

NAVAL SEA SYSTEMS COMMAND

# ONWATCH 2010



KEEPING AMERICA'S NAVY #1 IN THE WORLD



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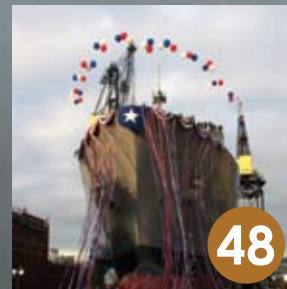
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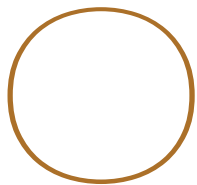




WELCOME!

WELCOME!

MORE THAN A YEAR AGO, THE NAVSEA TEAM EMBARKED ON AN AGGRESSIVE AGENDA FOR CHANGE, FOCUSED ON EXECUTING OUR TOP STRATEGIC BUSINESS PLAN GOALS—SUSTAINING OUR CURRENT FLEET, BUILDING AN AFFORDABLE FUTURE FLEET AND ENABLING OUR PEOPLE.



Our plan is fully aligned with SECNAV's and CNO's guidance and priorities. In this publication, I hope you will see some of the great work we've accomplished with our Fleet and industry partners in delivering state-of-the-art ships and weapons

systems for America's Navy.

In Sustaining our Current Fleet over the past year, our Naval Shipyards delivered four of five *Los Angeles*-class Docking Selected Restricted Availabilities (DSRAs) on time, with three delivered early. Historically, submarine DSRAs have been one of our toughest challenges. Additionally, our aircraft carrier availabilities continue to be delivered on, or ahead of schedule in the Naval Shipyards. We've also taken some major strides to improve the material condition of our surface Fleet with the stand up of Surface Ship Life Cycle Management (SSLCM) Activity, which was funded by new efficiencies generated through direct work reviews with our customers and definitized tasking methodology within our Warfare Centers. Additionally, we implemented a new initiative to perform detailed inspections of surface ships to identify maintenance required to achieve full service life. These efforts, com-

ined with realignment of the Navy's Regional Maintenance Centers into the NAVSEA team, will allow us to bring all aspects of the broader NAVSEA and industry engineering, programmatic and industrial capability and capacity together to maximize our combined contributions to sustaining today's Fleet today, tomorrow, and well into the future while optimizing the output from Navy's maintenance funding. I cannot overemphasize how much the Navy is counting on our leadership, ingenuity and willingness to change our processes for greater efficiency and effectiveness. Quite simply, the future of our 313-ship Navy depends on our ability to define and execute the right Fleet maintenance requirements within our funding constraints.

In building an Affordable Future Fleet, we've successfully streamlined procedures to engage NAVSEA engineers, industry, Pentagon leadership and the Fleet early on in the shipbuilding design and acquisition process. Of particular note, we have embarked on a comprehensive effort with the Supervisors of Shipbuilding, Conversion and Repair to focus on improved oversight of deckplate quality compliance and shipbuilding program oversight. Additionally, we've eliminated many cumbersome work practices, reviewed several speci-



fications in our shipbuilding requirements and set in place a structure that will allow us to make smarter investment decisions based on our risk versus reward assessment. This includes leaning forward to pilot and fast-track many initiatives to reduce the Navy's dependence on fossil fuels.

NAVSEA employees have made significant and substantial changes in support of our effort to reduce Total Ownership Costs (TOC) in shipbuilding and maintenance. We've eliminated 318,000 man-days of depot maintenance over the life-cycle of our *Virginia*-class submarines; eliminated more than 960,000 man-days of *Los Angeles*-class DSRA maintenance over the remainder of the class; fully implemented Rapid Cure Single Coat Paint on all ships, which greatly saves time and money with every application; and conducted trade studies on total life cycle costs of systems, including propulsion, ventilation, piping and berthing. We've also improved the upfront design process for new ship design to allow better cost-effective trade-offs early in the design process. With an increased focus on TOC, the Warfare Centers have identified 30 near-term TOC initiatives projected to save the Navy an estimated \$3.6 billion in life cycle savings and cost avoidances. Additionally, two warfare center teams were awarded the command's first TOC awards.

These initiatives provide REAL savings and were only possible by the creativity and drive of NAVSEA personnel looking at smarter ways to do business. In fact, based on these successes, we are incorporating a TOC performance objective for personnel across NAVSEA to focus attention on our individual responsibility to cut the cost of doing business. The status quo will not enable the 313-ship Navy. In 2010, we are committed

to continue to drive down the costs of our business.

In Enabling our People, we've expanded our workforce for the first time in more than a decade, particularly within our acquisition staff. We've also nearly completed the first round of Diversity Accountability Reviews, which establishes a baseline for measurable progress in hiring and promoting a diverse workforce. In 2009, we hired 84 Wounded Warriors—honoring our deep gratitude and respect for America's heroes who gave so much in the defense of all of us here at home. Our NAVSEA goal in 2010 is to become the Navy's leader in Wounded Warrior hiring.

The examples above, as well as the articles in this On Watch issue, highlight only a small portion of the great work accomplished recently. They also stand as solid foundation for our immediate focus areas in 2010. I invite you to learn about what NAVSEA engineers, scientists, divers, shipyard workers, technicians and support staff are doing to build and sustain a global force that protects the world 24/7. Whether you are a member of NAVSEA, the Navy, Industry, Congress or the American public, it is important to understand that NAVSEA is paving the way ahead in Keeping America's Navy #1 in the world!

KEVIN M. MCCOY  
VICE ADMIRAL, U.S. NAVY  
COMMANDER, NAVAL SEA SYSTEMS COMMAND

WELCOME!

WELCOME!

**WELCOME TO THE 2010 EDITION OF ON WATCH.** NAVSEA IS PROUD TO SHOWCASE OUR INVOLVEMENT IN MAINTAINING AND PROVIDING OUR NAVY WITH THE WORLD'S MOST CAPABLE SHIPS AND SYSTEMS.

The articles you will see in this edition are only a snapshot of our key programs—programs we're pursuing in our support of the CNO's objective of a 313-ship Navy.

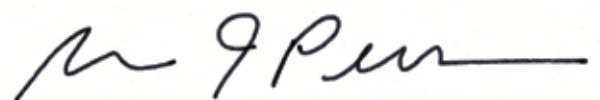
Our NAVSEA workforce is the linchpin to our ability to Sustain our Current Fleet and to Build an Affordable Future Fleet. To that end, we expanded our workforce in 2009 from 52,000 to 58,000, and with our NAVSEA field activities now at 40, this growth is no small task. This is why I am excited that we begin our adoption of the Navy's Enterprise Resource Planning this fall. This implementation certainly brings new opportunities to recognize the needs of our individual activities and our collective responsibility to create an environment that allows us to respond effectively to Fleet needs. At the same time, it also addresses the needs of our employees.

We have a strong core workforce of technical and scientific experts, and the key to our success in keeping NAVSEA as a relevant force for the 21st century is our ability to attract and retain the next generation of leaders at NAVSEA. In our section on people, you will see some great examples of our outreach efforts in action.

I am passionate about pursuing strategies that will help develop a sustainable corporate Talent Management environ-

ment that will allow us to identify the right people—both inside and outside NAVSEA—to help us meet our challenges. I look forward to implementing a command-wide, proactive approach that will ensure our ability to conduct coordinated outreach and recruiting efforts. This exciting transition will help us develop a more efficient structure to attract, acquire, develop and retain the people we need to complete our work efficiently. It is my goal to reinforce this foundational aspect of our organization—putting the right people in the right jobs—that will make us successful in 2010 and in the years to come.

I am pleased to share with you that we are on our way to opening more opportunities for career growth and providing a working environment that will broaden experiences and prepare our employees for higher-level duties. It is my privilege to lead the charge in making these changes possible, and together, we will meet the challenges ahead of us!



BRIAN PERSONS  
EXECUTIVE DIRECTOR  
NAVAL SEA SYSTEMS COMMAND

# MISSION

WE DEVELOP, DELIVER AND MAINTAIN SHIPS AND SYSTEMS ON TIME, ON COST FOR THE UNITED STATES NAVY

# VISION

WE ARE THE NATION'S TEAM ACCOUNTABLE FOR ACHIEVING THE 313-SHIP NAVY

- ▶ We must operate as a diverse organization with a single purpose to ensure the U.S. Navy remains the preeminent maritime power
- ▶ We must be supported by a modern, efficient industrial base
- ▶ We must be a world-class employer of choice that inspires innovation
- ▶ We must set the value-added standard for acquisition, engineering and maintenance


# GOALS

- ▶ Sustain our current Fleet efficiently and effectively
- ▶ Build an affordable future Fleet
- ▶ Enable our people:
  - ▶ Recruit, develop, and retain a high-performing, competency-based, mission-focused workforce
  - ▶ Transition to a competency-aligned organization
  - ▶ Build and value a culture of diversity



WARFARE  
CENTERS

# NAVSEA WARFARE CENTERS —DELIVERING RESULTS IN 2009



Robert Brown connects cables to a submarine antenna prior to testing in NUWC Newport's Tapered Anechoic Chamber. (U.S. Navy photo)



## IN SUPPORT OF VICE ADM. KEVIN MCCOY'S AGENDA FOR CHANGE, THE NAVSEA WARFARE CENTERS (WFCs) ARE "CENTERS OF EXCELLENCE" FOR SURFACE AND UNDERSEA WARFARE RESEARCH, DEVELOPMENT, TESTING, EVALUATION AND IN-SERVICE ENGINEERING.

First established in 1992, eight Naval Surface Warfare Center (NSWC) divisions and two Naval Undersea Warfare Center (NUWC) divisions provide full spectrum Fleet support to our 21st-century Navy and Marine Corps warfighters.

Approximately 19,000 scientists, engineers, technicians and support personnel, including more than 500 employees with Ph.D.s, maintain 133 specific technical capabilities. Technical authority provides scientific expertise in the understanding of complex engineering problems, delivering technical solutions, certifying technology as well as fostering innovation to maintain superior military capabilities. Of note, in FY09 WFC scientists and engineers were awarded 113 patents by the United States Patent and Trademark Office and filed 228 patent applications.

Partnering with Department of Defense (DoD) program offices, the Office of Naval Research, other government agencies, industry and academia, the WFCs not only are the primary stewards of the Navy's core engineering and technology expertise, but also perform work that industry partners will not do (due to profitability, liability); cannot do (specialized facilities, ensuring interoperability with different systems from different sources); or should not do (certification, technical authority). Additionally, the WFCs maintain unique national assets, such as test and evaluation ranges, shore facilities and laboratories that replicate "at-sea" systems.

Based on the Navy Working Capital Fund business model, the WFCs executed approximately \$5 billion of critical work in FY09. Additionally, with an increased focus on Total Ownership Costs (TOC), the Warfare Centers have identified 30 near-term TOC initiatives, projected to save the Navy an estimated \$3.6 billion in lifecycle savings and cost avoidances. This article highlights a few examples of how the WFCs provided direct Fleet support in 2009. With an increased focus on transparency, the synergy between the WFCs resulted in a year marked by many achievements in "Keeping America's Navy #1 in the World."

### Sustaining our Current Fleet

The WFCs made major contributions over the past year in sustaining our current Fleet, highlighted by NUWC Newport's response to the USS *Hartford's* (SSN 768) collision at sea. A team of engineers from NUWC Newport immediately deployed with several other NAVSEA experts to assess the damage and make repairs, enabling the submarine to safely return to the United States. Responding with little notice to



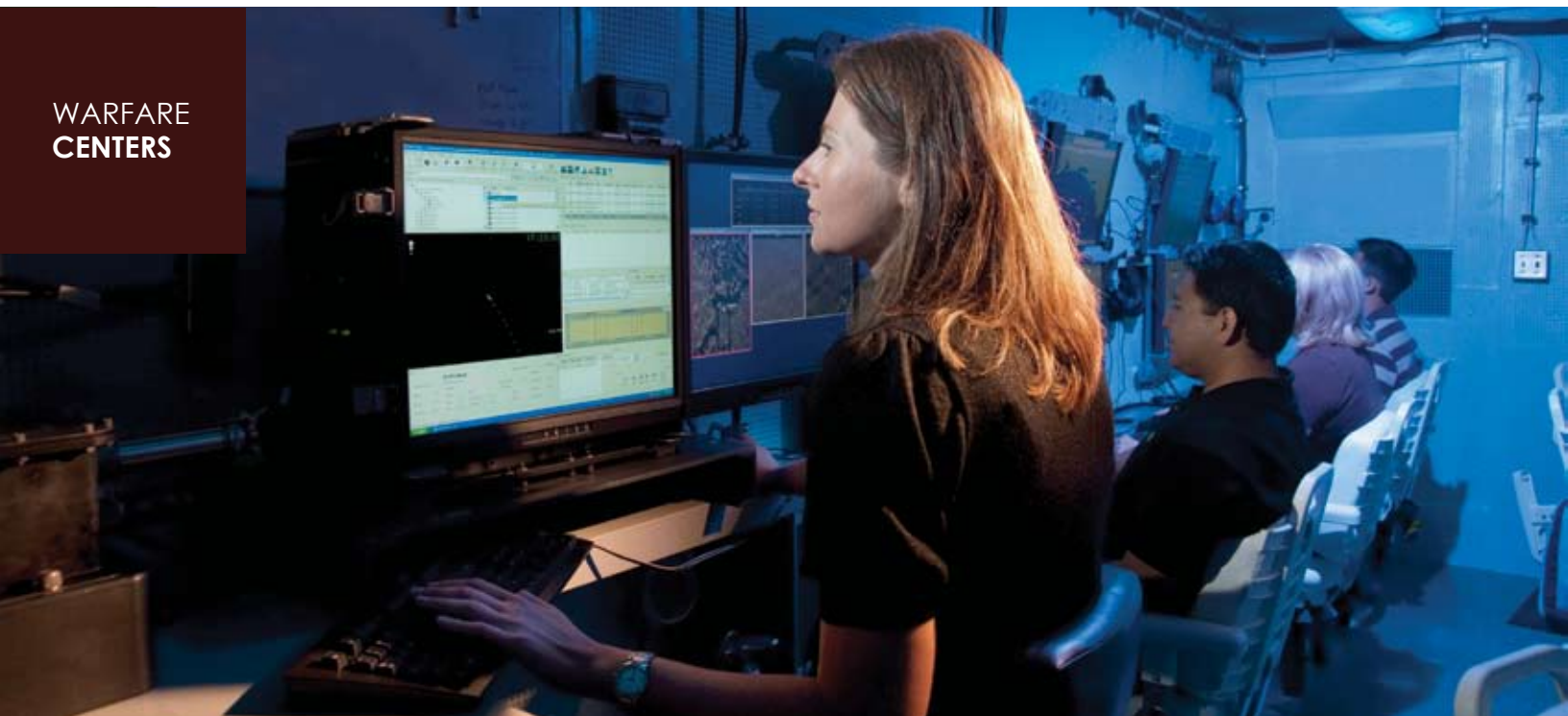
Sean McCready, NSWC Dahlgren software engineer, remotely controls the Navy Expeditionary Overwatch (NEO) unmanned surface vehicle sensor suite during a demonstration. (Photo courtesy of Northrop Grumman Corporation)

the U.S., they developed innovative technical solutions posed by *Hartford's* damaged sail and worked seamlessly to return the submarine safely. On the west coast, NUWC Keyport led the team that upgraded the combat system on the USS *San Francisco* (SSN 711) in San Diego. The modernization, which was delivered four days early, was the largest combat system upgrade conducted on site during a pierside Fleet maintenance period.

NUWC Keyport personnel also developed and delivered a Vertical Launch System Laser Cladding Repair System, which allowed for onsite, pierside repairs to help resolve difficult fleet maintenance issues. NUWC Keyport personnel performed the first laser repair on a *Los Angeles*-class submarine Vertical Launch System tube at Pearl Harbor Naval Shipyard in 2009.

NSWC Corona completed installation and training for the automated Metrology Bench Top, or MetBench, Calibration Management System aboard USS *Sterett* (DDG 104), marking the 100th ship installation. This innovative system now tracks more than 900,000 afloat assets and provides automated calibration capability for more than 370 unique model numbers aboard 127 surface ships. Significantly reducing the Fleet's workload, this system is estimated to save the Navy \$38.6 million by FY15.

## WARFARE CENTERS



Operating out of a Mission Package Portable Control System, Oana Underwood, tactics lead for minehunting systems at NSWC Panama City, performs post-mission analysis. (U.S. Navy photo by Dave Sussman)

### **Sustaining the Warfighter**

A combined Warfare Center team consisting of personnel from NUWC Newport and NSWC Panama City are supporting acquisition of an Integrated Swimmer Defense (ISD) capability. The Warfare Center ISD team is setting the stage for the acquisition of an end-to-end, detect-to-engage, anti-swimmer capability based on current commercial technology for delivery to Maritime Expeditionary Security Forces (MESF) in Spring 2010.

In 2009, NSWC Crane assumed Engineering Agent responsibility for the Counter Radio-Controlled Improvised Explosive Device (IED) Electronic Warfare 3.1 system, leading the implementation of CREW 3.1 from the systems' development to sustainment. CREW 3.1 is a dismantled, man-portable system that provides the warfighter with the latest electronic technology to defeat the deadliest threat our warfighters face in Iraq and Afghanistan. Similarly, NSWC Panama City celebrated the roll-out of the 500th Mine Roller, a third-generation countermeasures device designed to pre-detonate IEDs in the rugged terrain of Afghanistan.

NSWC Carderock and NSWC Crane partnered to install Counter Radio-Controlled IED (RCIED) systems aboard riverine assault boats (RABs) in Iraq, delivering six months early and directly impacting the safety of our warfighters patrolling waterways. NSWC Crane also delivered the High Mobility

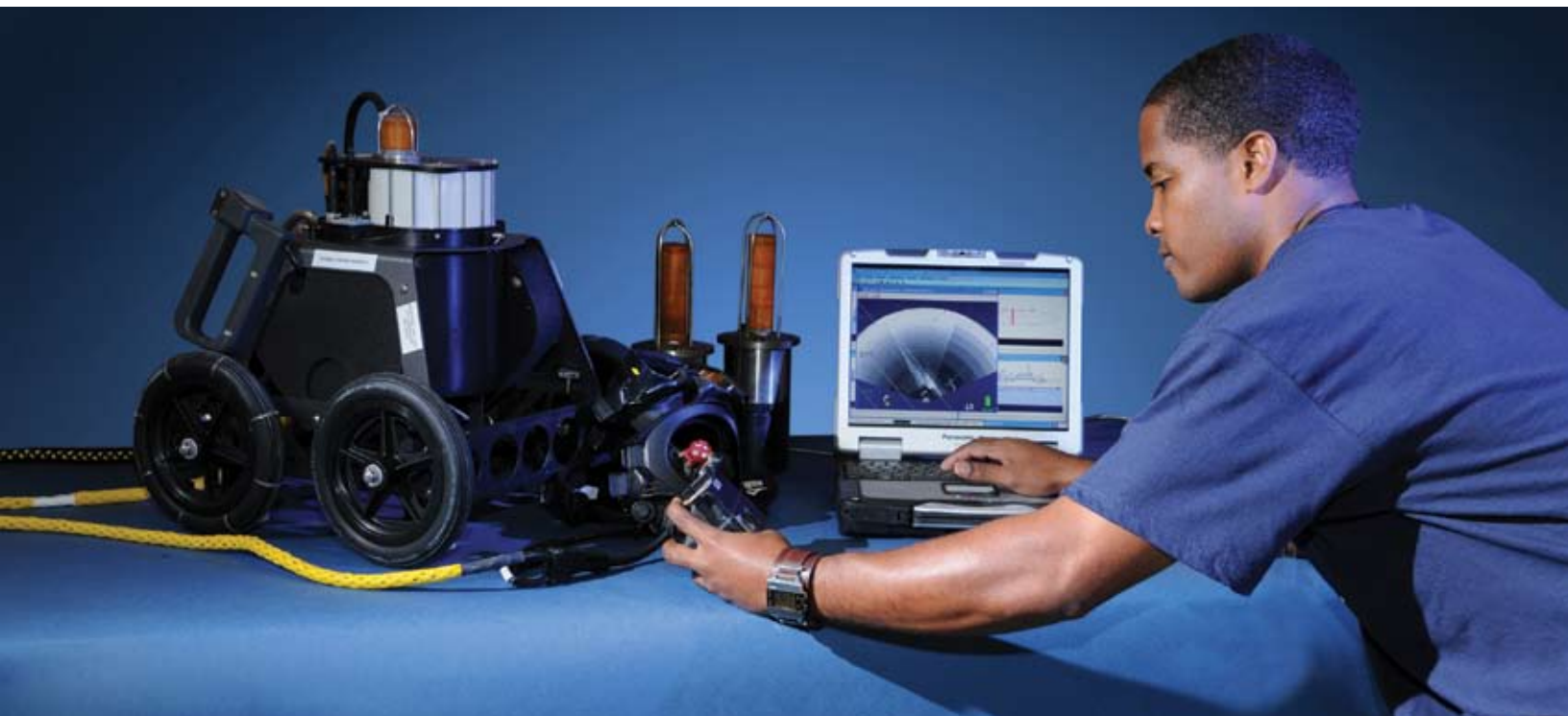
Multipurpose Wheeled Vehicle (HMMWV) Egress Assistance Trainer (HEAT) simulator at Eglin Air Force Base that provides our warfighters with safe and effective training should a HMMWV flip from an IED explosion or a driving mishap.

Naval Explosive Ordnance Disposal Technical Division (NAVEODTECHDIV) government civilian and contract personnel conducted 31 deployments to Iraq and Afghanistan in support of Combined Explosives Exploitation Cell (CEXC) operations. Additionally, NAVTECHDIV Technical Support Detachment CEXC Platoons 2 and 3 deployed to Afghanistan in direct support of *Operation Enduring Freedom* (OEF). NAVTECHDIV's expertise such as onsite incident and post-blast analysis of IED components and associated forensic material enables better understanding of the 'who, what, when, where and why,' of IED incidents. Subsequently, NAVTECHDIV is able to develop information and technologies to counter emerging threats and exploit evidence to identify bomb-maker signatures.

And finally, working with the Department of Homeland Security, NSWC Indian Head provided critical support in response to the terrorist threat on Christmas Day aboard Northwest Airlines Flight 253. Additionally, NSWC Indian Head provided expertise on Explosively Formed Penetrator IEDs to multiple government agencies and has manufactured over 14,000 test surrogate IEDs to date in support of vehicle armor development.

### **Sustaining our Great Green Fleet**

Aligned with the Navy's focus on energy efficiency and environmental stewardship, NSWC Carderock Ship Systems



NSWC Panama City mechanical engineer Blake Davis tests the Diver Hull Imagery Navigations System (DHINS), a hand-held unit used by Explosive Ordnance Disposal divers to effectively and efficiently sweep hulls for threats. DHINS is a prototype now entering into limited production phases. (U.S. Navy photo by Dave Sussman)

Engineering Station (SSES) engineers provided maintenance and crew training for the Auxiliary Propulsion System (APS) installed aboard USS *Makin Island* (LHD 8) which netted approximately \$2 million in fuel savings on the ship's maiden voyage. SSES also advanced research in Solid State Lighting, which utilizes Light Emitting Diode (LED) technology in an effort to reduce maintenance and improve efficiency. Similarly, NSWC Carderock engineers developed and tested the Ground Renewable Energy System prototype that provides warfighters in the field the capability of preserving the sun's energy to charge batteries, as well as operate radios, laptops and sensors.

NUWC Newport was selected as the Center of Excellence for marine species acoustic effects analyses by the Chief of Naval Operations' Environmental Readiness Division. NUWC Newport's modeling process will be the standard followed by all units for evaluating active acoustic events. NUWC Newport is also developing the next-generation software tool, called

Right: Navy officials perform the ribbon cutting for the Mission Package Support Facility grand opening on Oct. 16, 2009, at NSWC Port Hueneme. (U.S. Navy photo by Esthela McKenzie)

the Navy Exposure Model, which will provide the Navy with a single model for determining mammal density, distribution data and reporting metrics.

### Building an Affordable Future Fleet

In 2009, the Navy's Surface Warfare Enterprise (SWE) named Rear Adm. Jim Shannon its first Chief Technology Officer (CTO). Shannon, also the Commander of NSWC, serves the SWE by improving readiness in surface force warfighting technology. "I have the responsibility of leading the Navy workforce that develops, tests and evaluates all surface ship systems," said Shannon. "As the CTO, I am in the best





NSWC Corona mechanical engineer Alan Bond, right, and electrical engineer Mark Agnello, left back, work with a radio antenna mast as part of the Highly Transportable Land Mobile Radio (HT-LMR) system. The HT-LMR system provides U.S. Marines with temporary, transportable radio capabilities for post-disaster, infrastructure restoration and other missions. (U.S. Navy photo by Greg Vojtko)

position to advise the SWE on how we build and sustain the Navy's Fleet based on rapidly developing technology."

NUWC Newport assumed leadership of an assessment of the *Ohio*-class submarine replacement program's target strength requirements. The assessment will develop requirements to help reduce target strength signatures in the *Ohio*-class submarine replacement design.

#### WFC Contributions to LCS

The WFCs made some major contributions to the Littoral Combat Ship (LCS) program in 2009. NSWC Port Hueneme opened the doors of the LCS Mission Package Support Facility (MPSF), which serves as a central facility to store, deploy, upgrade and maintain the systems and elements that comprise LCS mission packages. As the primary responder for all sea-frame embarked mission packages, the MPSF will address afloat maintenance issues and provide technical support to the surface Fleet.

NSWC Panama City Division, the Technical Design Agent

for the Coastal Battlefield Reconnaissance and Analysis (COBRA) System, made a significant step forward in delivering viable 21st century mine detection capabilities for the LCS Mine Countermeasures Mission Package (MCM MP). COBRA passed its Milestone "C" decision in DoD's acquisition process, signifying that the design is mature enough to enter the production phase. Similarly, the first MCM MP successfully completed end-to-end testing during at-sea operations, validating the ability of the MCM MP Application Software to establish command and control, as well as enable operation of the Remote Minehunting System (RMS) and the MCM Unmanned Surface Vehicle.

Engineers from NSWC Dahlgren and Dam Neck demonstrated the Naval Expeditionary Overwatch (NEO) system combined with SeaLancet radios, the AN/SPQ-9B radar and the Integrated Combat Management System, resulting in several technological systems connected to provide an over-the-horizon threat detection capability. Considered to be a "systems-of-systems," NEO benefits Navy platforms including LCS with enhanced early warning capability.

Engineers from SSES Philadelphia successfully installed the first phase of a Condition-Based Maintenance Solution (CBMS) aboard LCS 1, that provides acquisition, processing, transmission and performance data for eight monitored Hull Mechanical and Engineering (HM&E) systems. CBMS allows our operators and maintenance managers to move from a time-based to condition-based maintenance program, which increases efficiency, reliability and safety.



NSWC Corona logistician Michael Syme and U.S. Marine Corps Cpl. Hismo Garza Jr. discuss the M240 weapons system at Camp Pendleton, Calif. (U.S. Navy photo by Greg Vojtko)

NSWC Port Hueneme's Louisville detachment and NSWC Dahlgren led the Structural Test Firing exercises for LCS 1 to ensure the weapons systems were properly installed and integrated with the hull structure. Additionally, Sailors from the first Surface Warfare (SUW) Mission Package detachment completed training at NSWC Dahlgren on the SUW Gun Mission Module, marking a key milestone in preparing LCS 1 for its maiden deployment in 2010.

NUWC Newport is developing the Anti-Submarine Warfare mission module for LCS's Unmanned Surface Vehicle (USV). To prepare for package implementation, testing was successfully conducted at NUWC Newport's Atlantic Undersea Test and Evaluation Center range, which included the remote operation of the USVs with Multi-static Off-Board Source, the USV Towed Array System, and the USV Dipping Sonar.

#### **Directed Energy—A Critical Game-Changing Technology**

NSWC Dahlgren engineers successfully tracked, engaged and destroyed five targets representative of an Unmanned Aerial Vehicle (UAV) with a laser fired through a beam director. The success of this effort validates the military utility of Directed Energy, and for further development and integration of increasingly more powerful lasers in the Navy's future Fleet.

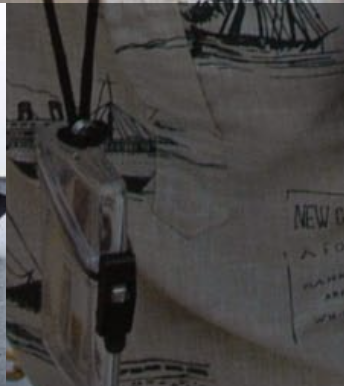
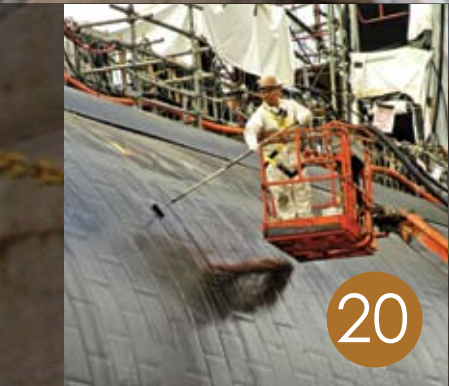
With the opening of the new Naval Directed Energy Center, WFC scientists and engineers will be better equipped to deliver this cutting-edge technology for the Navy's future Fleet.

Similarly, NSWC Crane assisted in the first successful test flight of the Large Aircraft Infrared Countermeasures system aboard a CH-53E *Super Stallion* helicopter. The advanced laser technology is designed to defeat threatening missile guidance systems by directing a high-intensity modulated laser beam into the missile threat without any action from the crew onboard.

These examples highlight only a small portion of the NAVSEA WFC's total contributions to building and sustaining the Navy's fleet in 2009. At the core of these accomplishments, the WFC engineers, scientists, technicians and support personnel remain committed to maintaining the superiority of our naval forces and ensuring the security of our nation. As the WFCs continue to pioneer naval research and development in the 21st century, the WFC leadership is committed to sustaining a highly-skilled workforce that reflects the diversity of our nation, and creates an environment that empowers each employee to reach their full potential.

"People are the Warfare Centers' most valuable resource, today and in the future. They are the Navy's technical intellectual capital, working closely with our warfighters to ensure mission success," said Rear Adm. Thomas Wears, Commander, NUWC. "Through innovation, technical authority, and in-service support of the Fleet, the WFCs continue to provide solutions for today's Navy and the Navy after next." ■

# SUSTAIN THE CURRENT FLEET





Shipwright supervisor Cyrus Ching sights in on a landmark to ensure USS Port Royal (CG 73) is properly aligned during undocking operations at Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility. (U.S. Navy photo by Marshall Fukuki)

# REDUCING TOTAL OWNERSHIP COSTS

ONE OF NAVSEA'S TOP PRIORITIES FOR 2009 AND BEYOND IS TO REDUCE TOTAL OWNERSHIP COSTS FOR THE U.S. NAVY'S SHIPS AND SYSTEMS. ON WATCH SPEAKS WITH **REAR ADM. THOMAS ECCLES**, NAVSEA'S CHIEF ENGINEER, TO LEARN MORE ABOUT TOTAL OWNERSHIP COSTS AND THE MEASURES BEING TAKEN TO REDUCE IT.

The Virginia-class attack submarine USS New Mexico (SSN 779) undergoes Bravo sea trials in the Atlantic Ocean. (Photo courtesy of Northrop Grumman Shipbuilding by Chris Oxley)



► **On Watch:** What is Total Ownership Cost (TOC) and why is reducing TOC important for NAVSEA?

► **Eccles:** Total Ownership Cost is essentially the cost of a weapons system or platform over its entire life cycle—this includes all costs associated with the research, development, procurement, operation and disposal. For most systems, this cost is projected out 30 to 60-plus years.

NAVSEA has been at the forefront of reducing TOC. In today's fiscal environment, every dollar invested in building the Navy of tomorrow needs to be spent effectively. As we introduce new ship classes, restart proven production lines and modernize our existing Fleet, we must concentrate on the true cost of ownership. For a typical ship program, more than 50 percent of the life cycle cost is in the operation and support phase of the program. So operational concepts should inform the design and integration of ship hull, weapons and communication systems, mission modules, manning and training plans, and infrastructure requirements. We must understand how these factors, individually and as a whole, impact the TOC of our Fleet.

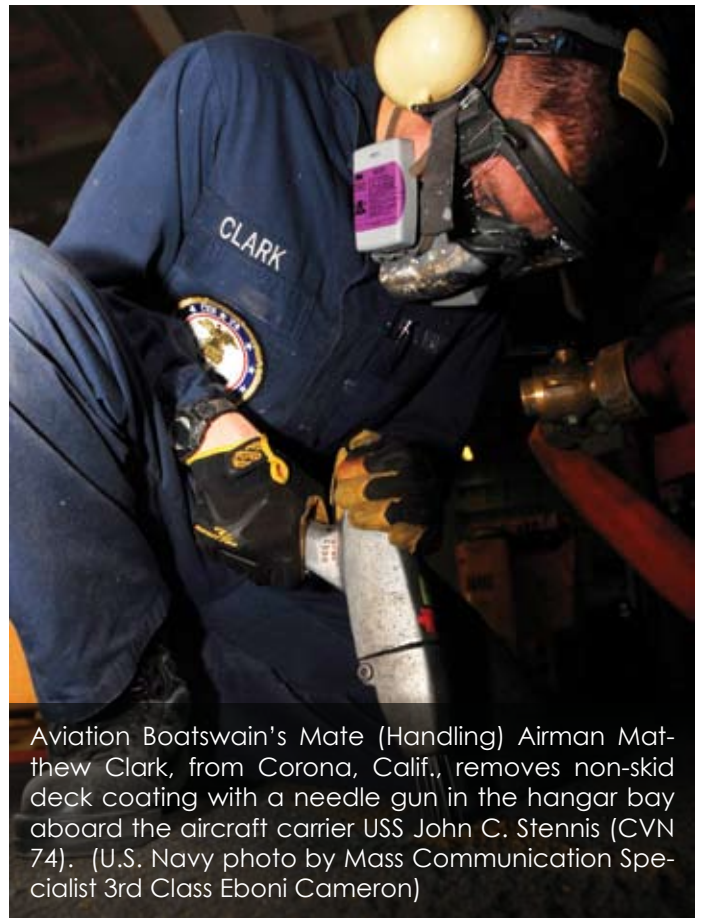
► **On Watch:** What are some examples of TOC initiatives that have been successfully implemented?

► **Eccles:** Let me give you just a few examples. The *Virginia*-class submarine program has already had great success and is a pilot program for the Vice Chief of Naval Operations' Reduction of Total Ownership Cost (RTOC) initiative. We are planning to build on the highly successfully Block III cost reduction methodology to garner further savings with the Block IV submarines. We've also completed an analysis of the class maintenance requirements and expanded the span between depot maintenance periods from 48 to 72 months. This will significantly reduce the time and costs associated with depot availabilities across the entire class.

Another example of a TOC initiative is the Document for Ship's Cost Reduction Program, where changes to specification requirements, such as changing specifications for motors, piping, welding, and shock requirements, are researched to determine if those changes will provide total cost reductions. NAVSEA is also looking at a new Main Propulsion Shaft Cover system that can be applied across various ship platforms. The new system is less cumbersome to apply, more environmentally friendly and has a service life of up to 15 years, a significant improvement from the old system's 10-year service life.

► **On Watch:** How does cost estimating fit into reducing TOC?

► **Eccles:** Decision makers at all levels are paying more attention paid to TOC estimates. In order to work within fund-



Aviation Boatswain's Mate (Handling) Airman Matthew Clark, from Corona, Calif., removes non-skid deck coating with a needle gun in the hangar bay aboard the aircraft carrier USS John C. Stennis (CVN 74). (U.S. Navy photo by Mass Communication Specialist 3rd Class Eboni Cameron)

ing constraints, the Navy needs to ensure that it can afford to not only acquire ship programs, but also operate and support them. To do this, NAVSEA develops life cycle cost estimates and updates and tracks them over the life of the program. These estimates are reviewed by the Milestone Decision Authority during each milestone of a program. In between milestone reviews, the Navy reviews and updates life cycle cost estimates to reflect actual costs and the most recent cost information. These estimates are a vital part of the Navy's acquisition milestone review process and provide Navy leadership with the information they need to decide if a system is affordable to the Navy.

► **On Watch:** How will NAVSEA address TOC in 2010?

► **Eccles:** NAVSEA is aggressively tackling TOC issues in 2010 and beyond. Most noticeably, NAVSEA is implementing a TOC objective for each employee. This is a first step in bringing culture change to the organization. NAVSEA also established a TOC Program Manager position to develop a continuous process for how we will manage TOC, focusing on culture change. The goal of the TOC program is to collect, consolidate and track all TOC initiatives in support of our directive to deliver savings to the Fleet. We took directive very seriously, and we are moving forward. ■

SUSTAIN THE  
CURRENT FLEET

The amphibious transport dock ship USS Denver (LPD 9) moors in a dry-dock at SSK Shipyard in Sasebo, Japan. (U.S. Navy photo by Mass Communication Specialist 3rd Class Casey H. Kyhl)

# IMPROVING SURFACE SHIP MATERIAL CONDITION

SEVENTY PERCENT OF THE NAVY'S FUTURE FLEET IS ALREADY IN SERVICE TODAY. FROM CRUISERS, DESTROYERS AND AMPHIBIOUS SHIPS, TO SUBMARINES AND AIRCRAFT CARRIERS, EACH SHIP CLASS MUST REACH ITS EXPECTED SERVICE LIFE OF IN ORDER FOR THE NAVY'S 313-SHIP PLAN TO BECOME REALITY.

In 2009, the Navy made significant strides in improving the way it manages the maintenance and modernization of its surface force. **Rear Adm. Jim McManamon**, NAVSEA's deputy commander for surface warfare, talks about the strides made in 2009 in surface ship maintenance and modernization.

► **On Watch:** The first step in ensuring ships reach their projected service lives is understanding the baseline material condition of the ships in general. How is NAVSEA gathering this information?

► **McManamon:** In partnership with the American Bureau of Shipping, NAVSEA conducted surface ship life cycle assessment pilot studies on four different ships representing four ship classes—*Arleigh Burke*-class guided-missile destroyers, *Ticonderoga*-class guided-missile cruisers, *Oliver Hazard Perry*-class guided-missile frigates and *Whidbey Island*-class dock landing ships. The surveys focused on items that impact the life cycle of the ship, such as hull thickness and distributed systems. The data will ultimately be a critical part of the Integrated Class Maintenance Plans for each surface ship class, which will serve as requirements for robust, forward-looking maintenance of the surface force.

► **On Watch:** NAVSEA stood up the new Surface Ship Life Cycle Management, or SSLCM, Activity May 8 in Portsmouth, Va. Can you tell us more about this new organization and what its role will be in the maintenance of the surface fleet?

► **McManamon:** SSLCM Activity will ensure that ships are in the shape they need to be in order to reach their projected service life. Partnering with U.S. Fleet Forces Command, SSLCM engineers and technical experts are developing life cycle strategies to address system upgrades, and fully implement the Integrated Class Maintenance Plan into each surface ship's maintenance schedule and availability planning process. The submarine and carrier communities already have activities that perform this same function, and we are modeling SSLCM after these organizations to take the tools and lessons learned when we can.

► **On Watch:** What other steps has the Navy taken to implement the infrastructure and leadership needed to improve the maintenance and modernization of the surface fleet?

► **McManamon:** In 2009, the Navy's Surface Warfare Enterprise created "Surface Team One," a group of senior executives and flag officers who are all involved in surface ship maintenance. NAVSEA has a significant presence on this team. To further underscore the importance of surface ship maintenance, NAVSEA established a deputy for readiness in the surface warfare directorate. Finally, the Navy's Regional

Maintenance Centers (RMCs) were realigned Oct. 1 to be operated by NAVSEA. (► See sidebar) By taking these steps, NAVSEA is making sure there is the right level of coordination, accountability and responsibility.

► **On Watch:** How will all of these steps together improve the condition of the surface Fleet?

► **McManamon:** We are changing the way we approach surface ship maintenance in the Navy. We are focusing foremost on ensuring ships meet their expected service lives through aggressive use of the Integrated Class Maintenance Plan. We are creating a new level of integration with SSLCM Activity, the naval shipyards, the RMCs, the Fleet, the NAVSEA 21 surface warfare organization and the NAVSEA 05 engineering organization. This synergy will ensure that today's surface fleet is able to meet the needs of the United States for decades to come. ■

## RMCs REALIGNED UNDER NAVSEA

To complete the alignment of the Navy's surface ship repair, maintenance and modernization community, the Regional Maintenance Centers (RMCs) will now be operated by NAVSEA's Logistics and Industrial Operations Directorate (SEA04).

South Central RMC has been disestablished, while Southeast and Southwest RMC are aligned as direct reports to NAVSEA. Mid-Atlantic RMC was consolidated with Norfolk Naval Shipyard, establishing a subordinate command, Norfolk Ship Support Activity, to provide services to the Norfolk waterfront. Northwest and Hawaii RMC remain aligned under Puget Sound Naval Shipyard and Pearl Harbor Naval Shipyard, respectively.

"The RMCs are owned by the Fleet, and operated by NAVSEA," said Peggy Harrell, Assistant Deputy Commander, RMCs. "The basic functions of the RMCs did not change, but by realigning activities engaged in the maintenance, modernization and sustainment of the Fleet under the technical authority of NAVSEA, while retaining strong Fleet and Type Commander involvement, we expect to improve our coordinated effort and the level of service we provide to the ships."



SUSTAIN THE  
CURRENT FLEET

# NAVAL SHIPYARDS: MAINTAINING WARFIGHTING READINESS

OWNED BY THE FLEET AND OPERATED BY NAVSEA, THE NATION'S FOUR PUBLIC SHIPYARDS PLAY A CRITICAL ROLE IN THE NAVY'S WARFIGHTING READINESS BY MAINTAINING, REPAIRING AND MODERNIZING THE FLEET.

Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility painter Ryan Hanakahi does touch-up painting on USS *Buffalo* (SSN 715) in Dry Dock 2 prior to her undocking. (U.S. Navy photo by Marshall Fukuki)

# A

lthough separated geographically, Norfolk Naval Shipyard (NNSY) in Portsmouth, Va.; Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF) in Pearl Harbor; Portsmouth Naval Shipyard (PNSY) in Kittery, Maine; and Puget Sound

Naval Shipyard and Intermediate Maintenance Facility (PSNS & IMF) in Bremerton, Wash., work as *One Shipyard*, mobilizing their workforces across organizational boundaries to provide support to the Fleet on time and on budget.

### Back to Basics

When NAVSEA introduced its Agenda for Change in 2009, the Naval Shipyards led a “Back to Basics” campaign focused on the execution of *Los Angeles*-class submarine availabilities to meet schedule requirements. Although always important, the key requirements of quality, schedule and cost were re-emphasized.

Back to Basics is about eliminating inefficiencies and optimizing the workday to improve shipyard processes. The goal is to complete quality availabilities on time and at cost. Under Back to Basics, a job accomplished right the first time saves time and money, and the Navy ultimately avoids disruptive and costly rework. This is important because, in the rare case that a quality error is made during production and missed

shipyards measure the time spent at a job site in order to identify and eliminate the causes of any low percentages of time spent at the work site.

Applying Back to Basics principles, the Naval Shipyards had several recent successes in 2009, including

- ▶ PHNSY & IMF completed a Docking Selected Restricted Availability on USS *Buffalo* (SSN 715) seven days ahead of schedule.
- ▶ PSNS & IMF and Ship Repair Facility Yokosuka successfully delivered USS *George Washington*'s (CVN 73) first Selected Restricted Availability in Japan on schedule.
- ▶ NNSY delivered USS *Harry S. Truman* (CVN 75) out of a six-month Planned Incremental Availability (PIA) four days ahead of schedule and under budget.
- ▶ PNSY successfully completed the USS *Hampton* (SSN 767) Docking Selected Restricted Availability in San Diego 15 days early.

### Getting Greener

Each of the four Naval Shipyards has been serving the nation for more than 100 years, and throughout that time, have strived to be good stewards of the environment and energy resources. Their stewardship has become more notable this year when Secretary of the Navy (SECNAV) Ray Mabus de-



during quality-control inspections, it can become a maintenance and safety problem for the Sailor at sea.

A principal part of the Agenda for Change initiative is sustaining the Fleet. The Naval Shipyards are anchoring the change in their first-year Back to Basics initiative. They are emphasizing quality performance and continued timely work execution with a particular focus on measuring and improving deckplate productivity and efficiency. This includes the use of technology to reduce high-cost maintenance, the use of risk-based engineering to validate maintenance requirements, the incorporation of lessons learned, and the elimination of non-value added steps from maintenance and modernization processes.

To improve productivity, the Naval Shipyards are promoting an “Optimizing the Workday” initiative. In this initiative, the

Left: The *Nimitz*-class aircraft carrier USS *Harry S. Truman* (CVN 75) transits up the Elizabeth River, Va. Right: USS *San Francisco* (SSN 711) (left) and ex-USS *Honolulu* (SSN 718) (right) are dry docked at Puget Sound Naval Shipyard & Intermediate Maintenance Facility. (U.S. Navy photos by Mass Communication Specialist 3rd Class Tyler Folsbee and William Sparks)

clared the reduction of the department’s consumption of fossil fuels to be one of his three priorities.

The SECNAV energy awards recognize exemplary achievements in energy and water efficiency by Navy and Marine Corps installations and ships. PSNS & IMF received the SECNAV’s Platinum Award for Excellent Achievement in Energy and Water Conservation, NNSY won a management award, and PHNSY & IMF won an award for having a well-rounded energy program.

## SUSTAIN THE CURRENT FLEET



Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility painter Michael Paglinawan completes an operator's checklist for a manlift so he can do touch-up painting on USS *Buffalo* (SSN 715). (U.S. Navy photo by Marshall Fukuki)

In January 2009 NNSY won the Sustained Distinguished Performance River Star from the Elizabeth River project, an organization dedicated to restoring the region's Elizabeth River. Finally, PNSY launched a new energy awareness campaign coordinated with Naval Facilities Engineering Command. Energy awareness displays and presenters were made available at all-hands gatherings and shipyard-wide messages were sent out weekly to promote no-cost energy-saving tips.

### Safety

Promoting a culture of safety within the *One Shipyard* concept is an invaluable technique used to protect the most valuable asset of the Naval Shipyards—their people. Safety is paramount to the shipyards' operational efficiency, regardless of the work assignment or where the work is accomplished.

The Voluntary Protection Program (VPP) continues to have a huge impact on the Naval Shipyards. All four shipyards are recognized by the Occupational Safety and Health Admin-

istration (OSHA) as meeting the highest standard for safety with OSHA's Star Site Status. In January 2009, the PSNS & IMF-Bangor site, received Star Site Status and two shipyards celebrated recertification of Star Site Status. PNSY's next recertification is in 2012, and safety remains a priority as the shipyard continues to achieve its goal of reducing injuries and illnesses by 10 percent.

Additional activities in partnership with community organizations and other entities are increasingly popular and effective. PHNSY & IMF hosted its third annual Learning Organization Safety Offsite in July, focusing on integrating safety into projects. The following month, PHNSY & IMF's Safety Office hosted a New Tool Show to introduce safer and more effective tools to workers.

Back on the West Coast, PSNS & IMF held the second annual West Sound Safety and Health Expo in partnership with the City of Bremerton. The two-day event reinforced overall safety and health practices for work and home life in today's world.

### Continuous Improvement

Embracing a culture of Continuous Process Improvement (CPI) and Lean transformation is another vital aspect of the *One Shipyard* concept. It has enabled the development of the very best ideas and innovative techniques to be shared corporately.

PHNSY & IMF and PNSY teamed to replace defective main storage battery cells aboard USS *Cheyenne* (SSN 773) in 16 days, about half the time originally estimated to do the job. Workers swapped out nearly 80 cells, each weighing 500 pounds, in an around-the-clock effort. The job was done in spite of just a week's notice to prepare for the work. In addition, the shipyard workers were unfamiliar with the new type of battery cell involved in the work and a concurrent battery replacement job on another submarine.

NNSY benefited from NAVSEA's Back to Basics strategy on submarine availabilities, first with USS *Boise's* (SSN 764) early completion and then on USS *Tennessee* (SSBN 734), which had a co-located project team and dedicated a sub hub next to the drydock.

At PSNS & IMF, employee-driven Lean innovations for molded in place coating removal and repair to support hull inspections and bolt access is projected to provide significant savings for *Seawolf*-class submarines. These innovations can be expanded to future work on *Virginia*-class submarines. Concurrently, the PSNS & IMF-Bangor site used Lean methodologies to improve weld planning by removing excessive controls. This led to a 60 percent reduction in both flow time and touch time.

Additionally, new processes were developed for first-time work, putting PSNS & IMF at the forefront of new technology implementation and standardization. These actions will yield improved cost, quality, and schedule performance for the repair of U.S. Navy assets.

## Enabling People

The concept of a coalition of a diverse group of people—employees, management and labor leaders—that help organizations improve their work atmosphere has been making strides across the Naval Shipyards.

PSNS & IMF established a Guiding Coalition that serves as the command's strategic planning group. Composed of the command's department and labor leaders and employees, the coalition was established to guide PSNS & IMF through meaningful strategic initiatives and to accomplish the command's mission and vision.

PNSY established the Portsmouth Leadership Alliance to engage the workforce. The alliance implemented a number of initiatives including a career pathways and mentoring program; a *Virginia*-class training and awareness series; a shipyard newscast; and the first Opportunities Expo showcasing more than 75 diverse groups from the shipyard.

At NNSY, the shipyard commander's concept of leadership through engagement is aggressively pursued and all shipyard personnel are encouraged to be leaders within their own spheres of responsibility.



Inside Machinist Apprentice Justin Orr guides a group of students through his shop at Portsmouth Naval Shipyard's Career Orientation Day. (U.S. Navy photo by Jeremy Lambert)

The *One Shipyard* concept allows the Naval Shipyards to level the workload and mobilize the workforce across all the yards to best ready the Fleet and stabilize a vital industrial base for our nation's defense. The Naval Shipyards stand ready to reach out across the globe, whenever and wherever called, to support the Fleet. ■



Secretary of the Navy Ray Mabus tours Marinette Marine Shipyard. (U.S. Navy photo by Mass Communication Specialist 2nd Class Kevin S. O'Brien)

Keeping America's Navy #1 in the world requires a skilled workforce to administer and oversee the building of high-quality, affordable ships and modernize and maintain those in service. The Supervisors of Shipbuilding, Conversion and Repair, known as the SUPSHIPs, are key players in achieving this goal.

The SUPSHIPs are the designated Contract Administrative Service agents responsible for administering the Department of Defense's shipbuilding and nuclear ship repair contracts awarded to private sector contractors. SUPSHIPs are also accountable for NAVSEA's quality, technical and fiduciary responsibilities for shipbuilding contracts.

SUPSHIPs Bath and Gulf Coast support and facilitate each step of building the Navy's surface Fleet. Working closely with Program Executive Office, Ships, SUPSHIPs Bath and Gulf Coast are keeping the production and delivery processes on schedule.

SUPSHIPs Groton and Newport News teams oversee the construction of the Virginia-class submarines, and SUPSHIP Newport News manages the aircraft carrier construction and refueling overhaul contracts.

"In 2009, the SUPSHIPs delivered 10 surface ships, two submarines and one carrier to the Fleet," said Rear Adm. David Lewis, NAVSEA vice commander. "In the coming year, the SUPSHIPs will continue to improve the oversight process to ensure ships and submarines are affordable, high-quality, and operationally superior." ■

# CHARTING SUCCESS: SUBMARINE TEAM ONE

Since 2001, Submarine Team One (ST1) has improved how the Navy conducts submarine maintenance. In just the past three years, ST1 has reduced the installation time for the Valve Regulated Lead Acid (VRLA) Battery and modified both the *Los Angeles* and *Virginia* classes' life cycle maintenance plans, thereby increasing the submarines' availability by reducing their time in depot availabilities, increasing operational availability and reducing total ownership costs.

ST1 brings together the stakeholders to improve cross-organizational processes associated with planning and executing depot-level submarine availabilities.

The team operates under nine guiding principles:

- ▶ Ensure all submarines operate safely and effectively to the end of their designed service life - acquisition and maintenance communities work together on design of new components/systems/platforms to ensure smooth transition from concept, to new construction, through end of life cycle.
- ▶ Exercise Technical Rigor - utilize our engineering assets to support the Fleet, identify/validate/refine minimum technical requirements, develop new technologies, and maximize operational availability.
- ▶ Execute stringent SUBSAFE certification process - provide maximum reasonable assurance that submarines are safe for unrestricted operations (Submarine Safety Manual; Submarine Availability Completion Manual; Joint Fleet Maintenance Manual).
- ▶ Modernize - develop, plan and program continuous modernization to keep our oldest submarine's capability on par with our newest; maximize commonality and keep focus on the Fleet's operational requirements.
- ▶ Pursue Commonality - increase the use of modular design, common Command, Control, Communications, Computers, Combat Systems, and Intelligence, or C5I, systems and common parts.
- ▶ Certification of Work Required/Completed - clearly identify minimum mandatory maintenance requirements and certify/report work completion.


- ▶ Ensure a robust feedback process - to report and learn from job completion, component/system material condition, cost data, and comments/ideas from planners, mechanics, Sailors, engineers and technicians.
- ▶ Maximize Operational Availability- safe increased operational time at the forefront; routine detailed review of metrics to capture, categorize and apply lessons learned.
- ▶ Minimize Time in Depot Availabilities - committed to robust planning process, pre-availability agreement and documentation of minimum maintenance and modernization requirements, fast start to availabilities, and lean processes to efficiently execute them.

Following these principles, ST1 has increased the Submarine Force's operational availability while also reducing costs. For example, ST1 drove the effort to redesign the VRLA battery so that it could be installed on board *Los Angeles*-class submarines within a 120-day Selected Restricted Availability. Recently, Portsmouth Naval Shipyard installed USS *Hampton*'s (SSN 767) battery in 103 calendar days—more than two weeks ahead of the time threshold.

In addition to reducing the time required to install the VRLA battery, ST1 championed a thorough engineering-based evaluation of the *Los Angeles*-class life cycle maintenance plan to determine if the Navy could extend the submarine's operating interval. After review, it was determined that the operating interval could indeed be extended from 48 months to 72 months. On average, this will eliminate one major shipyard availability and add a deployment to each submarine of the class, thereby reducing life cycle maintenance costs while increasing operational availability.

Similarly, ST1 along with the *Virginia* Class and Strategic and Attack Submarine Program Offices, began working to modify the *Virginia*-class' life cycle maintenance plan requirements with a goal of accomplishing no more than 44 months of depot-level maintenance, thus enabling 15 deployments per ship. While this effort is not yet complete, 14 deployments are achievable through an initial modification to the maintenance plan, starting with the ninth submarine of the class. Efforts continue for the first eight submarines of the class, and there have been significant reductions in required maintenance enabling 13 deployments for these ships. ■





The aircraft carrier USS *George Washington* (CVN 73) transits the Pacific Ocean. (U.S. Navy photo by Mass Communication Specialist Seaman Adam K. Thomas)

# CARRIER TEAM ONE: KEEPING CARRIERS FRONT AND CENTER

**M**aritime power revolves around aircraft carriers, the centerpiece of America's naval forces. On any given day, aircraft carriers exercise the Navy core capabilities of power projection, forward presence, humanitarian assistance, deterrence, sea control and maritime security. These national assets protect America's interest whether at sea or in port. Keeping them mission-ready is the focus of the professionals at Carrier Team One (CT1).

CT1 defines, champions and enables the improvement of cross-organizational key business processes for the planning and execution of aircraft carrier availabilities. Getting these important ships back to sea, on schedule, on budget and available for national tasking is vital.

Part of the Aircraft Carrier Maintenance Plan, aircraft carrier availabilities take different forms and lengths and each represent a different stage of a carrier's life. Availabilities range in length from four months for forward-deployed CVN Selected Restricted Availabilities, to 39 months for mid-life Refueling Complex Overhauls (RCOH). Planning for these availabilities

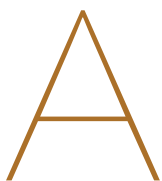
normally takes 12 months, while planning for a RCOH can take up to four years. These complex maintenance periods are conducted in five different locations throughout the United States and in Japan. During 2010, six aircraft carriers will undergo maintenance availabilities.

Through the use of knowledge sharing networks, CT1 uses proven practices and lessons learned to support successful carrier availability execution each year, while driving long-term process improvement. For example, the Co-Yard Knowledge Sharing Network coordinates the efforts of civilian industry partners, principally Northrop Grumman Shipbuilding, and the naval shipyards to improve depot-level work processes focusing on cost-saving initiatives centered around high cost-driver work. Other CT1 knowledge sharing networks help Sailors become better trained and better prepared to start their carrier availabilities.

CT1 has played an integral role in ensuring aircraft carrier availabilities are completed on schedule. Completing these availabilities as scheduled enables these national assets to return to sea, taking their place to support the nation's maritime strategy. ■

# NAVAL GUNS:

## ADVANCING THE WARFIGHTERS' SHIPBOARD CAPABILITIES



As Naval Sea System Command seeks to deliver enhanced capabilities to the warfighter, Program Executive Office, Integrated Warfare Systems' (PEO IWS), Naval Guns program office (IWS 3C) continues efforts to extend range and enhance accuracy of gun systems

aboard Navy ships.

Significant achievements from IWS 3C in FY09 are providing Sailors the ability to reach farther, more precisely and with greater striking power, and delivering broader defensive protection where our Sailors most often operate—on ships at sea.

There were a number of significant advances within the Naval Guns Program Office throughout the year, and perhaps the most visible program milestone was advances to the Mk 38, Mod 2, 25mm weapon system.

Following the terrorist attack on USS *Cole* (DDG 67) in October 2000, the Chief of Naval Operations created Task Force Hip Pocket, an OPNAV working group to address needs in ship's anti-terrorism/force protection posture, and build a layered defense for ships against small boat attacks while in port and underway. In July 2009, IWS 3C installed the 100th Mk 38, Mod 2, 25mm gun system onboard the very ship that precipitated the requirement for system advances.

The existing Mk 38, Mod 1 chain gun had a non-stabilized gun mount that required a Sailor to physically be stationed at the weapon.

"What this gun brings to the table," said Kevin LaPointe, IWS 3C program manager, "is that it's two-axis stabilized, remotely controlled—from a remote operations station, most often found in the pilot house. The system also has an EO/IR (electro-optical/infrared) sensor that can be used in both daylight (in color) and forward-looking infrared capability with a laser range finder and auto-track capability."

Fifty-four systems were installed aboard ships throughout the year, to include DDGs, CGs, LSD 41/49-class, patrol coastal ships, and FFG 7-class. FY10 promises to be equally busy for the program, with 55 systems slated to be installed and a new contract to take the program through the out years.



Sailors assigned to the guided-missile destroyer USS *Lassen* (DDG 82) fire an MK 38 25mm machine gun during exercise Multi-Sail 2009. (U.S. Navy photo by Mass Communication Specialist 2nd Class Matthew R. White)

Other significant achievements for the IWS 3C in FY09 include:

- ▶ **BRAC:** IWS 3C transitioned In-Service Acquisition Engineering Commodity Management from Naval Surface Warfare Center (NSWC) Crane to NSWC Indian Head, Det. Picatinny. Related to BRAC, but considered a non-BRAC transition, the program office also transitioned all Mk 160 Fire Control and Optical Sight Support from NSWC Port Hueneme (PH), Det. Louisville to NSWC PH.
- ▶ **Cruiser Modernizations:** IWS 3C provided state-of-art fire control integrated into the Aegis weapons to the USS *Bunker Hill* (CG 52) by replacing existing 5" Mk 62, Mod 2 guns with 5" Mk 62, Mod 4; replacing existing legacy Mk 86 fire control with Mk 160, Mod 11 (marking the first time Mk 160, Mod 11 has control two different gun mounts); and installing two Mk 20 electro-optical sights to support the system.
- ▶ **2T Munitions:** Delivered 8,000 Kinetic Energy, Electronic Timed (KE-ET) 5" rounds. Improving the number of rounds in the Navy's inventory reduced the requirement to cross-deck ammunition from ship to ship, and provided the Fleet with training rounds.
- ▶ **MOFN/MFF:** The program office made significant strides in qualifying Multi-Option Fuze for Navy (MOFN) towards completing redesign of the Multi-Function Fuze (MFF).

# ESSM ENDS 2009 WITH WORLD-CLASS MILESTONES

INCREASED PRODUCTION, GLOBAL READINESS AND MULTINATIONAL INTEGRATION LED THE MANY MILESTONES REACHED BY THE NATO EVOLVED SEASPARROW MISSILE (ESSM) PROGRAM IN 2009.

A Crane lifts an Evolved Sea Sparrow Missile (ESSM) aboard the guided-missile destroyer USS *McCampbell* (DDG 85). (U.S. Navy photo by Lt. j.g. Joel Jackson)

Of the team's many 2009 accomplishments NATO SEASPARROW/ESSM Project Manager, Capt. Michael D. Anderson, noted weapon delivery as the top 2009 achievement for the 12 nation consortium.

"We put significant emphasis into re-engineering our production line, which was largely coincident with the 1,000th ESSM delivery. We are delivering missiles at the rate of approximately 32 a month—40 percent higher than previous monthly records," said Anderson.

The ESSM delivery milestone was the culmination of a decade that started with low-rate initial production, was followed by full-rate production, and led up to the team's ultimate objective—a global battle force with a formidable ship self-defense capability.

"When you reach 50 ships, across 10 nations, with 1,000 missiles, that's a worldwide force structure of significance ... one we continue to grow," said Raymond Blackburn III, the project's special assistant for international affairs.

ESSM's increased deployment steadily improved the consortium's fleet readiness. The tactical significance of ESSM increases with its versatility, inventory size and integration into seven fire control systems and five missile launchers.

"ESSM brings an almost unmatched versatility," said Anderson, "when you think about the classes of ships and multinational

capability that ESSM brings to the fleet. And we are continuing to integrate ESSM into additional combat system architectures."

Recent integrations include the Aegis Open Architecture system and MK41 launcher configuration. Greece and Norway have conducted successful firings, and Spain is expected to test Aegis in 2010.

Anderson also noted that the number of allies bringing the ESSM into their combat systems is expanding. One capability that is attracting attention from potential purchasers is ESSM's demonstrated surface-to-surface capability against high-speed maneuvering surface targets, such as zodiacs and fast patrol boats found in the littoral environment.

As for future capabilities and goals for the program, Anderson said his team's work is already laid out.

"A formal vote by all 12 nations directed ESSM upgrades with an active and semi-active X-Band seeker called ESSM Block II. We've already made excellent progress in defining the way ahead for ESSM."

One of the consortium's most important initiatives for 2010 will be to expand the scope of cooperation by universally integrating the tactics, training and employment of ESSM Block II into the configuration profiles of the consortium nations. With 41 years of cooperative development, production and in-service support to build on, the NATO SEASPARROW Project and the ESSM Program are well positioned to continue their successful brand of international cooperation into 2010 and beyond. ■

SUSTAIN THE  
CURRENT FLEET

# CG & DDG MODERNIZATION

BRINGING VITAL HM&E AND COMBAT SYSTEMS UPGRADES

Three F/A-18C Hornets perform a fly-by over USS *Mobile Bay* (CG 53) and USS *Shoup* (DDG 86). (U.S. Navy photo by Mass Communication Specialist 3rd Class Justin R. Blake) Opposite page: The guided-missile destroyers USS *Lassen* (DDG 82) and USS *Curtis Wilbur* (DDG 54) underway in the Pacific Ocean. (U.S. Navy photo by Mass Communication Specialist 1st Class John M. Hageman)

The Navy's *Ticonderoga*-class cruisers and *Arleigh Burke*-class destroyers are the backbone of the surface Navy, comprising almost a third of the entire Fleet. But as capable as these warships are today, keeping ahead of evolving threats requires a constant eye toward maintenance and capability upgrades throughout their service lives.

NAVSEA's Surface Warfare Directorate (SEA 21) recognizes that maintaining and modernizing U.S. non-nuclear surface ships to ensure that they are capable, relevant, and affordable is a formidable task, especially when the time from delivery of the lead ship in a class to the decommissioning of the last ship of that class can exceed 75 years.

"Getting more effective life and more nautical miles out of in-service ships is key," said Rear Adm. James McManamon, deputy commander for surface warfare. "We need these ships not just to meet the needs of today's Navy, but to ensure the necessary capability and capacity for tomorrow and decades to come."

The in-service Surface Combatants Program Office in NAVSEA's Surface Warfare Directorate has embarked on the most comprehensive upgrade and modernization program in the history of the U.S. Navy. Its core mission is to sustain, modernize and increase the warfighting capabilities of surface combatants, with a primary focus on efficiency, readiness, evolution, and continuous process improvement.

"The decision to get full service life and more capabilities out of these Aegis warships was not made lightly, but with due diligence and reliance on sound engineering practices," said Capt. Robin Russell, program manager for in-service surface combatants. "What we have found through years of experience and lessons learned, that, as long as you maintain the combat systems' relevance and fully fund modernization and maintenance activities, these ships will remain mission relevant throughout their service lives and fill the warfighting gap at a fraction of the cost of building new vessels."

In 2009, the oldest of the Navy's in-service cruisers, USS *Bunker Hill* (CG 52), became the first of the Navy's *Ticonderoga*-class cruisers to receive complete combat systems (CS) and hull, mechanical and electrical (HM&E) modernization, introducing multiple critical new warfighting capabilities. *Bunker Hill's* combat system was modernized with Aegis Advanced Capability Build (ACB) 08, which is a critical step in evolving Aegis into an Open Architecture system. As the Navy continues its modernization program, the Open Architecture principle will evolve with ACB 12/14 to enable future combat system growth over the life of the class, as well as mission expansion, such as ballistic missile defense.

Only a few short months after the installation of CS and HM&E upgrades in February, *Bunker Hill* successfully completed Combat System Ship Qualification Trials in late July. These trials, a series of surface and anti-air warfare exercises,

validated the readiness and operability of the ship's new technology insertions.

Combat system upgrades in USS *Mobile Bay* (CG 53) and USS *Philippine Sea* (CG 58) also began in 2009. These ships were previously fitted with the HM&E upgrades. During the ongoing availabilities, improvements to weapons and sensors will be completed. These upgrades are currently underway at BAE shipyard in San Diego and Atlantic Marine in Mayport, Fla., respectively.

Over the next several years, the remaining 19 cruisers will undergo this structured modernization to ensure they too are able to reach their projected 35-year service lives.

In 2010 the modernization program for the 28 Flight I and II *Arleigh Burke*-class guided-missile destroyers will commence. USS *Arleigh Burke* (DDG 51) and USS *John Paul Jones* (DDG 53) HM&E modernization availabilities will be the first for the class. Similar to the cruiser program, the primary objectives of DDG modernization are to reduce workload and total ship class ownership costs via HM&E technology insertion, including a fully integrated bridge, improved machinery and damage control, wireless communications and digital



video surveillance. These modernization efforts will mark the first time in the Navy's history that a major modernization program has begun while ships of the class are still in construction.

In 2012, *John Paul Jones* will be the first destroyer to start an availability to modernize its Combat Systems to ACB12, marking a significant milestone in the Navy's implementation of Open Architecture in the Fleet. The Open Architecture environment will enhance these ships' combat systems today, as well as allow for more affordable combat systems upgrades as they mature.

Effective maintenance and modernization reduces total ownership costs and ensures that the Navy obtains a more effective service life from the ships by improving operational availability and increasing capacity.

"Modernized cruisers and destroyers are significantly more cost efficient to operate," said McManamon. "Responsible maintenance and modernization, like the cruiser and destroyer programs, allow the Navy to achieve the expected service lives on these valuable assets and maintain the current maritime strategy, all while saving the taxpayers' money." ■

A THOROUGH MID-LIFE MODERNIZATION PROGRAM IS CRITICAL TO KEEPING THE NAVY'S AMPHIBIOUS AND AUXILIARY SHIPS VIABLE TO THE FLEET FOR YEARS TO COME.



# AMPHIB MODERNIZATION AND MID-LIFE PROGRAMS

Providing efficient, effective and affordable life-time maintenance, upgrades and modernization will sustain the right force of ships with the right readiness to meet global peacetime, crisis-response, and wartime operational requirements.

Currently, NAVSEA's surface warfare directorate, SEA 21, is managing mid-life modernization and sustainment programs on LSD 41-, LSD 49- and LHD 1-class ships. These sustainment efforts allow the Navy to extend the service lives on these valuable assets, postponing the need for new construction.

USS *Gunston Hall* (LSD 44), the first ship of the *Whidbey Island* (LSD 41) class to undergo comprehensive mid-life modernization availability, successfully

concluded post-availability sea trials and rejoined the Fleet in 2009.

The ship received several critical technology upgrades during the availability, including the replacement of obsolete or unsupported hull, mechanical and electrical (HM&E) systems. In addition, replacing steam systems with all-electric functionality will significantly decrease the necessary maintenance required by the legacy steam systems, reduce total ownership cost and reduce Sailor workload. A Propulsion Load Management Unit in conjunction with new, more efficient propellers are a part of the Navy's larger effort to achieve greater fuel efficiency and will be installed during LSD mid-life availabilities.

"The modernization will allow the ship to continue supporting the Navy's amphibious assault and support operations

The multipurpose amphibious assault ship USS Wasp (LHD 1) is anchored during well deck operations off the coast of North Carolina. Insets: A rigger guides a replacement main propulsion diesel engine cylinder head down the escape trunk to the main machinery room aboard the amphibious dock landing ship USS Germantown (LSD 42). Dock landing ship USS Whidbey Island (LSD 41) escorts merchant vessel Golden Nori following the vessel's release from Somalia-based pirates. A hull maintenance technician welds the spool of a fire pump aboard USS Wasp (LHD 1). (U.S. Navy photos by Mass Communication Specialist 3rd Class David Smart, Lt. James Trudeau, Lt. j.g. Joe Donahue and Mass Communication Specialist 1st Class Andrew McCord)



for decades to come,” said Rear Adm. James McManamon, NAVSEA’s deputy commander for surface warfare. “Considering this was the first of an extremely complex class mid-life availability, this is truly a major accomplishment for the entire amphibious community.”

All 12 ships of the LSD 41 and LSD 49 classes are scheduled to undergo a similar mid-life upgrade over the next five years to ensure the class remains capable and mission ready through 2038. Today, lessons learned from *Gunston Hall’s* upgrades are being incorporated into the mid-life availability of the second ship in the class, the USS *Germantown* (LSD 42). Follow-on ships will benefit from these lessons, further increasing the efficiency and affordability of new system integration and improving operational availability.

Ships homeported on the East Coast will undergo up-

grades at Metro Machine Corp., in Norfolk, Va., and ships based on the west coast will receive upgrades at General Dynamics-NASSCO in San Diego.

“Critical mission tasks, like those required of the *Whidbey Island*-class, require that the U.S. Navy keep these assets mission ready and at maximum capability from delivery to decommissioning. To do this, we must ensure that the Navy’s amphibious and auxiliary ships are fitted with the right technologies, systems, sensors, weapons, platforms, and people to guarantee they are ready for tasking at a cost we can afford,” McManamon said.

By providing efficient and effective maintenance and modernization, NAVSEA is ensuring that U.S. Navy’s amphibious fleet is affordable and mission-ready for naval support operations into the mid-century. ■

The JCREW Program Office (PMS 408) develops and fields several types of Radio-Controlled Improvised Explosive Device (RC-IED) jamming systems. (U.S. Navy photo)

# DEFEATING THE DEVICES

The Joint Counter-RCIED Electronic Warfare (JCREW) program continues to be a primary component of the Department of Defense's (DoD) successful effort to improve our warfighters' ability to prevent Radio-Controlled Improvised Explosive Device (RC-IED) detonation.

The JCREW Program Office (PMS 408) is organized under Program Executive Officer Littoral Mine Warfare and works in close coordination with the Joint Improvised Explosive Device Defeat Organization (JIEDDO). The JCREW program has developed and fielded vehicle-mounted; man-portable; and fixed-site RC-IED jamming systems. In 2009, production commenced for CREW 3.1, a new man portable system that will replace the previously fielded Quick Reaction Dismounted system. Also in 2009, new M-ATVs (a new and lighter MRAP (Mine Resistant Ambush Protected Vehicle) began fielding with JCREW acquired CVRJ mounted jammer systems.

"Our enemies will always be able to use commercial communications devices to attempt to control explosive devices.

We will always be interested in denying this significant military capability," said JCREW Program Manager Capt. John Neagley. "As modern telecommunications systems get more complex and sophisticated, our CREW systems/architectures need to keep pace."

This cutting-edge technology has been delivered with unprecedented speed and quality, earning respect from warfighters in theater and recognition from the DoD. In November 2009, the JCREW Program Office was awarded the 2009 DoD David Packard Award for Acquisition Excellence.

"The maturity and effectiveness of today's JCREW systems are a product of NAVSEA's major intellectual and engineering investment," said Neagley. "PEO LMW maintains a robust portfolio of best practices, and Naval Surface Warfare Centers Crane, Dahlgren and EOD Technology Division provide unparalleled electronic warfare expertise to technical development."

To date, more than 17,000 JCREW systems have been deployed to the U.S. Central Command area of operations. ■



# NAVSEA LEADS ENERGY INITIATIVES

THE UNITED STATES CONSUMES 25 PERCENT OF THE WORLD'S OIL BUT CONTROLS THE PRODUCTION OF ONLY 3 PERCENT, ACCORDING TO THE NATURAL RESOURCES DEFENSE COUNCIL. AS A NATION, WE CONTINUE TO CONSUME MORE OIL AMIDST A FINITE SUPPLY.

Realizing this, Secretary of the Navy Ray Mabus recently announced that he is committing “the Navy and Marine Corps to meet bold, ambitious goals,” in energy reform. “In order to lower our reliance on fossil fuels, we need to improve the efficiencies of our systems and develop platforms that operate as a system of systems that are integrated together, and reduce our tactical vulnerability,” said Mabus.

Those efficiencies are scheduled to be demonstrated in 2012 by a Green Strike Group composed of nuclear vessels and ships powered by biofuel, according to Mabus. By 2016, the Navy plans to sail that strike group as a Great Green Fleet composed of nuclear ships, surface combatants equipped with hybrid electric alternative power systems running biofuel, and aircraft flying only biofuels—and deploy it.

Tomorrow's green fleet will require changes in how the Navy operates many of its ships. NAVSEA is looking ahead to making the Navy's ships green or more fuel efficient by engineering solutions on how ships are fueled, powered, designed and operated.

One of the first steps is to establish new shipboard alternative fuel sources. Currently, a certification process is underway to test alternative fuels for shipboard use. During fiscal year 2011, full scale engine testing is scheduled to be initiated and a limited Navy ship demonstration will be performed. In fiscal year 2012, a full scale engine will be completed and a limited strike group demonstration will be performed.

NAVSEA engineers at Naval Surface Warfare Center Carderock, Md., and Ship Systems Engineering Station in Philadelphia are developing more efficient hull forms, propellers and propulsion motors for use onboard naval ships. The most prominent initiatives being developed are Hybrid Electric Drive (HED) for the *Arleigh Burke*-class and a full Integrated Power System (IPS) for the *Zumwalt* classes of destroyers. The Navy has already fielded a successful hybrid electric drive plant on the *USS Makin Island* and is looking to back fit this capability

into its largest ship class, the *USS Arleigh Burke* (DDG 51)

Alternative fuel sources and HED represent two of the 12 NAVSEA fuel-saving initiatives currently under review. These range from underwater hull easy release coatings to solid-state lighting to steering/stability efforts and are undergoing evaluation for possible fleet-wide implementation.

Meanwhile, NAVSEA will continue to identify opportunities for culture change within our operational forces. This will include expanding the incentivized energy conservation program (i-ENCON). The i-ENCON program is a “Meet-the-Fleet”



A gas turbine system technician takes a fuel sample aboard the guided-missile destroyer *USS Stethem* (DDG 63). (U.S. Navy photo by Ensign Danny Ewing Jr.)

initiative spearheaded by NAVSEA to reduce ships' energy consumption. Program sponsors conduct routine meetings with ship operators to review specific fuel-saving procedures and recommend quarterly awards for ships with the most fuel-efficient operations.

“These efforts increase Fleet readiness by enabling Sailors at sea to train or deploy longer while spending the same amount of money on fuel,” said Hasan Pehlivan, i-ENCON program manager. ■

SUSTAIN THE  
CURRENT FLEET

Linehandlers assist the forward-deployed mine countermeasures ship *USS Patriot* (MCM 7) as she leaves her berth at U.S. Fleet Activities Sasebo to embark on spring patrol. (U.S. Navy photo by Mass Communication Specialist 2nd Class Joshua J. Wahl)

# PEO LMW MANAGES MCM FORCE

IN 2009, THE MINE WARFARE PROGRAM OFFICE IN PROGRAM EXECUTIVE OFFICE, LITTORAL AND MINE WARFARE SUSTAINED AND MODERNIZED IN-SERVICE SURFACE AND AIRBORNE MINE COUNTERMEASURES (MCM) FORCES, AND DEVELOPED A “FAMILY” OF NEW SYSTEMS.

The Navy’s dedicated mine countermeasures force is aging while the mine threat continues to modernize. With the Navy’s 14 *Avenger*-class ships beyond the midpoint of their service lives, PEO LMW continued execution of a comprehensive combat system modernization effort which included upgrades to mission planning, communications, navigation and mine hunting sonar systems.

In the area of Airborne Mine Countermeasures, PEO LMW upgraded the mine hunting sonar on the AN/AQS-14 to the AN/AQS-24A Airborne Minehunting System configuration. In addition to enhanced sonar performance, the AN/AQS-24A also provides an electro-optical identification capability.

While sustaining and enhancing current capabilities, PEO LMW also made significant strides in building the Navy’s future mine-defense force, which will reduce the mine

threat risk to Navy vessels and Sailors. During the next decade, the Navy will transition the mine countermeasures capability from today’s dedicated assets to Mine Countermeasures Mission Package-configured Littoral Combat Ships (LCS). This significant transformation will include manned and unmanned systems to increase Navy’s mine warfare capability, capacity, and speed of response to mine threats around the globe.

Critical elements of this transition are already being delivered to the Fleet, including the first two MCM Mission Packages for the Littoral Combat Ship. The LCS MCM Mission Package will allow forces to prosecute the mine threat from outside the mine threat area using offboard systems. Eight systems comprise the LCS Mine Countermeasures mission package and provide capabilities to detect, identify, neutralize, and influence-sweep sea mines. ■

Aviation Boatswain's Mate (Equipment) Airman William Buck, from Virginia Beach, Va., inspects a barrel nut on the flight deck aboard aircraft carrier USS *John C. Stennis* (CVN 74). (U.S. Navy photo by Mass Communication Specialist 3rd Class Josue L. Escobosa)

NAVSEA'S FLEET LOGISTICS OFFICE IN THE LOGISTICS, MAINTENANCE AND INDUSTRIAL OPERATIONS DIRECTORATE (SEA 04L) WAS HARD AT WORK IN 2009 PERFORMING LOGISTICS IN SUPPORT OF BOTH BUILDING AN AFFORDABLE FUTURE FLEET AND SUSTAINING THE CURRENT FLEET.



## SEA 04L: LOGISTICS MAKES A DIFFERENCE

To acquire an affordable future Fleet, SEA 04L logicians work closely with Program Executive Offices (PEOs) to make sure the Navy is making smart decisions when building and buying a weapons system or platform. Logisticians ensure that a system or platform can be efficiently supported throughout its entire lifecycle.

On the sustainment side, SEA 04L collaborates with Naval Supply Systems Command (NAVSUP), Defense Logistics Agency (DLA) and other organizations to make sure that maintenance and repairs are performed in the most affordable way. SEA 04L is playing a big role in building up the relationship between NAVSEA and DLA, which will play a much larger role in the sustainment of today's Fleet when they assume many of the procurements and warehousing functions previously performed by the Naval Shipyards.

"We are going through the process of educating DLA on our maintenance methods," said Rear. Adm. Nick Kalathas, director of NAVSEA's Fleet Logistics Office. "We are working on getting our requirements to DLA with sufficient lead time so they have time to source the material and put it under contract."

SEA 04L is also helping achieve gains in commonality, resulting in buying parts in a smarter, more efficient way.

"We have more than 6,000 different gate valves, but the Hull, Maintenance, and Electrical Governance Board, co-chaired by myself and NAVSUP Vice Commander John Goodhart, analyzed the population of gate valves and determined we only needed 350 different valves to satisfy our needs," said Kalathas. "Sustaining that variety is unaffordable and unnecessary."

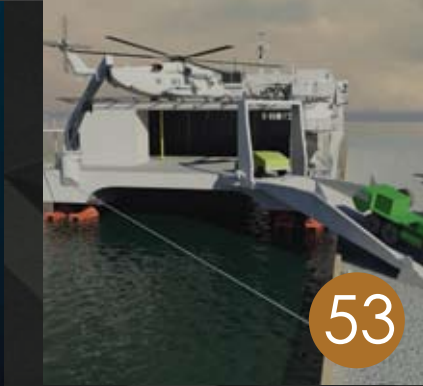
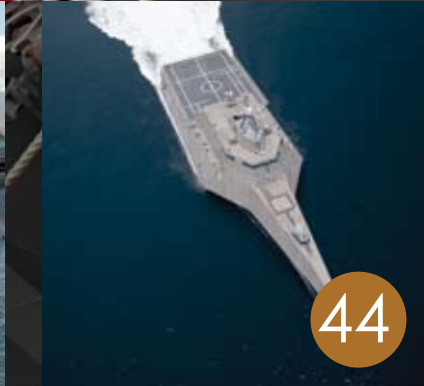
Working with NAVSUP and DLA, NAVSEA's engineering directorate and SEA 04L scrubbed the technical documents for gate valves, developed a grouping of high-quality valves, and awarded a commodities contract for those valves. This drives standardization, lowers life cycle support costs, and increases readiness—ultimately saving the Navy money. NAVSEA is assessing where this approach can be applied to other parts, such as power cables, motors and air filters. Additionally, NAVSEA has started a dialogue with Navy shipbuilders to see how they can leverage the Navy's commodities contracts and purchase these pre-screened, high-quality parts at a competitive price.

In 2009, SEA 04L embarked on a study of the industrial base to help the Navy understand the issues facing industry. The Navy can quantify and mitigate our risk by understanding the health and quality of vendors, identifying what areas have been outsourced and knowing where critical parts are being supplied by a single source. ■

# BUILD THE FUTURE FLEET



USS Wayne E. Meyer (DDG 108) commissioning.  
(U.S. Navy photo by Mass Communication Specialist 1st Class Tiffini Jones Vanderwyst)



The amphibious assault ship USS *Makin Island* (LHD 8) pulls into her homeport of San Diego. (U.S. Navy photo by Mass Communication Specialist 2nd Class Jon Husman)



# BUILDING AN AFFORDABLE FUTURE FLEET

AS PROGRAM EXECUTIVE OFFICER FOR SHIPS, **REAR ADM. BILL LANDAY** IS HARD AT WORK BUILDING AN AFFORDABLE FLEET FOR THE U.S. NAVY. HE SITS DOWN WITH *ON WATCH* AND TALKS ABOUT THE SPECIFIC STEPS BEING TAKEN IN THIS CRUCIAL AREA.

► **On Watch:** Can you tell me how we are “Building an Affordable Fleet”?

► **Landay:** The Navy needs ships with the right capability to do the mission, and we need enough ships to go out and provide that global presence that the nation expects. We have a two-prong solution to meeting this challenge. First, we focus on building ships more affordably so the Navy can build more ships with the shipbuilding budget. Second, we make sure our ships are affordable to maintain, upgrade and operate throughout their 30- or 40- year service lives.

► **On Watch:** What specific steps is the Navy taking to control costs before construction begins?

► **Landay:** When we look to control costs, we are focusing on the things we do up front before we start construction. That can allow us to potentially drive the cost of ships down and ensure the cost doesn't grow.

One example of how we're controlling cost is design maturity. We are committed to making sure our designs are

nearly complete before construction begins. For three of our major programs, LHA 6, DDG 1000, and JHSV, we made sure the design was at least 85 percent complete before starting construction.

We've also looked at our acquisition strategies across the entire PEO Ships portfolio to see where we can find opportunities to drive costs down. One example is the Littoral Combat Ship (LCS). We started with an acquisition strategy where we were designing two different ships. Although there were some benefits to this approach, from an acquisition perspective, we were missing opportunities like buying equipment in bulk and creating different kinds of competition on a single ship. So the Navy decided that it was going to down-select to a single platform and then compete construction on that platform across multiple yards. This decision will bring significant cost reduction because there will be less variation.

Another example of a creative acquisition strategy is with the DDG 1000 and DDG 51 swap. In 2009, the Navy decided that we would restart the DDG 51 program and truncate the DDG 1000 program. Instead of sticking to the original plan to build the DDG 1000 class in two different yards, we worked

with industry to come up with a solution to move all the DDG 1000 work to a single yard and then start up the DDG 51 class program in the other yard. Industry is able to better balance and plan their workload, and the Navy sees the efficiencies of serial production.

PEO Ships is utilizing fixed-price contracts to the fullest extent possible. In fact, the only cost-plus contract we have right now is for DDG 1000. Every other ship currently under construction is under a fixed-price contract, LCS 3 and 4, the DDG 51 class, DDG 1001 and 1002, all the Joint High Speed Vessels and all remaining LPD-17-class ships. Fixed price contracts put rigor on the Navy not to change the design and rigor on the shipbuilder to be as efficient as possible.

We are also bringing smaller yards into the Navy shipbuilding business. Instead of having just four shipbuilders, we now have contracts with seven. This added competition is helping to further reduce costs.

► **On Watch:** How is the Navy reducing cost once a ship is under construction?

► **Landay:** We've learned that each platform is unique and has a different area that drives cost. So we put together four



Secretary of the Navy Ray Mabus greets shipyard workers during a tour of Marinette Marine Shipyard. (U.S. Navy photo by Mass Communication Specialist 2nd Class Kevin S. O'Brien)

teams with the program office and industry to go after four key areas that drive cost: production labor, material costs, overhead and total ownership cost. In addition, we are working

closely with shipbuilders to give them new incentives in their contract. By offering focused incentives to the shipbuilders we are motivating them to keep costs down.

► **On Watch:** Can you tell us more about the trade studies that are being conducted for a “trade off analysis” of requirements?

► **Landay:** Let me give you one recent example—the Mobile Landing Platform. For the Mobile Landing Platform, we had some requirements that needed to be met by a design. We held a competition for industry to give us a design that met these requirements. In the past, we would have just awarded a contract for detail design and construction. But instead, we asked industry to work with us to identify what aspects of the ship were significant cost drivers. We looked at different propellers, living space constructions, propulsion and even simple, minor things. We met with the technical community to discuss the design proposed by industry. We were then able to go back to the requirements people to see where the requirements could be changed in order to significantly reduce the cost. That way the Navy really understands how much a requirement is going to cost us. Most important, the technical community, program people and requirements people are having these discussions earlier in the process, well before construction begins.

► **On Watch:** How are you applying Commonality and Open Architecture in Building an Affordable Future Fleet?

► **Landay:** In terms of commonality, we are looking at how can we re-use hull forms, starting with an existing hull form and just modifying it. A good example of this is the command ship replacement. We are also looking at commonality at the system level. Even though the propulsion systems between DDG 1000 and DDG 51 are very different, those two programs were able to have 60 percent commonality in HM&E. Another example of commonality is how we are taking the cutting-edge technologies on DDG 1000 technologies and embedding them into DDG 51 and even other platforms. Commonality also applies to smaller things like pumps and machinery control.

Open Architecture (OA) is another key concept that we are applying to our shipbuilding programs. OA is all about developing a set of standards that will allow the Navy to integrate the latest technologies on existing platforms. So we are working with National Shipbuilding Research Program to see where we can set standards for things like attachments, cabling, machinery controls and even plate thickness. Then we'd then give the shipbuilder those standards so we can give the shipbuilder standards. When it makes sense to do so, we should use commercial standards. The technical community again plays a key role in deciding when and how we use commercial standards by determining the level of acceptable risk. Right now we are focusing on combat systems and C4I spaces. ■

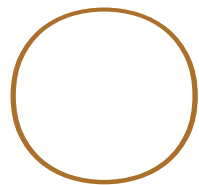
BUILD THE  
FUTURE FLEET

The *Virginia*-class submarine USS *Texas* (SSN 775) arrives at Naval Station Pearl Harbor in Hawaii. (U.S. Navy photo by Chief Mass Communication Specialist Josh Thompson)

# THE VIRGINIA CLASS

## — FROM ACQUISITION TO OPERATIONS

THE *VIRGINIA*-CLASS SUBMARINE TRANSITIONED FROM A PURELY ACQUISITION PROGRAM TO A FULLY OPERATIONAL SUBMARINE CLASS IN 2009. ON OCT. 15, USS *VIRGINIA* (SSN 774) DEPARTED NAVAL SUBMARINE BASE NEW LONDON, CONN., ON ITS FIRST FULL DEPLOYMENT. *VIRGINIA*'S DEPLOYMENT WAS JUST ONE OF MANY EVENTS THAT HIGHLIGHTED TEAM SUBMARINE'S 2009 CALENDAR, MAKING FOR A VERY NOTABLE YEAR.



On June 23, prior to *Virginia*'s deployment, Commander, Operational Test and Evaluation Force (COTF) deemed the U.S. Navy's newest class of submarines "operationally effective" and "operationally suitable," and recommended Fleet introduction. COTF,

the Navy's independent operational test agency, made the announcement after *Virginia*'s Initial Operational Test and Evaluation—a year-long evaluation of the class's seven core mission areas: Anti-Submarine Warfare; Anti-Surface Warfare; Strike;

Special Operations Forces; Intelligence, Surveillance and Reconnaissance; Irregular Warfare; and Mine Warfare.

The *Virginia* Class Program Office also instituted a Reduction of Total Ownership Cost (RTOC) initiative that builds upon its successful cost reduction effort and reduced the per-ship cost by nearly 20 percent beginning with the submarines authorized in Fiscal Year 2012. The RTOC effort applies cost reduction lessons learned to reduce the acquisition and post-delivery costs of the *Virginia* class through the development and implementation of repeatable cost reduction processes.



RTOC seeks to reduce post-delivery costs, such as maintenance, modernization, crew training, and operations. Reducing maintenance time also results in increased operational availability, which allows submarines to spend less time undergoing maintenance and more time deployed executing vital national security operations.

The *Virginia* Class Program Office extended its RTOC efforts to all affected stakeholders, including the naval shipyards, the Office of Naval Research, and its shipbuilding and industry partners. Team Submarine will apply the lessons learned during the RTOC effort into the design and eventual construction of the *Ohio*-class replacement SSBN.

2009 also saw the first *Virginia*-class change of homeport involving an inter-fleet transfer when USS *Hawaii* (SSN 776) sailed from Groton, Conn., to Pearl Harbor. *Hawaii*'s arrival on July 23 marked the first *Virginia*-class submarine to be stationed in the Pacific and reflects the Navy's ongoing force realignment—bringing 60 percent of the Submarine Force's attack submarine assets to the Pacific theater of operations. USS *Texas* (SSN 775) followed *Hawaii*'s transition to the Pacific with its arrival in Pearl Harbor Nov. 23. Prior to transiting to the Pacific Ocean, *Texas* became the first of the class to conduct under-ice testing and became the first *Virginia*-class submarine to surface near the North Pole Oct. 13.

Other major successes demonstrating the *Virginia* class' advanced capabilities and mission flexibility include:

- ▶ May 7 – *Hawaii* received the U.S. Coast Guard's Meritorious Unit Commendation for its part in counter-drug operations in the Eastern Pacific Ocean in support of Joint Inter-agency Task Force South from Feb. 20 to April 17, 2008
- ▶ Dec. 28 – PCU *New Mexico* (SSN 779) delivered to the Navy four months earlier than its contract delivery date
- ▶ Nov 20 – PCU *Missouri* (SSN 780) "floated-off" 57 months after start of construction and is the fastest yet achieved by the *Virginia*-class program. The previous float-off was 59 months on *New Mexico*

Opposite: The *Virginia*-class submarine USS *Texas* (SSN 775) arrives at its new homeport, Naval Station Pearl Harbor. Below: The *Virginia*-class attack submarine USS *New Mexico* (SSN 779) is christened in front of nearly 1,700 guests and crewmembers. (U.S. Navy photos by Chief Mass Communication Specialist Josh Thompson and Mass Communication Specialist 1st Class Todd A. Schaffer)

#### Block I

- ▶ USS *Virginia* (SSN 774) – Underway on first full-length deployment – Oct. 15
- ▶ USS *Texas* (SSN 775) – Transferred to SUBPAC – Nov. 23
- ▶ USS *Hawaii* (SSN 776) – First *Virginia*-class submarine in the Pacific – July 23
- ▶ USS *North Carolina* (SSN 777) – Began the first *Virginia*-class modernization to TI-08 Jan. 14 and completed a Post Shakedown Availability in March 2010

#### Block II

- ▶ USS *New Hampshire* (SSN 778) – Commissioned Oct. 25, 2008; underwent DDS testing Fall/Winter 2009
- ▶ PCU *New Mexico* (SSN 779) – Delivered to the Navy four months earlier than its contract delivery date – December 2009. Commissioning March 27, 2010
- ▶ PCU *Missouri* (SSN 780) – Commissioning July 31, 2010
- ▶ PCU *California* (SSN 781) – 73 percent complete
- ▶ PCU *Mississippi* (SSN 782) – 62 percent complete
- ▶ PCU *Minnesota* (SSN 783) – 51 percent complete

#### Block III

- ▶ PCU *North Dakota* (SSN 784) – Construction started March 2009
- ▶ PCU *John Warner* (SSN 785) – Construction started March 2010
- ▶ SSN 786 – under contract, contract delivery date August 2016
- ▶ SSN 787 – under contract, contract delivery date February 2017
- ▶ SSN 788 – under contract, contract delivery date August 2017
- ▶ SSN 789 – under contract, contract delivery date February 2018
- ▶ SSN 790 – under contract, contract delivery date August 2018
- ▶ SSN 791 – under contract, contract delivery date February 2019



# SWFTS

## — PROVIDING COMBAT CAPABILITY TO THE WARFIGHTER

A submarine, like all warships, derives its combat power from its tactical systems. These systems provide submarines with the ability to detect, track and prosecute targets—the true business of submarining. The programs that constitute Team Submarine’s Submarine Warfare Federated Tactical System (SWFTS) deliver these advanced systems with an innovative process that reduces costs and increases performance across the Submarine Force.

Introduced in 1998 to provide periodic modernization for sonar equipment and technology, the Acoustic Rapid Commercial-off-The-Shelf, or COTS, Insertion construct has transitioned into the SWFTS business model and is now applied across a wide range of tactical systems aboard all attack submarine classes and the four *Ohio*-class SSGNs. SWFTS is a system of systems, with sonar, tactical control, weapons control, imaging, electronic warfare, radio room and torpedoes all falling under SWFTS’s banner. These systems utilize COTS components and are on a regular Technology Insertion (TI) and Advanced Processor Build (APB) cycle that ensure they remain consistent with commercial standards, or “state of the practice.” Under the SWFTS paradigm, program offices deliver new APBs and TIs every two years, with each submarine receiving every other update on average.

A key component of the TI/APB cycle is the use of COTS and Open Architecture (OA) throughout the SWFTS systems. Combining COTS and OA eliminates much of the cost and cumbersome logistics tail by greatly reducing the need for spare parts while allowing the onboard processing power to



The *Ohio*-class guided-missile submarine USS *Georgia* (SSGN 729) arrives in Souda Bay, Greece. (U.S. Navy photo by Mass Communication Specialist 3rd Class John Martinez)

keep pace with commercial standards. Utilizing OA also provides for commonality across platforms, thereby greatly reducing Sailors’ training requirements as they move from one submarine class to another. To date, the Submarine Acoustic Program Office has retired three legacy baseline sonar systems and will complete three more legacy conversions. The Submarine Combat System Program Office retired four legacy baseline combat systems and has four legacy conversions remaining for the AN/BYG-1 Submarine Combat Control System. The Submarine Acoustic Program Office plans to complete all legacy conversions by end of calendar year 2012.

The SWFTS model is also fostering competition across the spectrum of components and systems. By fiscal year 2011, nearly all SWFTS contracts will be competitively awarded. These competitions, which the program office will hold every four to five years for each component, will allow the Navy to foster innovation, improve quality, and maximize research, design and acquisition funding.

In recognition for delivering improved and cost-effective capabilities, Program Executive Office Submarines received the 2009 Defense Enterprise Architecture Achievement Award. The Department of Defense gives this award annually in conjunction with the Association for Enterprise Information; the award recognizes achievements that profoundly improve operational performance and significantly advance information sharing capabilities.

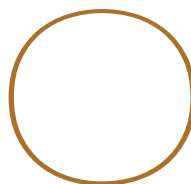
By fostering innovation and collaboration between the Navy and its industry partners through the SWFTS program, Team Submarine is delivering a more capable and cost effective fight to the Fleet. ■



# SUPSALV 2009 SUCCESSES



Deep Drone is lowered into the ocean during the investigation of a collision between a U.S. Coast Guard airplane and U.S. Marine Corps helicopter. Deep Drone is one of SUPSALV's ocean search and recovery assets. (U.S. Navy photo)



ocean search and recovery assets are a mainstay of Naval Sea System Command's Supervisor of Salvage and Diving (SUPSALV) operations. While search and recovery efforts may employ different types of assets, two important resources—Deep

Drone 8000 and the Towed Pinger Locator—are workhorses in SUPSALV's ocean search and recovery locker.

In November 2009, Deep Drone played a key role in the investigation of a collision between a U.S. Coast Guard HC-130H airplane and U.S. Marine Corps AH-1W helicopter near San Clemente Island, Calif. The key components that Deep Drone retrieved provided important information to the accident investigation board.

Earlier in 2009, SUPSALV used its Towed Pinger Locators to search for the cockpit voice and flight data recorders of Air France Flight 447. SUPSALV dispatched a 17-person team of military and contractor personnel and government assets, and searched more than 3,200 square nautical miles during 26 days of international search and recovery operation support to locate the plane's voice and flight data recorders.

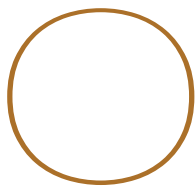
SUPSALV's mission is to provide technical, operational and emergency support to the Navy, Department of Defense and other federal agencies in the ocean engineering disciplines of marine salvage, pollution abatement, diving, diving system certification, and underwater ship husbandry. ■

Top of page: Kevin Pollard ties down a undersea cable, which will be attached to a SUPSALV towed pinger locator to help locate the flight data and cockpit voice recorders of a downed Air France passenger aircraft. (U.S. Navy photo by Oscar Sosa).

BUILD THE  
FUTURE FLEET

The littoral combat ship *USS Independence* (LCS 2) underway during builder's trials—the first opportunity for the shipbuilder and the U.S. Navy to operate the ship underway, and to test and correct issues before acceptance trials. (Photo by Dennis Griggs, General Dynamics)

# LITTORAL COMBAT SHIP: FAST, FLEXIBLE AND FIERCE



n a warm fall day in November, the future USS *Independence* (LCS 2) pushed away from the pier and sailed into Mobile Bay. The future Navy ship, with its distinctive aluminum trimaran was underway for Acceptance Trials.

“While LCS 2 had been to sea earlier this year for Builder’s Trials, Acceptance Trials are the first opportunity for the Navy to really put this ship through its paces,” said Rear Adm. Jim Murdoch, LCS program manager for the Program Executive Office, Ships (PEO Ships). “The ship performed exactly as designed, and I’m looking forward to getting this ship into the hands of our warfighters early next year.”

*Independence*, constructed by General Dynamics-Bath Iron Works at the Austal USA shipyard in Mobile, Ala., is the second littoral combat ship to successfully complete Acceptance Trials, the final milestone prior to the ship’s delivery to the Navy. USS *Freedom* (LCS 1), a different LCS variant characterized by a high-speed semi-planing steel and aluminum monohull and built by Lockheed Martin in Wisconsin at the Marinette Marine Corp. shipyard, was delivered to the Navy last year. Both variants, while visually very different, each meet the requirements for which they were designed.

The LCS class, will serve as the backbone of the Navy’s future surface fleet. LCS is capable of conducting open-ocean operations, but is optimized for littoral, or coastal, missions, and is designed to defeat “anti-access” threats, such as fast surface craft, quiet diesel submarines and mines.

The LCS seaframes will be outfitted with reconfigurable payloads, called mission packages, which can be changed out quickly. Mission packages are supported by military detachments that will deploy manned and unmanned vehicles, and sensors in support of mine, undersea and surface warfare missions.

The Navy plans to build a total of 64 mission packages —24 Surface Warfare Mission Packages, 24 Mine Countermeasures Mission Packages and 16 Anti-Submarine Warfare Mission Packages.

The Surface Warfare Mission Package is specifically designed to combat small, fast-boat threats and currently includes electro-optical/infrared sensors mounted on MQ-8B Fire Scout, a vertical take-off, unmanned air vehicle to provide over-the-horizon detection; 30mm guns to combat close-in targets; and the MH-60R Seahawk armed helicopter for surveillance and attack missions.

The first Anti-Submarine Warfare Mission Package will employ off-board manned and unmanned vehicles at a distance from the ship, allowing the Navy to rapidly engage hostile submarines while the ship stays at stand-off ranges. This package includes Engineering Development Models to demonstrate its ASW capability. Its performance will be assessed during formal at-sea Developmental Testing during 2010. Results will inform decisions on future Mission Package composition.

The Mine Countermeasures Mission Package is a modular, scalable capability that removes ships and Sailors from



Top of page: A Sailor salutes the flag as he comes aboard the littoral combat ship USS *Freedom* (LCS 1). (U.S. Navy photo by Mass Communication Specialist 2nd Class Jhi Scott) Above: USS *Freedom* (LCS 1) rests at her berth at Naval Station Mayport following independent ship training and certification. (U.S. Navy photo by Lt. Ed Early)

## BUILD THE FUTURE FLEET



Top: Cmdr. Don Gabrielson, commanding officer of the littoral combat ship *USS Freedom* (LCS 1), explains the touch screen navigational system on the ship's bridge to Adm. Jonathan W. Greenert, Commander, U.S. Fleet Forces Command. (U.S. Navy photo by Mass Communication Specialist 1st Class Jerry Foltz) Middle: Chief of Naval Operations Adm. Gary Roughead tours the bridge of the littoral combat ship *USS Independence* (LCS 2) at the Austal, USA shipyard in Mobile, Ala. (U.S. Navy photo by Mass Communication Specialist 1st Class Tiffini M. Jones) Bottom: *USS Freedom* (LCS 1) conducts flight deck certification with an MH-60S *Seahawk* helicopter. (U.S. Navy photo by Mass Communication Specialist 2nd Class Nathan Laird)

the dangers of the minefield while detecting, identifying, neutralizing and sweeping mines. Minehunting systems are deployed from the MH-60S helicopter, the Remote Minehunting Vehicle, or an unmanned surface vessel. The systems also provide for the identification and neutralization of mines—something that was previously largely accomplished by Navy divers.

Collectively, the various Mission Packages will provide a flexible, modular set of warfighting systems that enable the warfighter to respond to changing mission needs. The Navy will be able to introduce maturing mission systems quickly using an evolutionary acquisition process driven by warfighting requirements analysis.

2009 was an eventful year for the LCS program. While LCS 2 was completing sea trials, LCS 1 was busy preparing for an early 2010 maiden deployment, two years sooner than originally scheduled. The Navy prioritized and adjusted testing events to accommodate early deployment, which included refocusing the scope of work during the ship's first two post-delivery availabilities. The Navy intends to employ the ship's unique capabilities as soon as possible.

The program also began construction on the next two ships of the class, *Fort Worth* (LCS 3) and *Coronado* (LCS 4), both awarded under fixed-price contracts. Key lessons learned during the construction of both lead ships are being leveraged to drive down the costs of the follow ships while ensuring they are built and delivered with the highest quality.

The LCS shipyards are also making significant capital investment to further drive down costs while increasing production capacity. Austal USA, the builder of the General Dynamics LCS variant, has invested significant capital on the recently opened Modular Manufacturing Facility to efficiently produce high-quality ship modules and to improve production efficiency in both LCS and Joint High Speed Vessel construction. Fincantieri, the owner of Marinette Marine, has also invested significant resources in the yard for process and manufacturing efficiency improvements with the intent of driving down the cost of the Lockheed Martin variant.

The Navy anticipates these additional production efficiencies will reduce construction duration, lower production costs that run with time, and mitigate existing production process and control risks inherent with their current facilities and workflow. To achieve its affordability goals, PEO Ships will continue incentivizing these types of industry investments.

"Affordability is paramount," said Rear Adm. William Landay, program executive officer, ships. "We expect to see further cost reductions as Navy and industry learning increases, larger quantities are procured and additional cost reduction efforts are implemented."

The Navy's vision for the Fleet of the future includes 55 of these fast, shore hugging, mission-focused ships, and attaining this goal depends on the serial production of LCS on cost and on schedule. ■

The *Arleigh Burke*-class guided-missile destroyer USS *Wayne E. Meyer* (DDG 108) arrives at its new homeport of San Diego after transiting from Bath, Maine. (U.S. Navy photo by Mass Communication Specialist 3rd Class Joshua Martin)

# U.S. NAVY DESTROYERS TODAY AND TOMORROW

Construction began on the first ship of the DDG 1000 class in February 2009, and the Navy's Program Executive Office (PEO) Ships and its industry partners have worked diligently to mature the ship's design and ready their industrial facilities to build this advanced surface combatant on cost and on schedule. DDG 1000 is designed to defeat anti-access systems, including advanced cruise missiles, sea mines and quiet submarines operating in the littorals.

The DDG 1000 design was more mature at start of fabrication than any lead surface combatant to date, and all 13 Engineering Development Models, or EDMs, have entered production, including 155mm Advanced Gun System and its Long Range Land Attack Projectile (LRLAP); the Mark 57 Advanced Vertical Launch System; composite deckhouse; the infrared suppression engine exhaust and heat suppression system; and components of the Integrated Power System. The Navy currently plans to build three DDG 1000-class destroyers.

PEO Ships also demonstrated continued success in building DDG 51-class destroyers. In 2009, the future USS *Dewey* (DDG 105) and USS *Wayne E. Meyer* (DDG 108) were delivered, and USS *Truxtun* (DDG 103) and USS *Stockdale* (DDG 106) were commissioned. The Navy has five ships of the class currently under construction. These ships continue to be delivered at the highest quality, and serial production has allowed cost to be reduced while increasing capabilities. Capable of fighting air, surface, and subsurface battles simultaneously, ships of the class have a myriad of offensive and defensive weapons designed to support missile defense and other aspects of maritime defense well into the 21st century. Because of this range of capabilities, the Navy decided in 2009 to restart the DDG 51 program. ■



Workers at the General Dynamics-Bath Iron Works shipyard in Bath, Maine, weld together pieces of an inner-bottom unit for the future USS *Zumwalt* (DDG 1000). (Photo courtesy General Dynamics)

IT'S BEEN LESS THAN 10 YEARS SINCE THE PROGRAM'S INCEPTION, BUT ALREADY EIGHT SHIPS OF THE 14-SHIP *LEWIS AND CLARK* (T-AKE) CLASS HAVE BEEN DESIGNED, CONSTRUCTED, AND DELIVERED TO THE NAVY. SEVEN OF THE EIGHT DELIVERED SHIPS HAVE DEPLOYED AND HAVE MADE THEIR PRESENCE FELT IN THE FLEET.

## T-AKE CLASS TAKING CHARGE

From fighting pirates in the Gulf of Aden to delivering humanitarian relief to Indonesians ravaged by earthquakes, *Lewis and Clark*-class dry cargo/ammunition ships are contributing significantly to U.S. Navy forward presence missions.

The most recent ship to join the Fleet is USNS *Wally Schirra* (T-AKE 8), which was delivered on Sept. 1, 2009, more than a month ahead of the contract delivery date. USNS *Carl Brashear* (T-AKE 7) was delivered earlier in the year on March 4. Another four ships are under construction at General Dynamics-NASSCO, with the 12th, *William McLean*, in construction since Sept. 22.

The program will continue these successes into early 2010 with the delivery of *Matthew Perry* (T-AKE 9). If 2009 has been an indicator, *Perry* will deliver on time, on budget and ready to serve.



The Military Sealift Command dry cargo/ammunition ship USNS *Wally Schirra* (T-AKE 8), named after astronaut Capt. Wally Schirra, slides into San Diego Bay after her christening and launch. (U.S. Navy photo by Mass Communication Specialist 1st Class Jose Lopez Jr.)



“We are delivering an incredible capability on cost and on schedule,” said Frank McCarthy, program manager for Support Ships, Boats and Craft in the Navy’s Program Executive Office, Ships (PEO Ships). “PEO Ships and our industry partner have really been aggressive in looking for cost and schedule reductions, and that has really contributed to the success of the T-AKE program.”

As this class has entered serial production, NASSCO has increased learning and production efficiencies to make substantial reductions in labor hours, from hull to hull. For example, T-AKE 7 was produced with fewer than 50 percent of the man-hours it took to produce T-AKE 1, and had a 37 percent reduction in total construction time. PEO Ships is taking advantage of this successful program by applying lessons-learned from this class to other programs to help move beyond the challenges inherent in new ship construction.

To further increase construction efficiency, NASSCO has invested significant capital in their yard. Capital investment and facility improvements have led to cost reductions, and PEO Ships intends to continue supporting and incentivizing these types of industry investments and improvements.

*Lewis and Clark*-class ships are being built to replace the Military Sealift Command’s aging Fleet of single-mission ammunition and combat store ships, playing a vital role in guaranteeing the Navy’s worldwide forward presence by delivering ammunition, food, fuel, and other dry cargo to U.S. and al-

Cmdr. H. B. Le, commanding officer of the guided-missile destroyer USS *Lassen* (DDG 82), instructs Ens. Maynard Malixi to steer the ship during an underway replenishment with the Military Sealift Command dry cargo/ammunition ship USNS *Carl Brashear* (T-AKE 7). (U.S. Navy photo by Mass Communication Specialist 2nd Class Matthew R. White)

lied ships at sea. The ships are designed to operate independently for extended periods at sea, and can carry and support two helicopters to conduct vertical replenishment. The class is providing effective Fleet underway replenishment capability at a low life cycle cost compared to the auxiliary ships they are replacing. To meet that goal, T-AKEs are designed and constructed to predominantly commercial specifications and standards, and certified by the American Bureau of Shipping, U.S. Coast Guard and other regulatory bodies. ■

Military Sealift Command dry cargo/ammunition ship USNS *Alan B. Shepard* (T-AKE 3), left, and aircraft carrier USS *George Washington* (CVN 73) conduct an underway replenishment at sea. (Photo by Mass Communication Specialist Seaman Adam K. Thomas)



USS *New York* (LPD 21) enters New York Harbor. (U.S. Coast Guard photo by Petty Officer 2nd Class Annie Elis)



# LPD 17 CLASS: A NATION'S RESOLVE FORGED IN STEEL

CONSTRUCTED FROM STEEL SALVAGED FROM THE WRECKAGE OF THE WORLD TRADE CENTER, USS *NEW YORK* (LPD 21), THE FIFTH SHIP OF THE LPD 17 CLASS, WAS COMMISSIONED IN A SOLEMN CEREMONY ON NEW YORK CITY'S PIER 88 ON NOV. 7, 2009.

Punctuated by moving speeches from Secretary of State Hillary Clinton, New York Gov. David Paterson, Secretary of the Navy Ray Mabus, and other officials, the ceremony was a fitting reminder of the proud history of the ships that preceded it, the American spirit in the aftermath of Sept. 11, 2001, and the coming alive of a great ship. The significance of the day was reflected in the audience—crew and family members, shipbuilders, first responders, World War II veterans from the last ship named USS *New York* (BB 34) and family members of 9/11 victims.

LPD 21 was officially named “New York” by former Secretary of the Navy Gordon England, in honor of those who per-

ished in the terrorist attacks of Sept. 11, 2001. The ship's bow stem was constructed using 7.5 tons of steel salvaged from the World Trade Center. The Navy named the 8th and 9th ships of the class, *Arlington* (LPD 24) and *Somerset* (LPD 25), in remembrance of the victims of the attacks on the Pentagon and United Flight 93 respectively. Like *New York*, *Arlington* and *Somerset* are also incorporating materials salvaged from those sites.

The first five ships of *New York*, USS *Green Bay* (LPD 20) officially joined the Fleet during a commissioning ceremony in January 2009. The Navy's Program Executive Office, Ships (PEO Ships) is managing the construction of four more ships of the class at Northrop Grumman Shipbuilding facilities in Pascagoula, Miss., and New Orleans.

“*New York* is a product of continued improvement in LPD 17-class construction, testing and support,” said Frederick J. Stefany, LPD 17 class program manager for PEO Ships. “Each new ship in this class represents the lessons learned from the experiences of her four preceding sister ships. Like other shipbuilding programs managed by PEO Ships, the LPD 17 program has matured as it moves further into serial production and continues to apply lessons learned to follow-on ships of the class. Each ship received fewer trial cards from the Navy’s Board of Inspection and Survey indicating discrepancies needing correction during Acceptance Trials than its predecessor. This demonstrates that these lessons learned are being incorporated.”

Additional measures are also being implemented to improve affordability. The program continues to work diligently to minimize contract changes and has implemented requirements-to-cost tradeoffs and contract scope reductions. As the number of ships delivered has increased, the program migrated to fixed price contracts starting with LPD 21, reducing the government’s exposure to cost overruns.

The principal mission of LPD 17-class ships is to transport and deploy Marines fulfilling amphibious warfare missions provided by four older ship classes, including LST 1179, LPD 4, LSD 36, and LKA 113. LPD 17 class ships are longer than two football fields, with room for approximately 720 troops. The ships have the capability of transporting and debarking landing craft, air cushioned (LCAC) or conventional landing craft and Expeditionary Fighting Vehicles (EFV), augmented by helicopters or vertical take-off and landing aircraft (MV-22). These ships will support amphibious assault, special opera-



The amphibious transport ship *USS Green Bay* (LPD 20) travels under the Golden Gate Bridge for San Francisco Fleet Week 2009. (U.S. Navy photo by Chief Mass Communication Specialist Terry L. Rhedin)



Landing craft air-cushioned vehicles disembark from the well deck of the amphibious transport dock ship *USS Mesa Verde* (LPD 19) for an amphibious landing demonstration near Mayport, Fla. (U.S. Navy photo by Mass Communication Specialist Seaman Patrick Grieco)

tions and expeditionary warfare missions through the first half of the 21st century.

Each LPD 17-class ship has more than 23,000 square feet of vehicle storage space, more than double that of the ships it replaces. In addition, by focusing on optimized manning and reducing life cycle costs, ships of the class are easier to maintain, provide computerized onboard training, improve quality of life, and bring technological enhancements to every aspect of operations at sea.

The first two ships of the class, *USS San Antonio* (LPD 17) and *USS New Orleans* (LPD 18), completed their maiden deployments in 2009, returning to homeport in March and August, respectively. Both ships deployed to the U.S. 5th Fleet area of responsibility to conduct maritime security and anti-piracy operations. *USS Mesa Verde* (LPD 19) is preparing to deploy in early 2010. ■

Sailors assigned to Riverine Squadron 1 race along the Euphrates River in riverine patrol boats. (U.S. Navy photo by Mass Communication Specialist 2nd Class Kevin S. O'Brien)



# SMALL BOATS, BIG MISSIONS

Successful execution of the maritime strategy requires not only front line surface combatants, but also the acquisition and construction of numerous high performance boats and craft for the U.S. Navy, other government agencies and our foreign allies.

In 2009, the Auxiliary Ships, Small Boats and Craft program office (PMS 325) in the Program Executive Office, Ships (PEO Ships) delivered more than 85 boats and combatant craft to Navy commands and domestic agencies, including the newly established Navy Expeditionary Combat Command. PMS 325 has also delivered 186 high performance boats and combatant craft to allied nations.

These craft are often built to existing commercial standards, resulting in significant savings in cost and schedule.

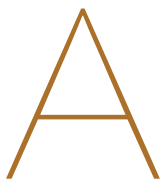
Current domestic acquisitions include riverine assault boats, riverine command boats, riverine patrol boats, force protection boats, barrier tenders, Fleet harbor security boats and service craft for U.S. Navy installations worldwide. In addition, the office is acquiring more unique items like the sail training craft being procured for the U.S. Naval Academy or the passenger boats being built to ferry tourists to the site of the USS *Arizona* Memorial in Pearl Harbor.

“Combatant craft, like our riverine boats, are very important to the Fleet,” said Jean Michel Coughlin, PEO Ships’ small boat acquisition manager. “They are able to embark down rivers, in shallow water and in the littorals. These areas must be patrolled to fight the constant threat of terrorism.”

The Navy’s foreign partners also rely on PMS 325 expertise in boat design and acquisition. This assistance represents a commitment for continued cooperation between the United States and its partners. The program office is aiding more than 50 allied nations in boat and combatant craft procurements through Foreign Military Sales, including the Middle East nations of Egypt, Kuwait, Yemen and Oman; and Asian countries such as Malaysia and the Philippines. PMS 325 is also assisting South and Central American countries like Colombia and El Salvador with the procurement of high-speed counternarcotics craft for critical drug interdiction missions.

PMS 325 is also managing an aggressive effort to reconstitute the Iraqi navy with a fleet of 35-meter patrol craft and offshore support vessels for use in guarding its critical offshore petroleum discharge platforms. This procurement will provide Iraq the capability to enforce their maritime sovereignty and security. ■

# JHSV STARTS CONSTRUCTION



Although in development for less than three years, work began on the Joint High Speed Vessel program in 2009 as the Navy and shipbuilder commenced construction on the first ship of the class following a successful Production Readiness Review (PRR).

“The PRR ensured the proper level of design maturity, availability of materials and components, and the shipbuilder’s readiness to successfully start and sustain fabrication,” said Capt. George Sutton, program manager of the Strategic and Theater Sealift program in the Navy’s Program Executive Office, Ships (PEO Ships). “The successful PRR gave the shipbuilder, Austal USA, the green light to begin construction of Fortitude, the first ship in the class.”

To leverage the Navy’s extensive experience in surface ship acquisition, PEO Ships has the lead on acquisition of both the Army and Navy high speed transport vessels. JHSV 1 is expected to deliver to the Army in 2013. The second JHSV will be delivered to the Navy the following year.

This commercially designed, non-combatant vessel leverages commercial technology and merges the previous Army Theater Support Vessel (TSV) and the Navy High Speed Connector (HSC) to decrease costs by taking advantage of the inherent commonality between the existing programs. Significant production and financial risk has been avoided by implementing proven technology, ensuring stable requirements, minimizing change, and through the ruthless pursuit of cost reduction and efficiency.

To further improve production efficiencies, Austal has constructed a Modular Manufacturing Facility (MMF), which was partially built using federal infrastructure improvement funding awarded to offset the damages of Hurricane Katrina. The first phase of this facility, completed in November 2009, will provide a five-fold increase in existing capacity, allowing the company to build JHSV more efficiently. Eventually, both Austal USA and the Navy anticipate that these additional production improvements will reduce construction duration, and better control the risks inherent with their current facilities and workflow.

“The rigorous design review process prior to construction ensures a great start to JHSV production,” Sutton said. “Additionally, the improvement in production processes and insertion of proven technology alleviates many question marks often associated with the acquisition of new ships. Our drive




The Joint High Speed Vessel (JHSV) will be used for fast intra-theater transportation of troops, vehicles and equipment for the U.S. Army and U.S. Navy. In January 2010, the Navy awarded contract modifications for the construction of the second and third ships in the JHSV program. (Illustration courtesy Austal USA)

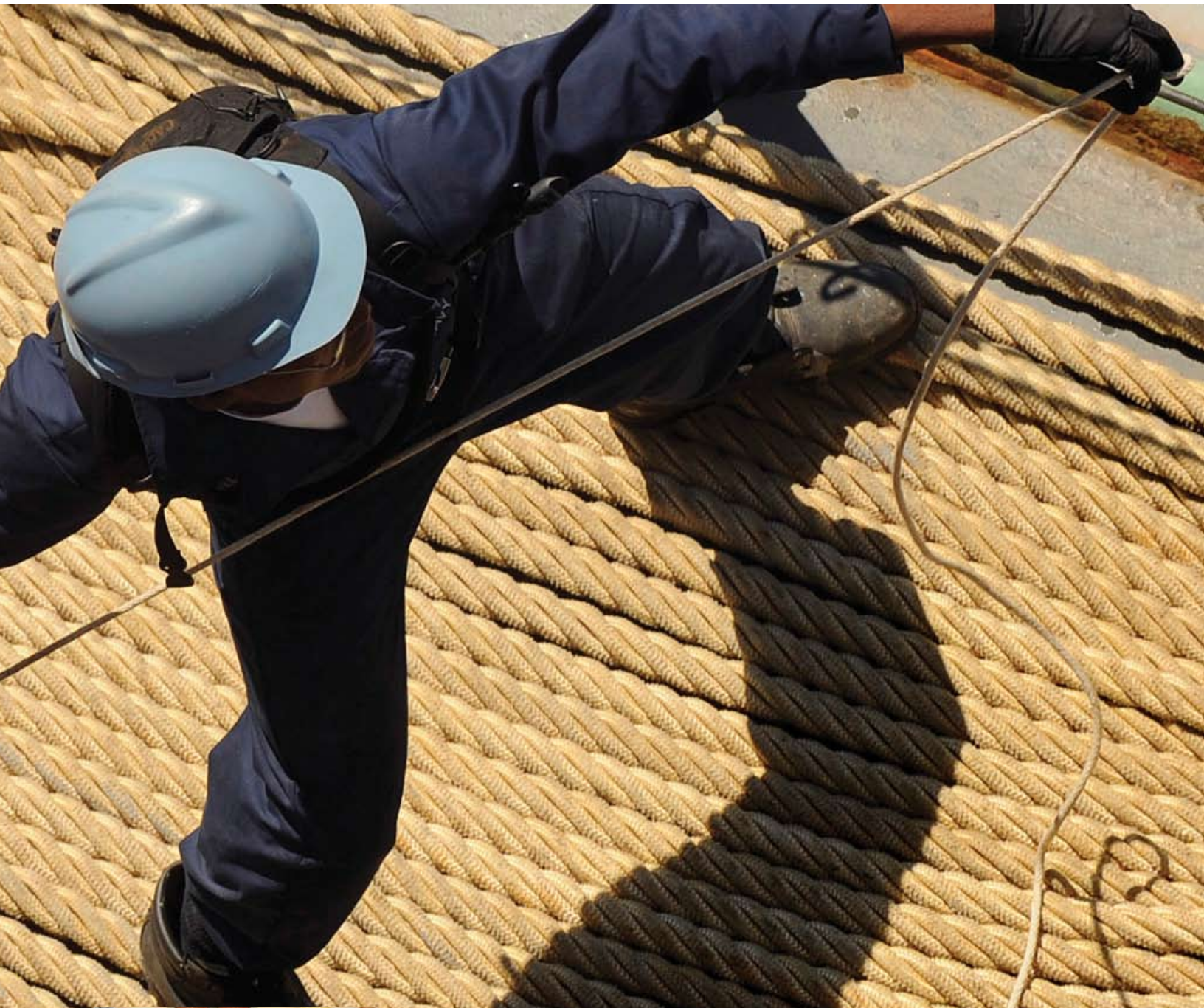
for affordability and efficiency are the cornerstones of the JHSV program.”

The program is procuring high-speed transport vessels for the Army and the Navy. These vessels will be used for fast intra-theater transportation of troops, military vehicles and equipment. The ships will be capable of transporting 600 short tons 1,200 nautical miles at an average speed of 35 knots. They will be capable of operating in shallow-draft ports and waterways, interfacing with roll-on/roll-off discharge facilities, and on/off-loading a combat-loaded Abrams Main Battle Tank (M1A2). Other joint requirements include an aviation flight deck to support day and night air vehicle launch and recovery operations. ■

# ENABLE OUR PEOPLE



A Sailor tosses a heaving line aboard USS *Fort McHenry* (LSD 43). (U.S. Navy photo by Mass Communication Specialist 2nd Class Kristopher Wilson)



ENABLE  
OUR PEOPLE



GROWING  
NAVSEA'S TALENT



NAVSEA'S SUCCESS AS AN ORGANIZATION IS DIRECTLY TIED TO THE SUCCESS OF ITS PEOPLE—A FACT THAT IS DEMONSTRATED BY ONE OF THE COMMAND'S THREE STRATEGIC GOALS OF "ENABLE OUR PEOPLE."



Championed by NAVSEA Executive Director Brian Persons and led by Naval Undersea Warfare Center Technical Director Don McCormack, NAVSEA has made significant strides in 2009 in accomplishing this goal through the command's Talent Management Strategy (TMS).

"NAVSEA's TMS is designed to attract the people we need to do the work and minimize the impact of employees leaving," said Alan Dean, head of the Warfare Centers' Workforce Directorate. "It also allows us to effectively respond to higher-level guidance, to changes in the external world and to the needs of our own employees. It reinforces the foundation—our people—that makes us successful as a command in accomplishing our mission and achieving our strategic goals in support of the Navy."

NAVSEA's TMS takes a national approach to talent management while preserving the strength of the local field activity. The TMS is being implemented by four teams that address the four different aspects of the talent management cycle: outreach; recruit; acquire; and develop and retain.

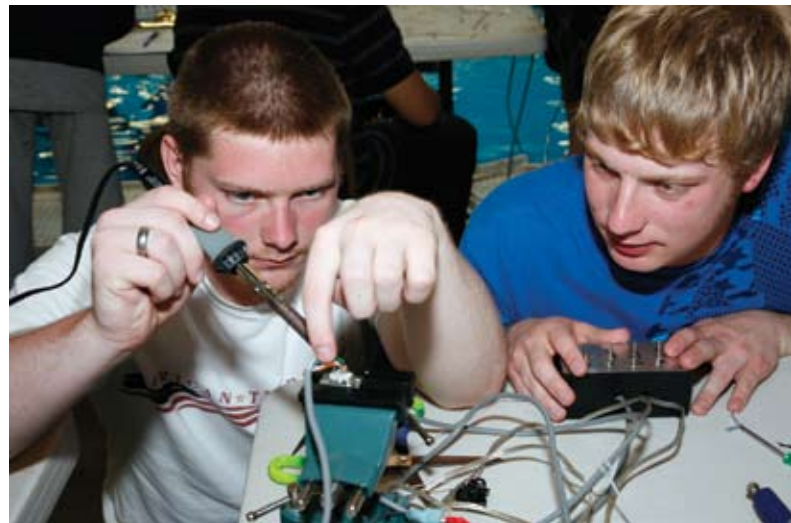
### Outreach

The United States is facing a crisis in the area of engineering with fewer and fewer American children choosing to enter into Science, Technology, Engineering and Math (STEM) fields of study. In 2009 NAVSEA ramped up its efforts to foster grade school, junior high and high school student interest in the STEM fields through outreach events at our Warfare Centers, shipyards and field activities through the NAVAL 21st Century Engagement, Education & Technology Program (21CEETP).

Throughout 2009, Portsmouth Naval Shipyard hosted dozens of local high school and elementary students and gave tours of the shipyard to educate students on the facility's contribution to the U.S. Navy and community as well as career opportunities at the shipyard.

In June, NSWC Carderock hosted the 10th International Human-Powered Submarine Races (ISR). During this biennial engineering design competition, teams of high school and college engineering students design, build and operate a human-powered submarine and navigate it through an underwater course.

Left: NSWC Corona Engineer Neal Nakafuji operates Ground Tracking System demonstration for third-grader Braeden Huffman during a Science Technology Education Partnership (STEP) Conference in Riverside, Calif. (U.S. Navy photo by Greg Vojtko)



Top: Physics students participate in a Remotely Operated Vehicle Challenge Day led by NUWC Keyport and the Naval Undersea Museum. (U.S. Navy photo)

Above: A shipyard worker speaks to a group of local elementary school students during an open house at Portsmouth Naval Shipyard. (U.S. Navy photo by Jeremy Lambert)

Later in the summer, 200 local middle school students teamed with 16 mentor volunteers from NSWC Dahlgren to solve challenging scenarios with technical solutions during a two-week Virginia Demonstration Project (VDP) Summer Academy.

"It is important to provide encouragement and stimulation to our young people regarding the field of science," said Jane Bachman, summer camp director and NSWC Dahlgren

ENABLE  
OUR PEOPLE



Local students in Keyport, Wash., participate in a Navy-led challenge day designed to increase students' interest in Science, Technology, Engineering and Mathematics (STEM) fields. (U.S. Navy photo)

Advanced Concepts and Payloads engineer. "The working environment experience where students can sense the why, what and how things are done through interaction with scientists and engineers can benefit them when making their future career decisions."

In October, nearly 3,000 4th through 12th grade students learned about Navy technology from the scientists and engineers of Naval Surface Warfare Center Corona during the 10th Annual Science and Technology Education Partnership (STEP) Conference in Riverside, Calif.

"The STEP conference is a great way to showcase the Navy's technologies to these young students, so they can see the exciting science and engineering careers that await them with the Navy," said NSWC Corona Commanding Officer Capt. Jay A. Kadowaki. "Their only limitation in life is how



(From left) NAVSEA Executive Director Brian Persons, Assistant Secretary of the Navy for Manpower and Reserve Affairs Juan Garcia, and NAVSEA Commander Vice Adm. Kevin McCoy speak with a wounded warrior during a visit to Walter Reed Army Medical Center. (U.S. Navy photo by Laura Lakeway)

boldly they dare to dream; we are here to inspire that dream and encourage them to do something that is literally out of this world."

Another way NAVSEA is working to ensure more young Americans pursue STEM careers is by creating scholarship opportunities for college students to pursue degrees in STEM-related fields. The command currently has more than two dozen NAVSEA scholars enrolled in an Historically Black College/University (HBCU) and pursuing STEM degrees, with a goal of growing this number to 100 HBCU and other minority scholars enrolled by the end of 2012. NAVSEA commands all across the country are forming relationships with targeted schools to create mentoring programs and internship opportunities.

NAVSEA field activities also engaged with the local community. Combat Direction Systems Activity (CDSA) Dam Neck, Va., a naval surface warfare activity, received the Navy's 2008 Community Service Award for Health, Safety, and Fitness for the second year in a row. CDSA Dam Neck's major health and fitness volunteer efforts included coaching and oversight of regional Special Olympics sporting events and volunteering with local school systems.

### Recruit

At a time when many companies are downsizing, NAVSEA continues to hire employees at entry, mid-career and senior management levels—in all career fields. Empowered through the NAVSEA Recruiting Partnership, NAVSEA field activities from Hawaii to Maine are hiring the best and brightest candi-

dates through local, regional and national hiring events.

Now in its second year, the NAVSEA Recruiting Partnership continued to mature in 2009. The partnership improved its use of technology to share resumes and collaborate as a team. The partnership also held a corporate training session to give all NAVSEA trainers a common set of tools to reach potential applicants. At 17 national recruiting events, NAVSEA recruiters gathered more than 2,000 resumes from qualified applicants for openings across the command.

In addition to hiring entry-level employees, NAVSEA is building up its acquisition workforce. NAVSEA is utilizing the Acquisition Workforce Development Fund to address this critical issue and ensure the Navy's acquisition workforce is robust and capable in the coming years.

Just one example of NAVSEA's successful new recruiting efforts in 2009 was the hiring of more than 50 displaced automotive professionals from the Detroit area. Many of these mid-career professionals were hired under the newly-established Naval Acquisition Associates Program, a comprehensive developmental program that prepares mid-level new-hires for successful careers at NAVSEA.

"After obtaining technical maturity in automotive-product development, I was looking for an organization that not only had a strong heritage, but one that was evolving their business models to include architecture development using systems engineering principles," said Lisa Burns, a former Ford Motor Company mechanical engineer who now works for Program Executive Office Integrated Warfare Systems. "At NAVSEA, I have also found personal and technical development through a two-year rotation program for mid-career professionals; comprehensive acquisition training; and one-on-one mentoring with executives. I am building an exciting new career while acquiring and developing innovative products for the U.S. Navy."

2009 also marked an expansion of NAVSEA's commitment to Wounded Warriors. NAVSEA partnered with organizations nationwide to blend educational opportunities, training and job placement with a Wounded Warrior's experience and skill set, so they can continue to serve. In 2009 NAVSEA established relationships with the Army Wounded Warrior Program, Army Warrior Transition Command, DoD Operation Warfighter, USMC Wounded Warrior Regiment, Navy Safe Harbor Program, Veterans Affairs, and medical staffs at major military hospitals.

"I think there are no better employees in our midst than folks who have raised their hand and said, 'I'm willing to go wear the uniform of this country and go into battle,'" said NAVSEA Commander Vice Adm. Kevin McCoy. "It's our goal to attract these individuals to NAVSEA and be the Navy leader in hiring Wounded Warriors."

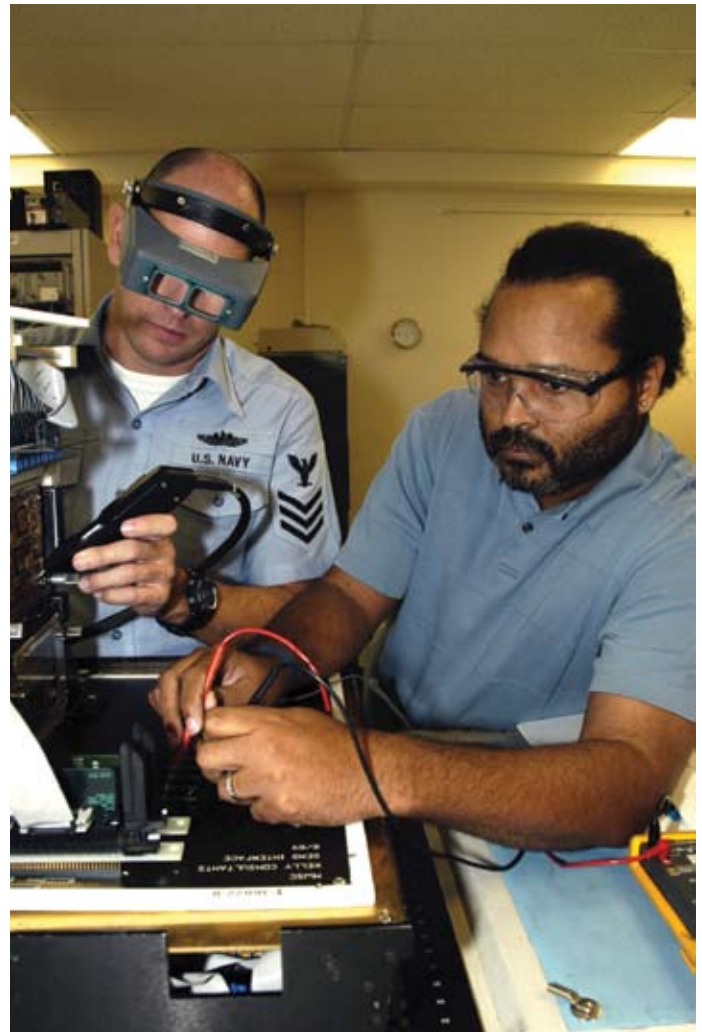
During fiscal year 2008 and 2009, NAVSEA hired more than 150 Wounded Warriors and many more veterans with disabilities. Puget Sound Naval Shipyard and Intermediate

Maintenance Facility, accounted for 119 of those hires. Leading the way in the education and hiring of Wounded Warriors is NSWC Crane, through its partnership with the non-profit organization Crane Learning and Education Center (CLEC). CLEC partners with the state of Indiana, the Lilly Endowment, and Crane Technology, Inc. to hire Wounded Warriors as interns, then provide training in a wide range of positions, such as technicians, logisticians and security specialists. NAVSEA plans to add more Wounded Warriors to its workforce with an ambitious outreach effort for fiscal year 2010.

### Acquire

In 2009, NAVSEA piloted an onboarding program to integrate and assimilate new hires into the organization and make sure that they feel welcomed, valued and prepared for what lies

Below: Electronics Technician 1st Class Anthony Taylor, left, and Lead 2M Technician Phil Lewis test circuit cards needing repairs at Pearl Harbor Naval Shipyard & Intermediate Maintenance Facility's Shop 67M module screening and repair activity. (U.S. Navy photo by Kathryn Vanes)





ahead. The new corporate process will underscore NAVSEA alignment through standardized onboarding practices while allowing individual sites to tailor their approaches to accommodate local differences. The program includes “traditional” orientation but extends well beyond the first day or week on the job. It will last up to a year, and include bi-weekly and monthly segments, such as mandatory training; workshops to explore benefits packages and to foster personal and professional development; a trip to a naval shipyard to “meet the Fleet;” and an anniversary celebration to commemorate the employee’s first year at NAVSEA.

“We expect our corporate onboarding process to have a domino effect,” said Naval Undersea Warfare Center Technical Director Don McCormack, who is heading the leadership board for Enable our People goal efforts. “By integrating folks more thoroughly and efficiently into the NAVSEA family, we bring them up to speed more quickly, give them more resources, and empower them to contribute to our mission success. We also anticipate that starting out on a strongly positive note will increase retention rates.”

### **Develop and Retain**

Perhaps the most critical aspect of NAVSEA’s Talent Management Strategy is the final phase where employees are offered the training and other developmental activities to allow them to grow professionally. The Leading for Results (LFR)

training program is one of several programs NAVSEA offers employees to maximize their career potential. Designed specifically for first-line supervisors appointed within the past six to 18 months, the LFR course assists participants in the transition from individual contributor to supervisor.

The Apprentice Program at the four Naval Shipyards continued to be a success in 2009, graduating a total of 550 apprentices across all the shipyards. The four-year program trains employees in nearly 30 different trades such as welder, pipefitter, electrician, machinist, rigger, fabric worker and metal inspector through formal classroom trade theory training and on-the-job work experience. Upon completing the rigorous and competitive program, apprentices graduate as skilled journeymen and many earn associates degrees.

“Being able to be part of the apprentice program was a great opportunity for all of us...personally, it has changed my life,” said Norfolk Naval Shipyard’s 2009 class valedictorian Laura Robbins, who shared her history of being a high-school dropout and single mother at the graduation ceremony. “It is because of our confidence and perseverance that we are here today.”

### **Diversity**

The command’s ability to attract, develop, mentor and retain a diverse workforce is fundamental to our ability to continue to build and maintain a strong, talented and relevant Navy.

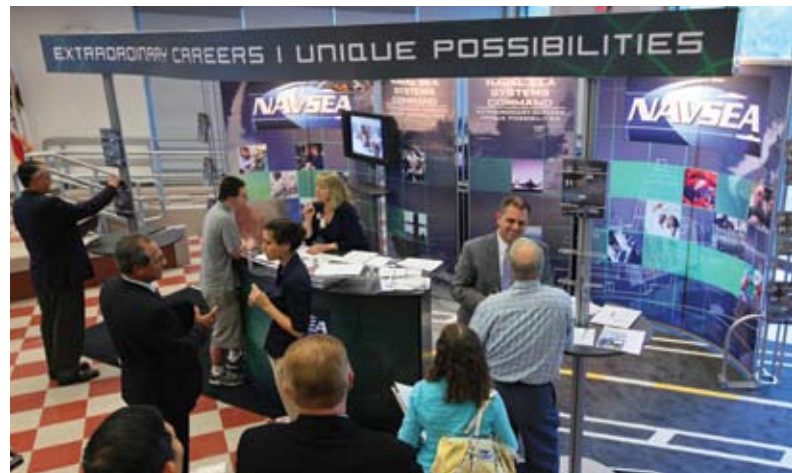


Opposite page and right: Job seekers gather outside a NAVSEA National Hiring Event at the Norco Campus of Riverside Community College in Norco, Calif. The event sought to find candidates to fill 1,500 engineering, scientific openings across the NAVSEA organization. Above: Elizabeth Brierty, left, and Annalisa Zavala, right, enjoy a thermal image of themselves created by Naval Surface Warfare Center Corona Mechanical Engineer Rey Cheesman using forward-looking infrared (FLIR) system during a family science night in Highland, Calif. (U.S. Navy photos by Greg Vojtko)

NAVSEA's commitment to diversity is embedded in each phase of the command's Talent Management Strategy.

NAVSEA builds relationships with diverse organizations to ensure the strength of our workforce. The command has long-standing, vigorous relationships with organizations such as Society of Hispanic Professional Engineers (SHPE), Society of Women Engineers (SWE), National Society of Black Engineers (NSBE) and American Indian Science & Engineering Society (AISES) -- just to name a few.

NAVSEA's robust diversity offices at headquarters and field activities implement powerful local diversity programs. The command has an internal Diversity Advisory Group, (DAG) consisting of broad representation from all NAVSEA activities, which assists with monitoring the EEO/Diversity climate within NAVSEA. The DAG also serves as a sound-



ing board for determining the work culture and attitudes of NAVSEA employees and focuses on concerns identified by all groups. In addition, NAVSEA has Employee Resource Groups, each lead by a NAVSEA senior leader, for each of the following: African American, American Indian, Asian Pacific American, Hispanic, Women, People with Disabilities and Wounded Warriors.

NAVSEA's commitment doesn't stop at the individual level—it is also applied to the command's business practices. In early 2009, NAVSEA and affiliated PEOs hosted the first Hispanic Owned Small Business conference in Los Angeles with

## ENABLE OUR PEOPLE



Thousands of employees gather at Puget Sound Naval Shipyard & Intermediate Maintenance Facility's Bremerton site in September 2009 to celebrate the site's recertification as an OSHA Voluntary Protection Program "Star" Site. (U.S. Navy photo by Rick Chaffee)

## VPP CULTIVATES CULTURE OF SAFETY

In 2009 NAVSEA continued its commitment to Safety and participation in the Voluntary Protection Program (VPP). VPP is a partnership between Occupational Safety and Health Administration and organizations where leadership, management and employees together take ownership of achieving exemplary occupational safety and health. All four of NAVSEA's naval shipyards have already implemented VPP principles and received "Star" status—the highest rating available under the program. This year NAVSEA headquarters made progress in the VPP Challenge Program, which it began in 2008. Headquarters stood up 12 VPP teams in 2009 to encourage employees and management to make safety and health an inherent part of their life. The teams focus on issues ranging from total wellness and ergonomics to transportation safety and emergency preparedness.

the goal to educate Hispanic businesses on how to compete for contracts with NAVSEA and the PEOs. Reaching out to minority businesses is a key part of NAVSEA's diversity initiatives.

Most important, NAVSEA implemented structured Diversity Accountability Reviews to make sure that diversity is promoted at all levels of the organization.

"Working together, we are identifying what jobs it takes in a person's career path to rise to the most senior levels of leadership," said McCoy. "So as senior leadership positions are filled, we are taking on the responsibility to ensure that there is a diverse selection pool of qualified candidates. I believe every individual should be inspired to reach their full career potential, and part of that is being able to rise through the ranks to the most senior levels of leadership. It is a business imperative that we implement this concept from the top - down. NAVSEA needs a workforce that reflects the talent and diversity of American society, if we are going to continue to design, build and maintain the world's greatest Navy." ■

Right: A team navigates the underwater course during International Human-Powered Submarine Races hosted by Naval Surface Warfare Center Carderock. (U.S. Navy photo by Nicole Martin)

Right Bottom: Naval Surface Warfare Center Corona Commanding Officer Capt. Jay Kadowaki, left, discusses Navy civilian career opportunities with Sabryna Hawes and daughter Jennifer Hawes during a Riverside College and Career Fair at Riverside Convention Center in Riverside, Calif. (U.S. Navy Photo by Greg Vojtko)



2010

# COMMAND POCKET GUIDE

THE COMPLETE DIRECTORY TO PEOPLE AND  
OFFICES AT THE NAVAL SEA SYSTEMS COMMAND



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