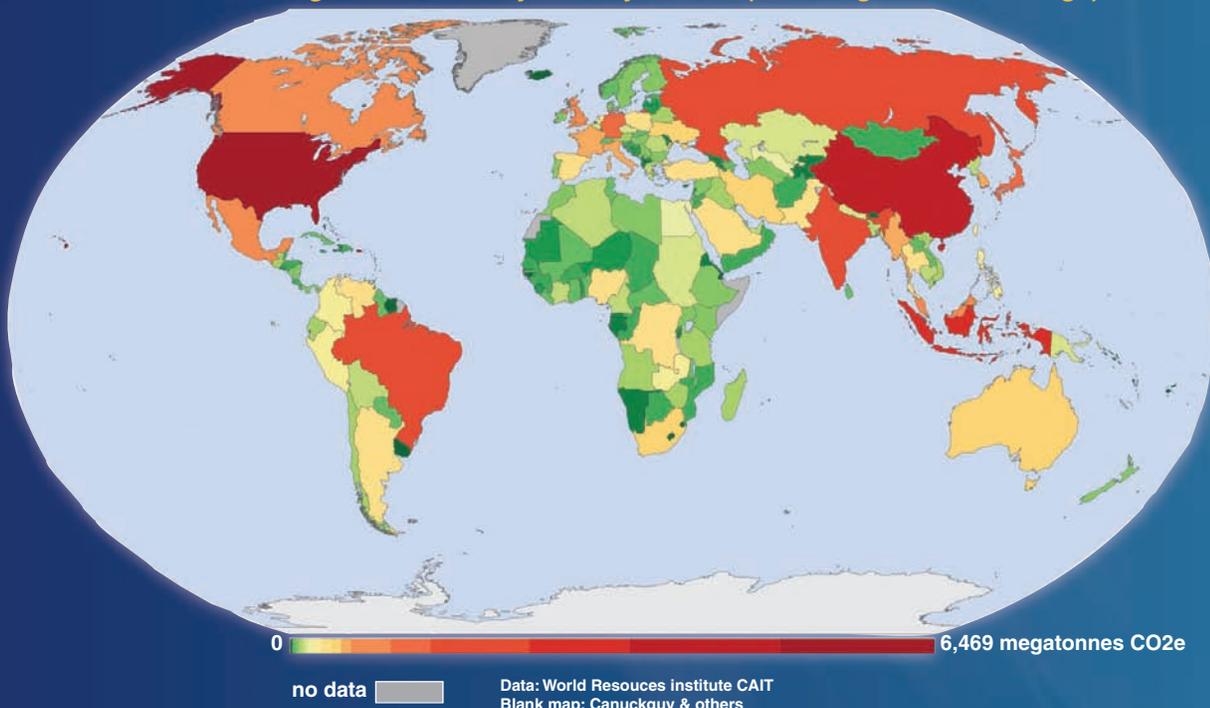
Beginning in 2008, the NESDI program sponsored a research initiative that, in addition to summarizing the climate change effects that are expected to occur in the next century, also provides an assessment of the likely impacts on naval infrastructure and operations. The Climate Change Initiation Decision Report (CC IDR) identifies gaps in the knowledge base specific to the influence of climate change on Navy shore operations and physical facilities

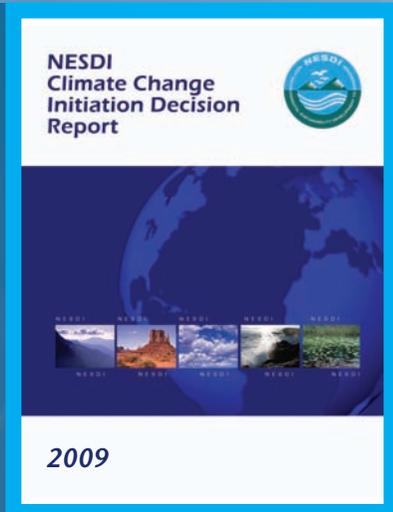
and infrastructure, and also provides descriptions of evolving technologies designed to help limit and/or adapt to climate change.

The goal of the CC IDR is to provide knowledge about climate change; make recommendations, particularly in the areas of mitigation and adaptation; and improve Command compliance as regulatory strategies and responding technologies continue to evolve. Inserting new processes and technologies as early as possible in the DoD acquisition process will improve success in meeting the Navy's climate change goals.

In late 2008, the CC IDR was presented to the NESDI program's Technology Development Working Group, complete with a set of anticipated issues related to climate change that the Navy will need to address through policies, instructions, education and technology adaptation and/or development. The CC IDR was refined and completed in 2009.

*Greenhouse gas emissions by country in 2000 (including land-use change)*





The team identified the following technology and management strategies as high priority solutions for sustaining mission readiness:

- Regulatory compliance strategy to ensure compliance with U.S. law,
- Facilities impact strategies to ensure that appropriate measures are taken to sustain and preserve resources and minimize risk,
- Mitigation strategies to sustain air quality standards, natural resources management, and energy efficiency,
- Adaptation strategies to minimize the severity of adverse impacts of climate change to natural resources and infrastructure, and
- Intervention (geoengineering) strategies—long-term strategies for reducing carbon dioxide levels.

In the area of regulatory compliance, the report covers methodologies for determining an operation’s carbon footprint and strategies for reducing greenhouse gas emissions.

The facilities impact assessment evaluates key installations for climate change impacts. This section includes risk assessment and an operations survey of hazardous chemical use across the Navy.

**Mitigation** strategies include a variety of approaches to improve energy efficiency, such as: small-scale combined heat and power; waste heat-to-power technology for remote locations; non-commodity

biofuels (e.g., algae, cellulose, waste, etc.); hybrid heavy-duty tactical and rolling fleet vehicles; energy conservation within buildings; and heat-island effect reduction by modifying buildings and grounds.

**Adaptation** strategies will be required to minimize the severity of the adverse impacts of climate change. Adaptation should be guided by the findings of the facilities impact assessment that identifies and prioritizes facilities and operations most at risk in terms of exposure, and weighted by mission dependency. The high-priority adaptation strategies include: development of adaptation planning processes and teams; retrofitting/waterproofing of critical infrastructure such as underground utilities; shoreline protection to prevent erosion; inundation modeling to determine if and where flood control systems may be needed; and retrofitting or relocation of critical facilities.

The **intervention** section discusses technologies which are in early developmental stages and likely will not be available for implementation for a number of years or decades. However, the ability to reduce, or even reverse, climate change by reducing atmospheric carbon dioxide levels is of such great potential benefit that several technologies merit further study.

Climate change regulatory strategies and responding technologies are a fluid topic of attention right now. As scientific observations are verified or rejected, models are regularly updated and new information appears. Technological discoveries and solutions are proposed almost daily.

In the years ahead, the NESDI and other appropriate programs may consider the priority recommendations within the CC IDR to ensure the Navy’s ability to meet its mission unimpeded by weather events and/or compliance issues.

## ACCOMPLISHMENTS

### **Made Investments Based on Fleet Requirements**

**In FY09, as in past years, the NESDI program continued to base its management decisions and investments on documented Fleet operational requirements.**

Through the involvement of various Navy environmental Functional Working Groups (FWG), the program enhanced the Navy's capability to better understand and document the environmental risks associated with Fleet operations. In FY09, a total of nine Navy FWGs were involved in identifying, collecting and ranking Fleet operational needs. FWGs are comprised of Fleet personnel or representatives that address issues related to a specific area of Fleet operations. The following FWG support is instrumental to the continued success of the NESDI program:

#### **Range Sustainment**

- The Range Commanders Council
- The Range Support Group
- The Underwater Range Sustainment Group

#### **Weapon System Sustainment**

- The Naval Aviation Technology Integration Program
- The Naval Sea System Command's (NAVSEA) Pollution Prevention (P2) Working Group

#### **Ship-to-Shore Interface & Air and Port Operations**

- NAVFAC's Clean Air Act (CAA), Clean Water Act (CWA), and TMDL Working Groups
- The Risk Assessment Working Group (RAW)
- The Alternative Restoration Technology Team (ARTT)

#### **Regulatory and Base Operations**

- NAVFAC's CAA, CWA, and Safe Drinking Water Act (SDWA) Working Groups
- The Petroleum, Oil and Other Hazardous Substances Working Group
- The RAW
- The ARTT

***Continued collaborations across the Navy helped to guarantee the ongoing success of the NESDI program in FY09.***



## **Maintained a Collaborative Management Approach**

**The management philosophy adopted by the NESDI program manager and the program's Technology Development Working Group (TDWG) is characterized by the following statements.**

**The NESDI program encourages:**

- Collaboration among program personnel, its Principal Investigators, customers, and the Fleet,
- Engagement with other potential customers in communities outside of the traditional audience for the program,
- Leveraging of personnel and financial resources of other R&D programs,
- An open door that welcomes to the table everyone with a potential interest, and
- The free flow of information among participants.

In FY09 as in previous years, the NESDI program tapped the requisite expertise from each System Command (SYSCOM) to ensure balanced participation and a more direct connection to the Fleet through each individual SYSCOM representative. The TDWG has representatives from Navy SYSCOMs including the Naval Air Systems Command (NAVAIR), the Naval Sea Systems Command (NAVSEA), NAVFAC, and the Space and Naval Warfare Systems Command (SPAWAR). The success of this approach, supported and embraced by each SYSCOM, is demonstrated by the following accomplishments:

- The TDWG collected and reviewed 66 responses to the program's FY09 needs solicitation and developed a list of 12 highly ranked needs.
- The TDWG reviewed 27 pre-proposals and 14 proposals for funding consideration. These reviews ensured that proposed projects would successfully achieve technology integration.
- The TDWG selected five FY10 project new starts that best met the collective needs of the program (see table on the next page).

## ACCOMPLISHMENTS

NESDI program management personnel selected the following projects for either end-of-year late starts or new starts in FY10.

### Proposed FY10 Project New Starts

No.	Title	Proposed Solution
1.	<b><i>Demonstration of Physical &amp; Biological Conditioning of Navigational Dredge Material for Beneficial Reuse</i></b>	This project will evaluate the effectiveness of conditioning methods on weathered and freshly dredged marine sediment to enhance its beneficial reuse potential.
2.	<b><i>Chemical Safety—Environmental Management System—Enterprise</i></b>	This project will result in the development of the Chemical Safety—Environmental Management System—Enterprise (CS-EMS-E) for Commander Navy Region Mid-Atlantic in Norfolk, VA. CS-EMS-E is a web-based hazardous waste management system that will track and report state and federal regulatory compliance as well as billing information on associate cost rendered for the management, storage, transportation, treatment and disposal of hazardous waste.
3.	<b><i>Mitigation of Environmental Impacts from the Venting of Full-Scale Practice Bombs at Navy Ranges</i></b>	Practice, full-scale inert (FSI) bombs are used extensively at most of the Navy’s land-based test and training ranges. After range clearance operations have been completed, these bombs are lined up in a designated area for venting. This project will result in the development of Best Management Practices and guidance to all Navy activities that will ensure that FSI bombs are, in fact, inert by exposing the internal filler, ensuring all fuses have fired, and opening the casing so pressure does not build up during subsequent demilitarization operations.



**In addition to the FY10 new start projects mentioned on the previous page, the NESDI program provided seed funding to support the initiation of the following four ESTCP projects:**

**1. Evaluation of Re-suspension Associated with Dredging, Extreme Storm Events and Propeller Wash.**

This ESTCP project will leverage NESDI resources to demonstrate and validate innovative methods to quantify the resuspension and recontamination potential of contaminated sediments affected by propeller wash and utilize the validated methods to evaluate and quantify the resulting effects from propeller wash on the effectiveness and stability of sediment capping.

**2. Water Conservation: Tertiary Treatment and Recycling of Wastewater.**

This ESTCP project will leverage NESDI resources to demonstrate and validate an innovative on-site wetland-based wastewater treatment system that produces non-potable water from gray water.

**3. Smart Water Conservation Systems for Irrigated Landscapes.**

This ESTCP project will leverage the NESDI program to demonstrate and validate the retrofitting of existing landscape irrigation systems with smart water conservation systems that reduce the costs of water used for landscape irrigation and that can more efficiently irrigate the landscape surrounding Department of Defense (DoD) buildings.

**4. Concentrated Solar Air Conditioning for Buildings.**

This ESTCP project will demonstrate and evaluate a solar air conditioning system that includes a parabolic solar energy collection system linked to a dual effect absorption chiller.

**Conducted In-Progress Reviews to Ensure Successful Project Execution**

During FY09, the NESDI program conducted three In-Progress Reviews (IPR) to ensure that funded projects remained focused on the Fleet-driven need and will successfully result in a technology of value to the Fleet. The program sponsored IPRs on the west coast (Port Hueneme, CA), east coast (Carderock, MD) and for the range community (Norfolk, VA) so that its primary customers could influence the ongoing execution of NESDI-sponsored projects. Some customers were able to attend the meeting in person while others participated via the Internet from Hawaii and other locations. In attendance at the east coast IPR, held at the Naval Surface Warfare Center (NSWC) Carderock were subject matter experts from NSWCs Carderock and Philadelphia as well as NAVSEA headquarters. The 2009 range IPR was attended by representatives from Fleet Forces Command and the Navy's range community.

## Advanced Anodizing Technology Brings Multiple Benefits: Automated System Improves Quality, Reduces Costs

For years, the Navy's Fleet Readiness Centers (FRC) have been anodizing aluminum aircraft parts to increase corrosion-resistance and durability. Anodizing is an electrochemical oxidation treatment used to form a protective coating on aluminum. Anodization occurs when the aluminum becomes positively charged by placing it in an electrolyte bath and introducing direct current and a cathode (negative electrode). The anodized aluminum surface is relatively porous and can be dyed in a variety of colors and/or sealed to further increase its corrosion-resistant properties.

Traditional methods of anodization involve manual operation/adjustments of the electric current, the use of lead cathodes, copper busbars to conduct electricity, and sulfuric acid as the common electrolyte. These methods, while successful, have had their share of disadvantages when it comes to consistency and the efficiency in which the oxide is formed. Manual adjustments and control of current flow not only provides inconsistent and non-reproducible coatings, but could increase the risk of defects and rejects. This particularly becomes an issue when anodizing alloys rich in copper since these alloys are more prone to burning on high current density areas.

Lead cathodes, chosen for their corrosion-resistance, add to the problem by introducing contaminants to the bath. The same is true of the copper busbars. As the level of unwanted contaminants in the bath increases, the electrolyte must be disposed of more frequently to maintain proper bath chemistry—this lengthens the process and adds toxic materials to the waste stream. In addition, more than one process tank has typically been needed when anodizing more than one coating type.

A NESDI-sponsored project at the FRC Southeast (FRCSE) in Jacksonville, FL demonstrated an improved methodology that takes advantage of commercial off-the-shelf solutions such as Metalast™ technology.

Developed by Metalast International, Inc., this technology automates the process through the use of an Integrated Process Controller (IPC) and an Interface Controller, and introduces a chemical additive for the bath chemistry, designed to reduce contaminant build-up, improve uniformity and eliminate burning. Also as part of this project, FRCSE has demonstrated the use of Trivalent Chrome Post Treatment (TCP) as a seal on anodized aluminum alloys.

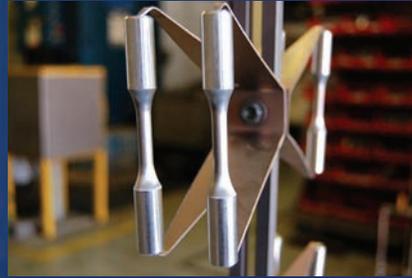
With minimal training, desired strategies can be entered via a touch screen into the IPC and set up to run in "automatic" mode—the artisan no longer has to manually monitor each run, but is free to concentrate on other tasks.

The specification that governs the aluminum alloy anodizing is military specification MIL-A-8625F. This specification identifies the different types of anodizing. The target types for this project are the following:

- Type II. Sulfuric acid anodizing, conventional coatings produced from sulfuric acid bath
- Type IIB. Thin sulfuric acid anodizing, for use as a non-chromate alternative
- Type III. Hard anodic coatings

The Metalast™ anodizing process has been successfully demonstrated at the FRCSE for Types II, IIB and III anodizing under this project. Based on preliminary fatigue data resulting from this study, authorization for producing Type IIB oxides using the Metalast™ process will be pursued and implemented across all Navy sites. Additionally, based on the performance of the TCP process as an anodize sealer, the Naval Air Systems Command (NAVAIR) enterprise is pursuing the authorization and implementation of TCP in 2010 via maintenance manual changes and NAVAIR approval letter.

## TECHNOLOGY REPLACEMENT



### **Optimizing the Anodizing Process.**

*This project successfully demonstrated and integrated technologies to optimize the application of anodized coatings to aircraft components and parts at Fleet Readiness Centers in Jacksonville, FL and Cherry Point, NC with potential integration at the Fleet Readiness Center in San Diego, CA.*

Pending a successful review of the fatigue data, a NAVAIR approval letter will be written and signed, giving all NAVAIR entities authority to use the Metalast™ anodizing process for producing all anodizing types, and authorization of TCP as a sealer on anodized aluminum.

**Upon completion, the Metalast™ project will have provided the following key benefits to the entire NAVAIR enterprise:**

#### **Capabilities Gained**

- Increased process consistency, throughput and verification
- Increased/improved corrosion performance
- Reduced operator error and supervision of process
- Can be used with most electrochemical processes
- Improved accuracy and repeatability of the process
- Reduced defects and rejects in finished parts
- Overall increase in efficiency and quality of coating
- Lower labor and energy costs
- Affordable and user-friendly technology with minimal training required
- Facilitates compliance with international organization and quality standards

#### **Efficiencies Achieved**

- Reduces cycle and throughput times by as much as 40 percent
- At least 15 percent more efficient than conventional anodizing

#### **Environmental Benefits**

- Reduces waste due to consolidation of bath chemistries and extended bath life
- Energy savings are realized due to use of aluminum cathodes
- Energy savings with room temperature anodize sealer
- Chemicals and energy are used more efficiently due to the reduced number of rejects/rework
- Reduced worker exposure to hexavalent chromium with use of TCP anodize sealer

#### **Cost Avoidance & Payback**

- Initial investment: \$70,000 (includes all required equipment and chemicals)
- Total cost avoidance: \$56,000 per year in increased efficiency, labor savings, and reduction in hazardous waste disposal
- Payback period: Less than two years

## ACCOMPLISHMENTS

### **Made Significant Progress on a Critical Mass of Projects** **In FY09, NESDI program personnel were able to provide the Fleet with a number of new technologies, modified industrial processes or other solutions that minimize environmental impacts. Among the successfully executed projects are:**

- 1. Assessing Climate Change-Related Impacts on U.S. Navy Installations.**  
This IDR provides an assessment of climate change impacts on Navy installations and provides recommendations to maintain Navy readiness.
- 2. Potable Water Quality Management.**  
The first NESDI project in this area resulted in the publication of *The Potable Water Quality Management Guidance Document* which provides Navy drinking water program managers with direction and information for meeting compliance goals contained in the new disinfection byproducts rules.  
A follow-on project is validating a real-time contamination detection system that continuously monitors drinking water supplies to ensure that high quality drinking water is being delivered and provides water security surveillance to guard against the threats of terrorist attacks on water systems.
- 3. Prohibited & Controlled Chemical List.**  
This project provided the Navy with standard chemical inventories for both weapon system program and facility operations managers to use to improve their hazardous material management and minimization efforts.
- 4. Toxicity/ Bioaccumulation of Munitions Constituents in the Marine Environment.**  
This project resulted in the development of a comprehensive data set on toxicity of munitions constituents to regulator-approved marine species and the definition of potential bioaccumulation, cellular level impacts and trophic transfer.
- 5. Advanced Anodizing Aircraft Parts Using Process Control Technology.**  
This project successfully demonstrated and integrated technologies to optimize the application of anodized coatings, thereby reducing labor and waste.

*More details about these projects are included as case studies in this report.*

#### ***Shipboard Mobile Surface Cleaning Technology.***

*This project is validating a mobile surface cleaning technology for critical cleaning of shipboard non-skid and shoreside surfaces to remove contaminants, mitigate pollution from weather deck and stormwater runoff and reduce associated manpower and waste management burden.*



**Significant progress was also made in FY09 on the following projects:**

1. **Environmental Effects of Lasers on Biota in the Marine Environment.**  
This study assessed the extent and diversity of the laser-based systems being used in an underwater environment which may have an effect on the biological community and marine life.
2. **Web-Based Model Server.**  
This project increased the accessibility of joint/interagency environmental models through a common user interface with web-based model simulation architecture.
3. **Direct-Push and Point-and-Detect, In Situ Sensors for Perchlorate.**  
This project is validating the use of direct push and point-and-detect sensor systems, for use in the field, to measure perchlorate either for rapid screening and monitoring purposes or for contaminant source characterization of perchlorate in groundwater or surface waters.
4. **Containment and Long-Term Monitoring Strategies for Contaminated Sediment Management.**  
This project is generating a suite of integrated containment and monitoring strategies for remediating contaminated sediments and assessing the long-term effectiveness of remedial actions.
5. **Underwater Ordnance Casing Corrosion.**  
This project will result in an underwater corrosion prediction model for unexploded ordnance (UXO) which will predict time to penetration of UXO items in the marine environment and will provide a user's guide.



## ACCOMPLISHMENTS

### IDRs Provide Insights & Guide Decision Making

The NESDI program sponsors the development of IDRs to provide technical insights and analyses before investment decisions are made. It is often difficult to project the success of current investments without the technical evaluation and assessments contained in an IDR. Specifically, the purpose of an IDR is to develop a comprehensive strategy to guide investments in a particular discipline or issue area. IDRs typically include a discussion of the problem to be addressed, the relevant regulations, the current state of the science and associated practices, technology alternatives including existing and emerging options, gaps in the knowledge base and recommendations for future actions. The following is a list of the IDRs and studies that the NESDI program has sponsored since FY07:

1. **Beneficial Use of Navy Dredge Sediment.**

This IDR provides an overview of the types and scope of Navy dredging activities, along with current disposal practices, and a technology assessment of practices that would increase the beneficial use of these dredge sediments. Some of the recommendations include evaluating available beneficial reuse technologies for navigational dredge sediments, such as desalinating, addition of organic amendments and use of phytoremediation for making clean landscape top soil. Other recommendations include improved management strategies for dredge data; UXO exclusion techniques; improved Confined Disposal Facility design; and regionalized treatment facilities—all which would aid in the overall management strategy of dredged sediment.

2. **Anti-Fouling Oil Booms.** The purpose of this IDR was to compare and contrast industry and Navy practices of permanent oil boom use and maintenance to determine the appropriateness of Navy investments. The study indicates that the Navy may be able to save significant amounts of money by:

- a. Reducing the quantity of permanent boom deployed,
- b. Maintaining a more rigorous and comprehensive maintenance schedule, and
- c. Developing an inherently antifouling permanent boom assembly.

3. **Climate Change.**

Beginning in 2008, the NESDI program sponsored a research initiative that, in addition to summarizing the climate change effects that are expected to occur in the next century, also provides an assessment of the likely impacts on naval infrastructure and operations. The Climate Change IDR identifies gaps in knowledge specific to the influence of climate change on Navy shore operations and physical facilities and infrastructure and also provides descriptions of evolving technologies designed to help limit and/or adapt to climate change. Greenhouse gas emissions, already identified as contributing factors to climate change, must be inventoried so that appropriate reduction strategies may be implemented.

4. **Shipyards Environmental Sustainability: Collection and Review of Naval Shipyards Water Program Environmental Needs.**

This IDR identifies current challenges in maintaining naval shipyard environmental compliance and productivity, documents various needs that were identified, defined and prioritized by shipyard personnel, and includes details on regulatory and performance drivers, suggested solutions and possible integration pathways.

For FY09, high priority shipyard environmental sustainability needs were submitted for NESDI program consideration based on documentation provided via this IDR. Subsequent proposal review and selection resulted in technology demonstration investments for dry dock floor advanced surface cleaning and underwater hull preservation in dry dock using motion assisted environmental enclosure technology. These investments aim to improve environmental compliance while increasing or maintaining current shipyard productivity.



5. **Plastic Waste Processor (PWP) Disk Recycling and Disposal.**

The ultimate objective of this IDR is to find suitable alternatives to the current Navy process of landfill disposal of PWP disks and develop partnerships with the private sector to receive and process PWP disks into useful feedstock for manufactured products or fuel in waste-to-energy conversion systems. Currently, PWP disks offloaded at Naval Station Norfolk, along with all combustible solid waste generated by the naval station, shipyard and surrounding communities, are transferred to a refuse derived fuel plant and then thermally processed at an adjacent power plant as part of a regional waste-to-energy system. Comparable practices on the west coast are not yet economically viable based on the volume of disks generated onboard Navy ships.
6. **Enhanced Mobile Industrial Surface Cleaning.**

The purpose of this IDR is to identify industrial, shoreside applications that need enhanced mobile surface cleaning to ensure safe mission operations, human health and safety and environmental compliance.
7. **Pier Side Underwater Ship Husbandry Waste Reduction.**

This IDR will help to determine the efficacy of reducing the shoreside impact of waste generated from underwater ship husbandry operations and identify technology demonstration/validation and integration opportunities that will help sustain the long term environmental viability of these critical, pierside fleet readiness operations.
8. **Environmental Effects of Underwater Ordnance.**

This IDR and subsequent studies gathered available scientific information associated with the effects of underwater ordnance with specific emphasis on defining munitions constituents, identifying possible environmental fate, determining munitions constituents toxicity and/or bioaccumulation potential to marine organisms, delineating exposure scenarios and quantifying the underwater risk from both leave-in-place and blow-in-place management options.
9. **Long Term Disposition of Seafloor Cables.**

The results of this study will provide the Navy a scientific basis for making sound decisions for either the abandonment-in-place or retrieval of seafloor cables when they reach the end of their useful life. Laboratory studies coupled with modeling will document the potential for leaching of contaminants of concern over time in the marine environment. Limited field measurements of the biota established on an abandoned communication cable off the Southern California coast will be analyzed, along with controlled laboratory studies of retrieved specimens of the same cable. The study results will also help the Navy obtain permits for new cable installations.
10. **Laser System Usage.**

The NESDI program sponsored a study entitled, *Laser System Usage in the Marine Environment: Applications and Environmental Considerations* to provide the scientifically defensible technical data needed to develop Navy-wide environmental policies for performing Environmental Impact Statements with laser activity in marine environments. The Navy uses and is continuing to develop laser technology applied in an underwater marine environment for use in communication, surveillance and mine detection. As new technologies are transferred to the fleet through the acquisition process, it is necessary to identify and mitigate environmental, safety, and occupational health risks associated with the emerging systems.

## ACCOMPLISHMENTS

### Technology Integration

For the NESDI program, technology integration means making sure that technologies and other products and services developed by the program are eventually incorporated into the daily operations of the Fleet. To promote this focus on technology integration, the NESDI program has developed and promulgated the following requirements as part of its technology integration philosophy. A NESDI-sponsored project is successfully integrated once the following requirements have been met:

- The technology has been validated by the user community.
- An acquisition agent has been identified and funding has been planned for and is in place for the integration.
- The technology has been accepted by the stakeholders.
- Customer satisfaction has been assessed and documented.
- A marketing strategy is in place.
- An implementation plan and schedule are in place.
- Sufficient support infrastructure is in place.
- A training plan has been developed and Fleet personnel have been trained on the use of the new technology.
- The use of the technology has been implemented (regardless of pathway).
- Commercialization is available (if no acquisition agent exists).
- A formal change has been recognized by the SYSCOMs and the Fleet.
- The former technology has been replaced or eliminated.
- Benefit metrics have been re-assessed and validated.
- The technology has been made available through the supply/procurement system.

***These requirements have been posted on the program's web site and communicated with program personnel including Principal Investigators and other personnel charged with technology integration mandates.***

In addition to establishing a culture that promotes technology integration and successfully integrating projects in the hands of the end users, the NESDI program has also:

- Constructed an automated tool, called the Technology Integration Planning tool, to guide project managers through the technology integration process,
- Placed emphasis on projects that are more likely to be integrated, and
- Required Principal Investigators to document their technology integration efforts in their semiannual briefs to the NESDI program manager.



## Made In-Roads Into the Range Community

In FY09, the program dedicated more time and energy to engage a number of different FWGs that represent the various environmental subject matter experts across the Navy including the Range Sustainability Group and other working groups with related mandates. Through these interactions, the program gains insights into the operation of the Navy's ranges, their outstanding challenges and solutions the NESDI program may provide to address those challenges. In addition, the NESDI program held its August 2009 IPR in Norfolk, VA to reach its customers in the Atlantic Fleet range community.

The program continued to tap the expertise assembled in the various Media Field Teams. These subject matter experts are in touch with the challenges being faced by the various media program managers across the Navy including air, water and other media-based programs. Over the course of FY09, more and more members of the various Media Field Teams were involved in the NESDI program helping to expand the submittal of needs from across the Fleet.

## Began to Understand Climate Change Impacts on the Navy Shore Community

The NESDI program also did its part in FY09 to gain an understanding of the potential impacts of global climate change on the future operations of the Navy. Beginning in 2008, the NESDI program sponsored a research initiative that, in addition to summarizing the climate change effects that are expected to occur in the next century, also provides an assessment of the likely impacts on naval infrastructure and operations. The resultant IDR, published in 2009 and entitled *Assessing Climate Change-Related Impacts on U.S. Navy Installations*, identifies gaps in our knowledge specific to the influence of climate change on Navy shore operations and physical facilities and infrastructure and also provides descriptions of evolving technologies designed to help limit and/or adapt to climate change.

The results contained in this IDR will also aid in the cooperative development of a comprehensive Navy RDT&E climate change investment strategy in FY10. In addition, SPAWAR personnel are developing analytic methods for assessing impacts of local mean sea level rise and associated phenomena on two U.S. military installations in the southwest.

## **Toward Safer Water, Fewer Violations: Projects Aim to Improve Drinking Water Quality**

The NESDI program has funded two important projects dealing with water safety over the last three years—Potable Water Quality Management and Demonstration of Real-Time Drinking Water Quality Monitoring Technologies.

### **Potable Water Quality Management**

Water quality management is all about creating the right balance. Disinfecting drinking water is necessary to remove potential contaminants—but the same chemicals that remove contaminants in drinking water can produce carcinogenic by-products.

Addressing this issue, the U.S. Environmental Protection Agency (EPA) Stage 1 Disinfectants and Disinfection By-products Rule went into effect in 2004. An amendment to the Safe Drinking Water Act

(SDWA), this rule required new standards to balance the risks between microbial pathogens and disinfection by-products.

In Fiscal Year (FY) 2004, Navy installations received 14 SDWA Notices of Violation (NOV)—a dramatic increase from the three received in FY 2003 and the two in FY 2002. Maintaining drinking water quality in compliance with regulations can be a complex business, and Navy installations need more information on available tools to ensure that compliance is sustained.

To help ensure compliance, the Naval Facilities Engineering Command (NAVFAC) Water Media Field team identified the need for a guidance document for distribution to water management personnel worldwide.



*Water quality monitoring equipment panel installed at Pleasant Valley site, Naval Base Ventura County.*



The NESDI program responded by sponsoring the development of a guidance document that contains examples of actual problems and solutions as identified by a survey of Navy water systems. It addresses topics such as unidirectional flushing—the process of flushing out sediment that accumulates in the pipes—as well as disinfection strategies, system monitoring practices, and potential upgrades to drinking water treatment and distribution systems. *The Potable Water Quality Management Guidance Document* (UG-2077-ENV) discusses available technology solutions, and includes a preliminary literature-based evaluation for several promising technologies. The finished document was distributed Navy-wide for use by drinking water program managers in the fall of 2007. It is available in hardcopy and in a user-friendly interactive CD from the NAVFAC Engineering Service Center (ESC).

#### **Demonstration of Real-time Drinking Water Quality Monitoring Technologies**

There are many factors that contribute to drinking water safety, but the single most effective way to mitigate water contamination issues is to detect contamination early enough to allow for a timely response. To that end, a one-year demonstration project of continuous and real-time water quality monitoring technologies was begun at the NAVFAC ESC at Naval Base Ventura County in Port Hueneme, CA.

The program is aimed at preventing water quality compliance issues as well as improving water system security.

A Government Accounting Office (GAO) study (GAO-04-29) identified drinking water distribution systems as the most vulnerable among various components of water systems due to their large

number of access points, ease of access and the difficulty in detecting contaminants.

Contamination of water systems may be caused by natural events (e.g. earthquakes), unintentional acts (e.g. spills, cross connections), or intentional acts (e.g. sabotage), all of which threaten mission readiness and the well-being of Navy personnel and their families living or working on military installations. The current practice for water quality compliance is to manually collect samples for laboratory analysis on a weekly or quarterly basis. This practice does not allow water system staff adequate time to respond to changes in water quality and may also miss many poor water quality events occurring outside “normal” sampling events. For overseas bases, the analysis turnaround time is even longer and the quality of the local water supply is less reliable. A continuous and real-time water contamination detection system coupled with automated notification can help safeguard against abnormal water quality.

To date, the majority of Navy water utilities have not implemented a real-time monitoring strategy due to a lack of proven technologies as well as the associated high costs. The current demonstration project aims to provide managers with a cost-effective version of this technology. Estimated investment costs for a system are \$60,000 for hardware and \$30,000 for fabrication and installation. Operation of the system involves quarterly calibrations and weekly system check out. Technical support (\$5,000 to \$15,000 annually) from vendors is also recommended.

The project team completed field installation of two systems in June 2009 and started a one-year demonstration. An interim report will be issued in early 2010 and will provide the performance data necessary to help naval field activities with their system procurement decisions.

## ACCOMPLISHMENTS

### Improved the Efficiency of the Program

As part of its ongoing quest to improve the efficiency with which the program is executed, NESDI program personnel dedicated time and energy to the following efforts:

- **Enhanced the Program Web Site.**

After unveiling the program's consolidated web site in FY06, program personnel enhanced the functions required to execute the program throughout FY09. The program web site ([www.nesdi.navy.mil](http://www.nesdi.navy.mil)) provides a single, centralized repository for information pertaining to the management of the program and execution of program-sponsored projects. This web site promotes more efficient management of program information and more timely communication of critical deadlines and other information to key program personnel across the Navy. The web site also allows personnel from other R&D programs to have up-to-date insights into the NESDI program's priorities. It's simple, efficient and provides site visitors with quick access to program resources and information. The following specific updates to the program web site were made in FY09:

1. *Incorporated a sponsor approval process for needs and full proposals.*  
After a need or full proposal has been validated by the program's management team, the web site is now used to collect final approval or disapproval from the sponsor along with any associated comments.
2. *Implemented a Quality Assurance (Q/A) function for full proposals and projects.*  
This function improves the quality of data in conjunction with reducing the workload on team members. The process examines all data elements and provides pass/fail results with explanations. An automated email is available to management members that attaches the Q/A report and sends the results to the project lead for action.
3. *Developed user guides.*  
A number of user guides were developed in an effort to improve participant understanding of the program and web site functionality. The guides explain each component of the program's yearly cycle with instructions on how to accomplish associated tasks via the web site.
4. *Implemented an action item tracker to better manage assigned tasks.*  
Management members can create and assign action items for specific needs, proposals, or projects as well as broader management categories such as communication and financial tasks. An automated email is available to remind members of their assigned action items if they are either overdue or due in a week.



- **Executed Program Schedule and Associated Submission Deadlines.**

For the third year in a row, a critical portion of the NESDI program was executed electronically via the program’s web site including the following tasks:

1. The NESDI program manager developed, documented and promulgated the annual program schedule a year in advance.
2. Fleet personnel submitted their needs on the same schedule using the same template following the same process.
3. The TDWG evaluated and ranked Fleet needs then requested sponsor approval of highly-ranked needs.
4. Personnel submitted their preliminary project proposals following the same format and schedule.
5. The TDWG evaluated and ranked the preliminary project proposals.
6. Personnel submitted their full project proposals.
7. The TDWG evaluated and ranked full project proposals.

- **Compiled and Analyzed Program and Project History Data.**

Over the course of the past four years, the NESDI program has assembled a substantial archive of the program’s history of funded projects. The analysis of these archive data has enabled program management personnel to:

1. Determine which organizations have submitted needs to the program so that program personnel can encourage submittals from its priority customers,
2. Ensure that needs deemed to be high priority by the program are addressed by the program, and
3. Validate that program investments are concentrated in the program’s priority investment areas—range sustainment and ship-to-shore interface.

- **Investigate Other Options to Increase Program Efficiency.**

In addition, NESDI program personnel are investigating other methods and mechanisms to increase the efficiency with which the program is executed in FY10, including electronic meeting surrogates to minimize the travel burden on program support personnel and other electronic tools (including additional enhancements to the program’s web site) to enhance program efficiency.

## ACCOMPLISHMENTS

### Expanded the Collection of Needs & Proposals

In FY09, the NESDI program expanded the collection of needs and proposals to include more representation from the Fleet and resulted in the following 12 highly-ranked needs—all in the Regulatory and Base Operations (EEC-5) investment area:

#### High Priority Fleet Needs

No.	Reference	Need	Description
1.	N-0663-09	<b><i>Chemical Safety— Environmental Management System—Enterprise</i></b>	Investigate the availability and capability of software packages that could be used by the Navy for managing and reporting enterprise-wide hazardous materials information.
2.	N-0659-09	<b><i>Beneficial Use of Dredged Sediments</i></b>	Investigate the beneficial use of dredged sediments that will allow for the diversion of sediments from disposal sites to uses/applications such as wetland creation and enhancement, beach nourishment, construction fill, agricultural use and a variety of other uses.
3.	N-0654-09	<b><i>Evaluation of In-Situ Toxicity Testing in Developing Risk- Based Clean-Up Goals at Environmental Restoration Sites</i></b>	Develop site-specific, risk-based clean-up goals during the refinement stages of a Baseline Ecological Risk Assessment to comply with Navy policy and guidance.
4.	N-0653-09	<b><i>Application Of Multi-Incremental Sampling (MIS) During Ecological Toxicity Testing to Establish Site-Specific Clean-Up Goals at Environmental Restoration Sites</i></b>	Determine if MIS protocols, a form of composting and sample manipulation resulting in one sample being provided to the chemical laboratory, are applicable to contaminants other than explosive residues and/or sampling objectives as part of an Ecological Risk Assessment.
5.	N-0641-09	<b><i>Test and Validation of Best Management Practices (BMP) for Use in Total Maximum Daily Load Compliance</i></b>	Assess, test and validate BMPs that might be implemented to reduce contaminant loading of water bodies on many Navy bases listed as impaired on the CWA Section 303(d) list.
6.	N-0640-09	<b><i>MS4 Compliant Storm Drain Inlet High Surface Area Filter</i></b>	Develop an inexpensive storm drain inlet filter media, based upon a high surface area filter, to capture fine zinc and copper particulates from stormwater.
7.	N-0632-09	<b><i>Strategic Environmental Sustainability Assessment of Navy Regions</i></b>	Develop the tools and techniques to enable a consistent, standardized system for measuring, tracking and reporting of installation environmental sustainable accomplishments and metrics.



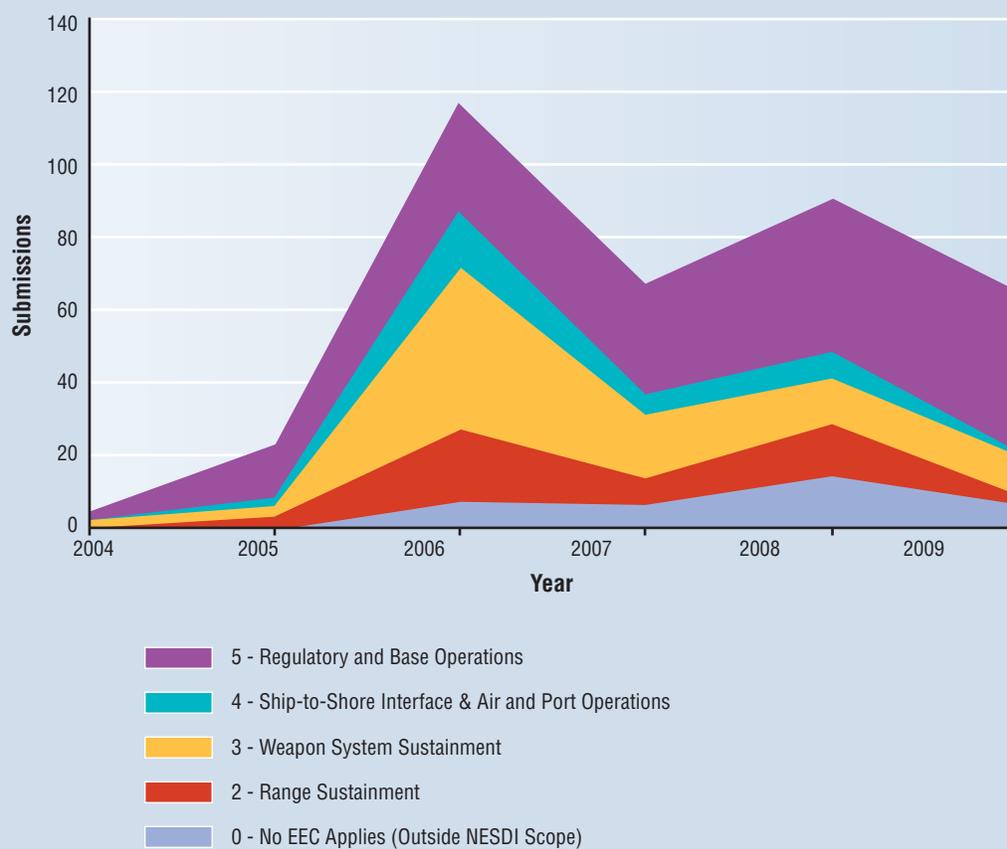
No.	Reference	Need	Description
8.	N-0610-09	<b><i>Climate Change Risk Assessment Initiative</i></b>	<p>Develop and update planner and designer tools (checklists and risk assessment methodologies) to incorporate climate change issues into long-term management practices.</p> <p>Collect and evaluate a diverse range of data to assess and predict impacts to global climate change as it relates to communities in general and Navy bases and facilities in particular.</p>
9.	N-0609-09	<b><i>Climate Change Adaptation Initiative</i></b>	<p>Develop adaptation technologies to help Navy installations and commands cope with the impacts of climate change such as sea level rise, increased storm surges, saltwater intrusion, increased frequency and magnitude of climate extremes including temperature (heat waves, extreme cold and snow/ice), precipitation (drought, floods), wildfires and diminished resources such as fresh water and energy.</p>
10.	N-0606-09	<b><i>Climate Change Mitigation Initiative</i></b>	<p>Find innovative ways to reduce petroleum consumption, reduce greenhouse gas emissions and improve energy efficiency to comply with Executive Order 13423.</p>
11.	N-0603-09	<b><i>Multi-trophic Level Toxicity Test</i></b>	<p>Find more cost-effective and feasible methods for routine, laboratory testing of the transfer of contaminants in higher trophic level organisms.</p>
12.	N-0599-09	<b><i>Demonstration and Evaluation of Low Impact Development Technologies &amp; Best Management Practices</i></b>	<p>Demonstrate additional stormwater management strategies that will enable Navy managers involved in any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet to use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the pre-development hydrology of the property with regard to the temperature, rate, volume and duration of stormwater flow.</p>

***It should be noted that the process generated far more needs than the program can financially support. NESDI increasingly relies on the leveraging of efforts to meet the needs of our community. In addition, some areas of the program do not always meet the community's need with a technically proficient solution in the current year. Those needs are reconsidered by the NESDI program in the following fiscal years as funding allows.***

## ACCOMPLISHMENTS

**FY09 showed an increased in the needs collected in EEC-5.  
Almost half (44 percent) of the needs collected this year fell under this classification.**

**Needs by EEC and Year**





## Leveraged Resources & Expertise of Other Technology Demonstration Programs

In FY09, the NESDI program continued to build on successful partnerships with other environmental 6.4 programs to leverage resources and expertise. NESDI program-initiated projects that have joint service application are forwarded to the Strategic Environmental Research and Development Program (SERDP), the Environmental Security Technology Certification Program (ESTCP), and the Joint Group on Pollution Prevention (JG-PP). This ensures that each Service has identified the technical criteria for the solution that will be used to evaluate the execution of the project. The result is to eliminate duplicative efforts and maximize the integration of technologies across the Services.

Wherever possible, the NESDI program reached into its user community and other program sponsors to leverage project resources appropriately. The results of these efforts were impressive in FY09, with a total cost sharing of nearly \$2.1 million (for additional details, see the following table). This is a testament to the ongoing need for and urgency of the program's investments.

### NESDI Program & Leveraged Funding (2008 and 2009)

EEC	2008 NESDI Funding	2008 Leveraged Funding	2009 NESDI Funding	2009 Leveraged Funding
2: Range Sustainment	1110.0	268.0	610.0	345.0
3: Weapon System Sustainment	1514.4	1398.7	1115.7	273.5
4: Ship-to-Shore Interface & Air and Port Operations	1037.4	0.0	466.3	0.0
5: Regulatory and Base Operations	2370.0	584.0	2125.0	1431.0
<b>YEAR TOTAL</b>	<b>6031.8</b>	<b>2250.7</b>	<b>4317.0</b>	<b>2049.5</b>
<b>GRAND TOTAL (2008 &amp; 2009)</b>		<b>8282.5</b>		<b>6366.5</b>

*in thousands of dollars*

## Assessing the Effects of Unexploded Ordnance on the Marine Environment: NESDI Studies Collect Body of Evidence

Warfare and training exercises over the past few decades have left unexploded munitions in the world's oceans and waterways. In 2002, the NESDI program initiated studies of the potential toxicity, degradation and bioaccumulation of these materials in the marine environment.

The goal of this project is to determine whether the Navy's approach to leaving unexploded munitions in place is sound and justifiable. The scientific team focused on areas where current and past operations may have left explosives along shorelines, at coastal sea ranges and within rivers, harbors and estuaries. The project team set out to answer four main questions:

1. What is the fate of explosives leaking from unexploded ordnance on marine food chains?
2. What concentrations of explosives in the water cause toxic effects in marine invertebrates and fish?

3. Are explosive compounds accumulated in invertebrates transferred to fish and therefore potentially available to human consumers?
4. What is the fate of explosives when associated with different types of sediments?

A variety of studies were conducted between 2003 and 2009 to help answer these questions. Levels of the explosives trinitrotoluene (TNT), cyclotrimethylenetrinitramine (RDX) and cyclotetramethylenetetranitramine (HMX) were studied in bottom-feeding fish, invertebrate organisms that live in or near sediments and the sediment itself. All species were U.S. Environmental Protection Agency (EPA) -approved for toxicology research. In order to characterize effects, the researchers used higher levels of the explosive compounds than would generally



*Toxicity testing chambers containing benthic invertebrates, seawater and munitions constituents mixed in sediment.*

All photos by Gunther Rosen.



*Researchers studied the effects of explosive chemicals on juvenile fish, mussels and benthic invertebrates.*

be found in the natural environment, resulting in higher than realistic environmental exposure levels.

The data generated by these studies have been and continue to be presented in a number of peer reviewed publications. These studies suggest that TNT, RDX and HMX present a low ecological risk under expected exposure scenarios in the marine environment. This conclusion is substantiated by a large body of data illustrating that these chemicals typically undergo extensive degradation upon contact with water and marine sediment, and that relatively high concentrations of these chemicals would be required to produce toxic effects. These chemicals also have a low propensity to bioaccumulate in marine life, and have virtually no potential for transfer from invertebrates to fish; meaning a very low likelihood of exposure to humans via the food chain. NESDI-funded toxicity and bioaccumulation studies have exhibited consistently similar results using a variety of species, including benthic (bottom-feeding) and pelagic (those that live higher in the water column) invertebrates and fish.

To date, these NESDI studies have been used as a resource by the Agency for Toxic Substances and Disease Registry in a response to a request by the Northern Mariana Islands Commonwealth to conduct a study of the effect of underwater ordnance on pelagic fish. The Agency cited the data collected through the project to conclude that “Pelagic fish caught in open waters are not likely to contain high levels of explosive residues and will not pose an imminent public health hazard to people who eat them.” Citing existing research instead of conducting a new study saved the Navy \$300,000 to \$400,000.

## Study Results Published in Scientific Literature

The research results from this NESDI project resulted in the following published articles in a number of scientific journals:

1. Rosen, G. and Lotufo, G. (2007). “Bioaccumulation of explosive compounds in the marine mussel, *Mytilus galloprovincialis*,” *Ecotoxicology and Environmental Safety* 68:228-236.
2. Rosen, G. and Lotufo, G. (2007). “Toxicity of explosive compounds to the marine mussel, *Mytilus galloprovincialis*, in aqueous exposures,” *Ecotoxicology and Environmental Safety* 68:237-245.
3. Yost, S. L., Brannon, J. M., Pennington, J. C., and Hayes, C. A. (2006). “Environmental process descriptors for TNT, TNT-related compounds and picric acid in marine sediments,” *Marine Pollution Bulletin* 54:1262-1266.
4. Lotufo, G.R. and Lydy, M. J. (2005). “Comparative toxicokinetics of explosive compounds in sheepshead minnows,” *Archives of Environmental Contamination and Toxicology* 49: 206–214.
5. Rosen, G. and Lotufo G.R. (2005). “Toxicity and fate of two munitions constituents in spiked sediment exposures to marine amphipod *Eohaustorius estuaries*,” *Environmental Toxicology and Chemistry* 24:2887-2897.
6. Brannon, J. M., Price, C. B., Yost, S. L., Hayes, C., and Porter, B. (2005). “Comparison of environmental fate and transport process descriptors of explosives in saline and freshwater systems,” *Marine Pollution Bulletin* 50:247-252.

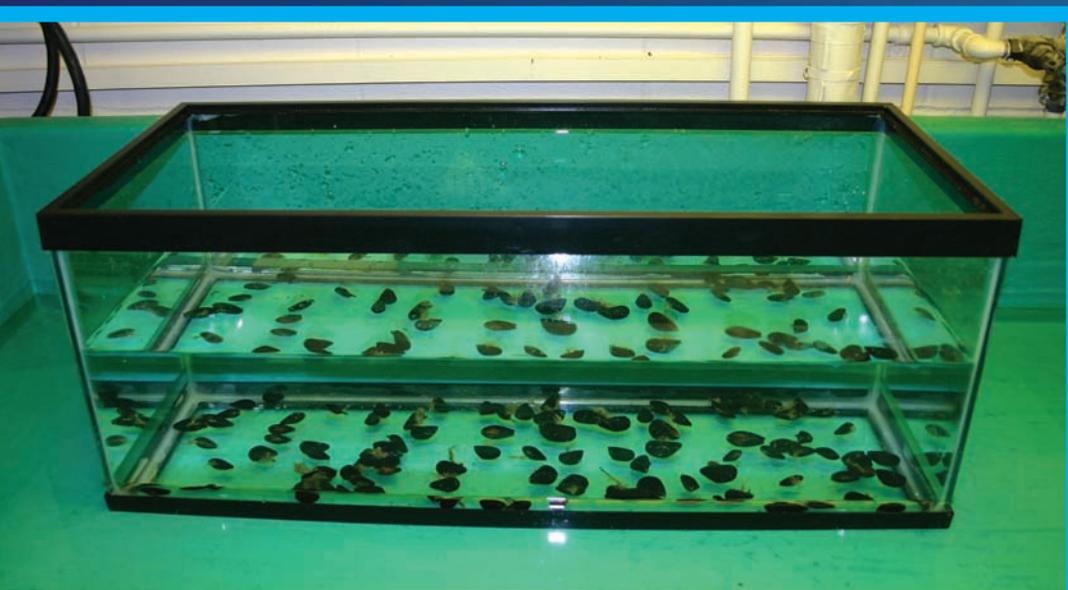
## CASE STUDY:

## Toxicity & Bioaccumulation of Munitions Constituents in the Marine Environment

At the island of Vieques (a former Navy firing and bombing range in Puerto Rico), the results of these studies may assist in addressing the regulatory concerns associated with underwater military munitions. The studies' conclusions that there are low ecological and human health risks associated with exposure to underwater munitions sites may be used to reduce environmental and public health regulatory concerns associated with underwater Munitions Response Program (MRP) sites.

Data from the project are also being used in research funded by the Department of Defense's Strategic Environmental Research and Development Program to develop models designed to help determine the fate and transport of munitions constituents in the marine environment.

The compilation of laboratory and field data should eventually allow the Navy to use the results of these studies to support regulatory compliance at other underwater munitions sites. By demonstrating that there are few if any associated ecological risks, the Navy may be able to leave in place unexploded ordnance if they do not pose an explosive safety risk. This may also reduce the costs of underwater site investigations. Priorities can then be focused on potential explosive safety and minimizing associated risks. Until then, the Navy will continue to support investigation of scientific efforts relating to munitions contaminants in the marine environment.



*Tank containing mussels exposed to TNT in seawater.*



## ACCOMPLISHMENTS

The 14 projects in the next table account for the \$2,049,500 collected by NESDI program personnel in FY09 for leveraged efforts:

### NESDI Projects That Received Leveraged Funding in FY09

No.	Title	Leveraged Funding Received in FY09
1.	<i>Improved Assessment Strategies for Vapor Intrusion</i>	750.0
2.	<i>Containment and Long-Term Monitoring Strategies for Contaminated Sediment Management</i>	265.0
3.	<i>Mitigation of Underwater UXO Blow-in-Place Explosions</i>	260.0
4.	<i>Predictive Trajectory Model for Oil Spills for Navy Harbors</i>	200.0
5.	<i>Pollutant Source Tracking</i>	156.0
6.	<i>Nanocrystalline Cobalt Phosphorous Electroplating as a Hard Chrome Alternative</i>	145.0
7.	<i>Powder Coating Removal Technologies</i>	65.0
8.	<i>Operational Range Clearance</i>	60.0
9.	<i>Bio-based Hydraulic and Metal Working Fluids</i>	40.0
10.	<i>Abiotic In Situ Treatment of 1,2,3-Trichloropropane to Protect Drinking Water Resources</i>	40.0
11.	<i>Direct-Push and Point-and-Detect, In Situ Sensors for Perchlorate</i>	25.0
12.	<i>Navy Aircraft Deactivation, Demilitarization, and Disposal Assessment</i>	20.0
13.	<i>Low Temperature Powder Coating</i>	13.0
14.	<i>Cadmium Alternatives Navy Specific Testing</i>	10.5
<b>TOTAL</b>		<b>2049.5</b>

*in thousands of dollars*

Collaborations with these other programs help to support the ongoing success of a number of the NESDI program's own projects. For example, the NESDI projects in the table on the next page have obtained leveraged funds in FY10 from ESTCP to expand the reach of their technologies outside the Navy. With an investment of \$475,000, the NESDI program was able to leverage over four million dollars in support from ESTCP. These numbers do not include in-kind support and other resources that may have been provided. These ESTCP projects allow NESDI program personnel to participate in a number of strategic initiatives that they would not otherwise have the opportunity to influence.

## ACCOMPLISHMENTS

### ESTCP Projects That Will Receive NESDI Program Funding in FY10

No.	Title	Description	FY10 ESTCP Funding	FY10 NESDI Funding
1.	<b><i>Smart Water Conservation Systems for Irrigated Landscapes</i></b>	<p>This project will demonstrate and validate the retrofitting of existing landscape irrigation systems with smart water conservation systems that reduce the costs of water used for landscape irrigation and that can more efficiently irrigate the landscape surrounding DoD buildings. In particular, this project will demonstrate an integrated suite of commercially available smart water conservation technologies for irrigated landscapes (turf and low-water ground cover). Specific technologies that will be tested include:</p> <ol style="list-style-type: none"> <li>1. Advanced evapotranspiration irrigation controllers;</li> <li>2. Centralized and site-specific sensor inputs (rain, ambient temperature, soil moisture, leak detection);</li> <li>3. Efficient water delivery systems (drip systems, bubblers, micro sprayers); and</li> <li>4. Rooftop rainwater and Heating, Ventilation and Air Conditioning system water condensate harvesting systems to displace potable water consumption for irrigation.</li> </ol>	570	50
2.	<b><i>Water Conservation: Tertiary Treatment &amp; Recycling of Waste Water</i></b>	<p>This project will demonstrate and validate an innovative on-site wetland-based wastewater treatment system that produces non-potable water from gray water. The system can also be used in a stand-alone configuration for the tertiary treatment of black water or as an add-on to a conventional sewage treatment plant. In either case, the treated water can be used for irrigation, toilet flushing, industrial wash water and/or groundwater recharge. The technology mimics processes that occur naturally in wetlands. However, sensors linked to computer controls enhance natural biological processes in a controlled environment and reduce the treatment time in an aesthetically pleasing package. The treatment system is easily scaled and can operate as a stand-alone system or be integrated into a larger water treatment and reuse system.</p>	1135	210



No.	Title	Description	FY10 ESTCP Funding	FY10 NESDI Funding
3.	<b><i>Concentrated Solar Air Conditioning for Buildings</i></b>	This project will demonstrate and evaluate a solar air conditioning system that includes a parabolic solar energy collection system linked to a dual effect absorption chiller. The integrated solar collection system demonstrates a renewable energy technology that will help DoD meet its energy goals while reducing its greenhouse gas footprint. Small scale parabolic trough-concentrated solar power collectors integrated with dual effect absorption chillers provide a renewable energy based source of air conditioning. Tying parabolic collectors to dual effect absorption chillers is a new application of two proven technologies.	1383	25
4.	<b><i>Evaluation of Resuspension from Propeller Wash, Dredging and Extreme Storm Events in DoD Harbors</i></b>	This project will demonstrate and validate innovative methods to quantify the resuspension and recontamination potential of contaminated sediments affected by propeller wash and utilize the validated methods to evaluate and quantify the resulting effects from propeller wash on the effectiveness and stability of sediment capping. In particular, this project will evaluate the relative potential for re-migration and re-contamination from propeller wash-induced resuspension versus resuspension from dredging and storm events.	359	150
5.	<b><i>Methodology for Assessing the Impact of Sea Level Rise on Representative Military Installations in the Southwestern United States</i></b>	This project is developing analytic methods for assessing impacts of local mean sea level rise and associated phenomena on two U.S. military installations in the southwest. The project will result in an analysis framework for determining military installation vulnerabilities under joint scenarios for four specified increases in local mean sea level and other regional-specific climate responses as projected over the next century. This will allow for the use of this framework for assessing the potential vulnerabilities of any coastal military installation in the southwestern United States.	840	40
<b>TOTALS</b> <i>in thousands of dollars</i>			<b>4,287</b>	<b>475</b>

**Acid Waste Treatment Technology.**

*This project resulted in the integration of a pier side system for the recycling, reuse and management of acid and heavy metal wastewater generated from shipboard seawater heat exchanger pipe flushing operations that meet local sanitary sewer discharge limits. A prototype field test was conducted at Naval Air Station North Island in San Diego, CA. A final turn-key system is planned for implementation at Puget Sound Naval Shipyard in Seattle, WA.*





## METRICS

The NESDI program assesses its progress using performance metrics in the following three areas:

### 1. Project Execution.

These metrics capture the degree to which the NESDI program effectively executes individual projects.

- a. Fleet Needs. The number of needs collected from the Fleet each year. (In FY09, 66 needs from Fleet operational personnel and acquisition community members were collected.)
- b. Address High Priority Needs. The number of needs ranked as “high priority” by program personnel each year. (In FY09, the program identified 12 high priority Fleet operational needs. The FY10 project new starts address some of those high priority needs.)
- c. Performance-Based Evaluation. Each project is evaluated based on cost, schedule and performance to determine how efficiently individual projects are executed. Projects are adjusted based on regular evaluations conducted by program personnel. (The NESDI program sponsored three annual program reviews in FY09 to reevaluate project cost, schedule and performance objectives.)

### 2. Technology Integration.

This metric deals with the program’s ability to effectively integrate technologies into Navy operations. Project buy-in is obtained from end users, approval authorities and procurement stakeholders prior to project funding. Integration objectives are reviewed and approved by the TDWG at the onset of each project (a “go/no-go” decision). No project is funded until objectives are approved. Integration objectives and accomplishments were reviewed semi-annually. Products integrated are evaluated again after one year to:

- a. Ensure that goals are met,
- b. Address unanticipated barriers, and
- c. Update associated Return on Investment (ROI)/cost avoidance numbers.

### 3. Cost/Environmental/Operational Benefit.

These metrics pertain to the benefit achieved by the Navy through the integration of innovative products and services and fall into three categories:

- a. Cost avoidance,
- b. Current and future regulatory compliance status, and
- c. Increased Fleet readiness.

In this area, the NESDI program is tracking the following indicators:

- User ROI/cost avoidance (greater than 2.5),
- Quantified environmental benefits,
- Reduced emissions and/or waste generated,
- Reduced environmental liability,
- Informed decision-making,
- Reduced worker exposure,
- Reduced cost of compliance,
- Reduced Notice of Violations,
- Quantified operational readiness benefits,
- Reduced operation & maintenance costs,
- Reduced maintenance time,
- Reduced turn around time, and
- Program management costs.

## Chemicals on the Hit List: Hazardous Chemical Lists Major Step Toward DoD-wide Elimination

Reducing or eliminating prohibited and controlled chemicals is an ongoing effort in all branches of the military. But because of the large number of hazardous chemicals required in day-to-day maintenance operations, acquisition program offices are often unsure of which chemicals to focus on first. In an effort to provide guidance on this issue, the Naval Sea Systems Command (NAVSEA) turned to the NESDI program for financial support and guidance, and the Naval Surface Warfare Center (NSWC) Carderock for technical assistance in creating a standard chemical avoidance list for new acquisition programs—the Prohibited and Controlled Chemical List (PCCL). Through the use of one standardized, comprehensive list, the Navy will be better able to achieve its goal of 50 percent hazardous material usage reduction, as specified in Executive Orders (EO) 13148 and 13423.

The PCCL is generated through a computer algorithm using specific health, safety and environmental regulatory impact factors weighted by hazard severity. The most recent environmental regulations, safety and occupational health standards, as well as anticipated legislation are considered. A prioritization strategy is devised to manipulate the universe of chemicals, and each chemical is assigned a composite, quantitative value.

Throughout the ongoing development process, NSWC Carderock has coordinated its activities with NAVSEA stakeholders, industrial hygiene professionals and technical warrant holders to obtain concurrence on the selection criteria, prioritization methodology, and implementation of the PCCL. Upon completion of the prioritized chemical list, the next phase of the project is an implementation strategy which will include new guidance (see NAVSEA Letter 5090 Ser 04R/138 dated 26 November 2008).

The final phase of this NESDI-sponsored initiative involves using the list to identify hazardous materials used in new weapon systems platform acquisition and to guide future research and development (R&D) investments.

The PCCL will serve as a baseline for future hazardous materials avoidance across Navy activities. The list will help facilitate compliance with EOs 13148 and 13423, as well as environmental, safety and occupational health regulations and restrictions. Use of the list will also help lower hazardous material lifecycle costs for Navy weapon systems. (Cost benefits derived from the implementation of the PCCL are estimated on a case-by-case basis.)

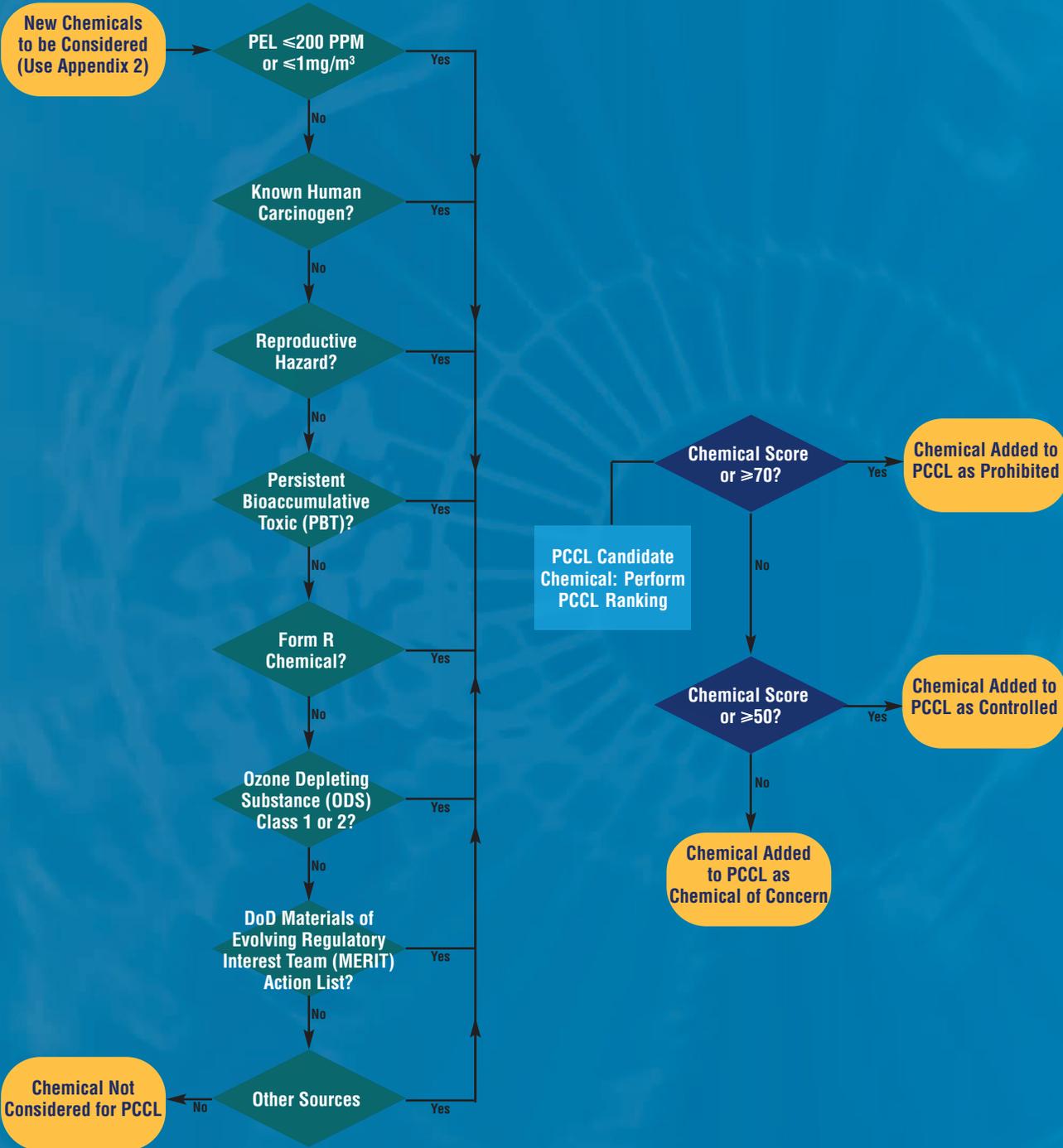
The baseline PCCL was completed in 2006. It is being utilized by several current NAVSEA acquisition programs including:

1. **The Anti-Torpedo Torpedo Defense System (ATTDS),**
2. **The Common Missile Compartment (a joint project with the British Royal Navy),**
3. **The Joint High Speed Vessel (JHSV), and**
4. **The Maritime Prepositioning Force (Future) (MPF(F)).**

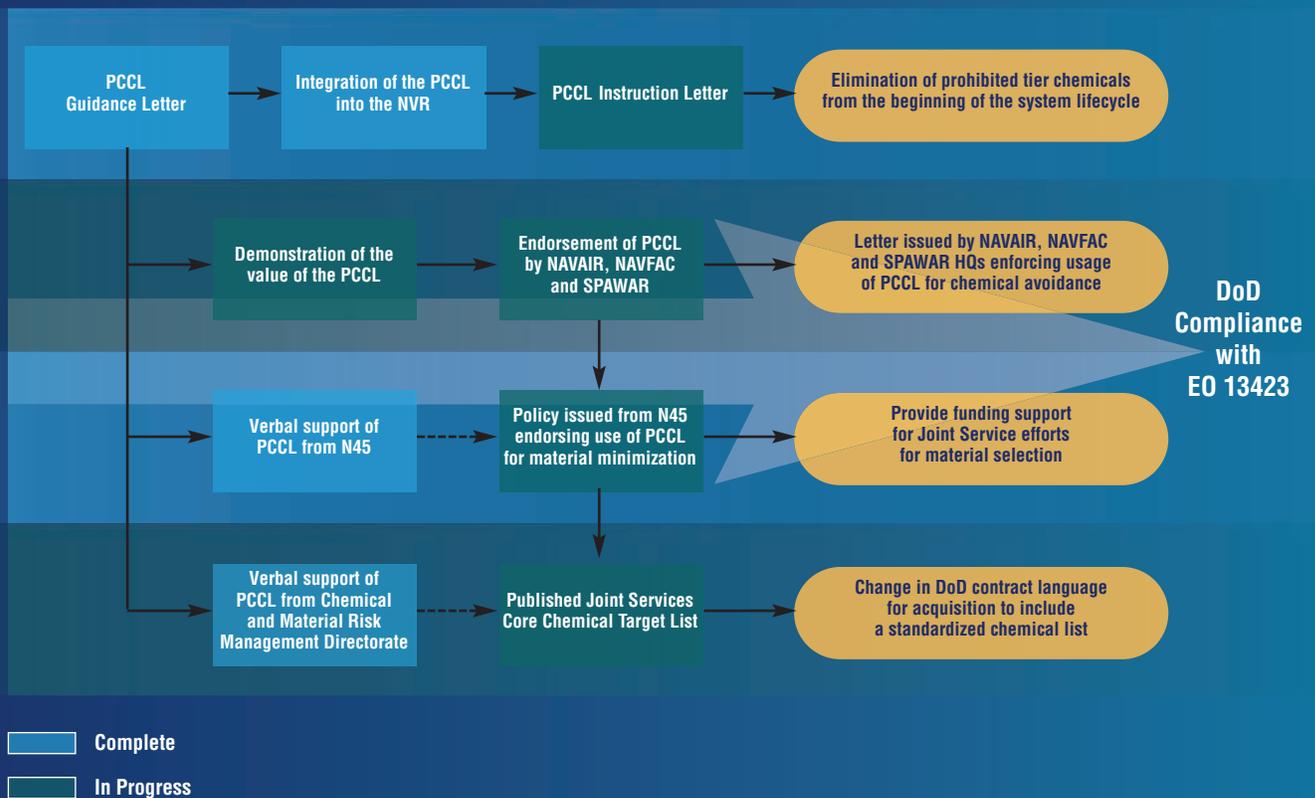
It is also projected to be used in future acquisition programs such as CG(X) (the Next Generation Cruiser program). The PCCL will also be integrated into the 2010 Naval Vessel Rules. The list continues to be shared with personnel from other Navy commands such as the Naval Air Systems Command, the Space and Naval Warfare Command and the Naval Facilities Engineering Command as well as the other Department of Defense (DoD) services and contractors for their utilization.



### PCCL Flowchart



**PCCL Implementation Across DoD**



NAVSEA has also created a focused subset of chemicals specific to future research and development—the NAVSEA Target Chemical List (NAVSEA TCL). It is expected that both the PCCL and NAVSEA TCL will drive future R&D efforts in reducing and eliminating hazardous materials, such as those targeted chemicals on the NAVSEA TCL identified by the Joint Service Solvent Substitution Working Group. Both lists are to be disseminated to other Navy Commands for consideration and implementation throughout DoD.

Going forward, a new training course is being developed for new DoD acquisition program managers on chemical prioritization and elimination, featuring the PCCL. Both lists need to be updated intermittently as changing regulations demand, and as chemical evaluations continue.



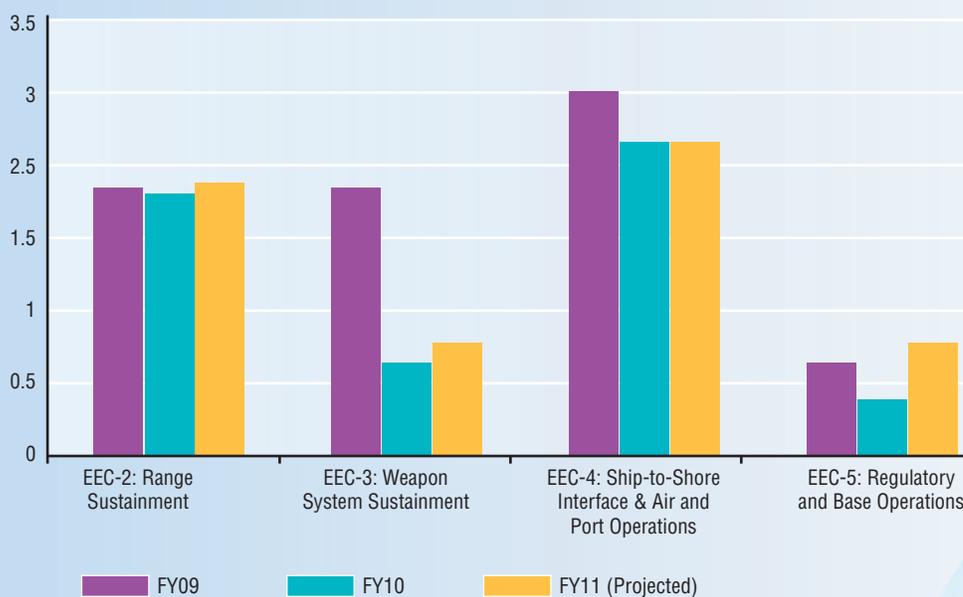
## FINANCIAL REVIEW

The NESDI program has prioritized investments in various EECs based on their potential risk to the Navy mission. The NESDI program has aligned its investment portfolio based on priority, urgency and operational requirement. The table below highlights the approximate breakdown of program investments by EEC.

### NESDI Program Funding (by EEC)

EEC	Name	FY09	FY10	FY11 (Projected)
EEC-2	Range Sustainment	2.115	2.081	2.181
EEC-3	Weapon System Sustainment	2.104	0.787	0.848
EEC-4	Ship-to-Shore Interface & Air and Port Operations	2.896	2.475	2.486
EEC-5	Regulatory and Base Operations	0.723	0.418	0.872
<b>TOTAL</b>		<b>7.838</b>	<b>5.761</b>	<b>6.387</b>

*in millions of dollars*



### THE ROAD AHEAD: PLANS FOR FY10 & BEYOND

In FY10, the NESDI program will face the challenges associated with significant budget cuts and increasing technology gaps. Therefore, the efficient and effective application of program resources and personnel will be even more critical in FY10. To this end, program personnel will complete a series of strategic plans in several focus areas (including climate change and range sustainability) in an effort to target program resources and personnel in areas of greatest need. Program efforts in FY10 will be concentrated in the following three areas:

**1. Expand Outreach Efforts to the Fleet.**

In FY10, the NESDI program will redouble its outreach efforts to the Fleet to:

- a. Coordinate the collection of requirements especially those requirements that pertain to the ongoing successful management of the Navy's operational and training ranges,
- b. Support the integration of the program's innovative technologies into the hands of Fleet artisans, and
- c. Incorporate perspectives from Fleet users into the planning and execution of individual NESDI projects to ensure a more complete integration of those projects.

Many of these objectives will be accomplished by increasing Fleet participation via direct interaction with a designated TDWG member at selected key venues throughout the year. In addition, users/stakeholders will be encouraged to participate at the program's annual IPRs.

**2. Assess Future Environmental Risks to the Navy's Operational and Training Capability.**

In FY10, the NESDI program will continue to dedicate resources to identify and assess the potential impacts of environmental requirements on the Navy's operational and training ranges, as well as its ports and harbors. Increased awareness in sustainable solutions will be a necessity.

**3. Concentrate on Project Completion and Integration.**

In FY10, the NESDI program will:

- a. Implement accountability factors into its business processes to ensure that projects are completed in a timely fashion and within designated budgets,
- b. Conduct the financial analyses necessary to capture the return that the program is achieving on its investments,
- c. Better understand the potential and realized benefits of program-sponsored projects,
- d. Determine the appropriate pathways and resources required to ensure that projects are successfully integrated,
- e. Enhance the program's various planning, execution and reporting functions to guarantee a better return on program investments, and
- f. Develop an investment strategy that promotes the rapid turnaround of solutions to the field using leveraged funding from other existing projects and programs.



No.	Organization
-----	--------------

- |     |   |
|-----|---|
| 1.  | Fleet Forces Command, Range Complex Support Team                          |
| 2.  | Fleet Industrial Supply Center Puget Sound                                |
| 3.  | Fleet Readiness Center South  |
| 4.  | Fleet Readiness Center Southeast  |
| 5.  | Fleet Readiness Center Southwest  |
| 6.  | Naval Air Engineering Station Lakehurst, NJ                               |
| 7.  | Naval Air Station Jacksonville, FL  |
| 8.  | Naval Air Station Whidbey Island, WA                                      |
| 9.  | Naval Air Systems Command, Design Interface and Maintenance Planning      |
| 10. | Naval Air Warfare Center—Aircraft Division Lakehurst, NJ                  |
| 11. | Naval Air Warfare Center—Aircraft Division Patuxent River, MD             |
| 12. | Naval Air Warfare Center—Weapons Division China Lake, CA                  |
| 13. | Naval Base Kitsap Bangor, WA  |
| 14. | Naval Facilities Engineering Command                                      |
| 15. | Naval Facilities Engineering Command Atlantic                             |
| 16. | Naval Facilities Engineering Command Engineering Field Division Southwest |
| 17. | Naval Facilities Engineering Command Environmental Compliance             |
| 18. | Naval Facilities Engineering Command Hawaii                               |
| 19. | Naval Facilities Engineering Command Headquarters                         |
| 20. | Naval Facilities Engineering Command Mid-Atlantic                         |
| 21. | Naval Facilities Engineering Command Northwest                            |
| 22. | Naval Facilities Engineering Command Pacific                              |
| 23. | Naval Facilities Engineering Command Southwest                            |
| 24. | Naval Facilities Engineering Service Center                               |
| 25. | Naval Sea Systems Command Contaminated Water Program                      |
| 26. | Naval Sea Systems Command Headquarters                                    |
| 27. | Naval Sea Systems Command Headquarters, Asset Management                  |
| 28. | Naval Sea Systems Command, Laboratory Quality Accreditation Office        |
| 29. | Naval Sea Systems Command, Salvage and Diving Operations                  |
| 30. | Naval Station Everett, WA   |
| 31. | Naval Surface Warfare Center Carderock, MD                                |
| 32. | Naval Undersea Warfare Center Newport, RI                                 |
| 33. | Navy Region Southwest   |
| 34. | Portsmouth Naval Shipyard   |
| 35. | Puget Sound Naval Shipyard & Industrial Maintenance Facility              |
| 36. | Ship Repair Facilities and Japan Regional Maintenance Center              |
| 37. | Space and Naval Warfare Systems Command, Systems Center—Pacific           |
| 38. | Submarine Base Kings Bay, GA  |
| 39. | Submarine Base San Diego, CA (Point Loma)                                 |
| 40. | University of California at Santa Barbara                                 |
| 41. | Virginia Class Program Office   |

### Organizations Participating in the NESDI Program

Over the years, a range of organizations from across the Navy and elsewhere have supported the NESDI program in one way or another.

In addition to the program's resource sponsor—the Chief of Naval Operations Environmental Readiness Division—personnel from the following organizations supported the program in FY09 by:

- Attending an IPR,
- Submitting or ranking a need,
- Submitting or ranking a pre- or full proposal,
- Contributing to the progress of the project,
- Providing ad hoc advice and guidance, and/or
- Logging onto the program's web site.

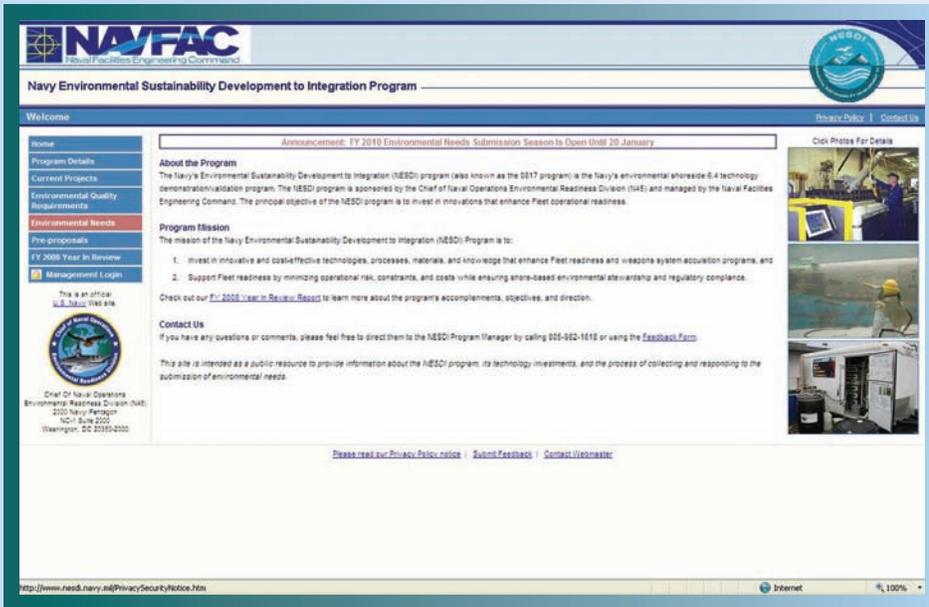
# FY10 SCHEDULE

WHAT	OCT	NOV	DEC	JAN	FEB	MAR	APR
Announce Needs Solicitation	16-OCT						
Review New Starts & Go/No Go Decisions					1-5 FEB		
Complete Needs Collection Process				20 JAN			
<b>EVALUATE NEEDS</b>					1-5 FEB		
Obtain Sponsor Approval					15-26 FEB		
Request Pre-proposals						2 MAR	
Close Pre-proposal Collection							13 APR
Collect Comments on Pre-proposals							
<b>EVALUATE PRE-PROPOSALS</b>							
Request Full Proposals							
Collect Full Proposals							
Comment on Full Proposals							
<b>EVALUATE FULL PROPOSALS</b>							
Obtain Sponsor Approval							
Announce New Starts							
Semi-Annual Status Reports	DUE: 9 OCT	REVIEW: 4 NOV					DUE: 13 APR
<b>IN-PROGRESS REVIEWS</b>							



MAY	JUNE	JULY	AUG	SEPT
11 MAY				
17-21 MAY				
26 MAY				
		13 JULY		
			13 AUG	
			16-20 AUG	
				13-24 SEPT
				27 SEPT
REVIEW AT IPR	REVIEW AT IPR			
WEST: 17-21 MAY (Port Hueneme)	EAST: 21 – 25 JUNE (Arlington)			

For up-to-date information about NESDI-sponsored R&D projects and to participate in the ongoing execution of the program and download an electronic copy (pdf) of this and previous Year in Review reports, visit the NESDI program web site at [www.nesdi.navy.mil](http://www.nesdi.navy.mil).



## FOR MORE INFORMATION

For more information about the operation of the NESDI program, contact Leslie Karr, the program manager, at 805-982-1618 (DSN: 551-1618) and [leslie.karr@navy.mil](mailto:leslie.karr@navy.mil). Members of the program's TDWG can be contacted at the following phone numbers and email addresses:

No.	Who	Command	Phone	Email
1.	Lynn Cahoon	NAVAIR	252-464-8141	<a href="mailto:albert.cahoon@navy.mil">albert.cahoon@navy.mil</a>
2.	Stacey Curtis	SPAWAR	619-553-5255	<a href="mailto:stacey.curtis@navy.mil">stacey.curtis@navy.mil</a>
3.	Jeff Heath	NAVFAC	805-982-1600	<a href="mailto:jeff.heath@navy.mil">jeff.heath@navy.mil</a>
4.	Bill Hertel	NAVSEA	301-227-5259	<a href="mailto:william.hertel@navy.mil">william.hertel@navy.mil</a>
5.	Leslie Karr (Chair)	NAVFAC	805-982-1618	<a href="mailto:leslie.karr@navy.mil">leslie.karr@navy.mil</a>
6.	Jerry Olen	SPAWAR	619-553-1443	<a href="mailto:jerry.olen@navy.mil">jerry.olen@navy.mil</a>
7.	Nick Paraskevas	NAVAIR	301-757-2140	<a href="mailto:nicholas.paraskevas@navy.mil">nicholas.paraskevas@navy.mil</a>
8.	Barbara Sugiyama	NAVFAC	805-982-1668	<a href="mailto:barbara.sugiyama@navy.mil">barbara.sugiyama@navy.mil</a>
9.	Cindy Webber	NAVAIR	760-939-2060	<a href="mailto:cynthia.webber@navy.mil">cynthia.webber@navy.mil</a>

Document preparation assistance and graphic design services were provided by Bruce McCaffrey Consulting, Inc. under General Services Administration contract number GS-10F-0375K.



Leslie Karr  
Naval Facilities Engineering Service Center  
1100 23rd Avenue (EV40)  
Port Hueneme, CA 93043



# A Year of Transition: 2009

Accomplishments of the Navy Environmental Sustainability  
Development to Integration Program in Fiscal Year 2009

