



# PROGRAM EXECUTIVE OFFICE

## LITTORAL & MINE WARFARE



## ANNUAL REPORT FY2008



APPROVED FOR PUBLIC RELEASE



# *PEO LMW HISTORY*

PEO LMW designs, delivers and maintains the systems, equipment and weapons needed by the warfighter to dominate the littoral battlespace and provide the Warfighter Assured Access.

PEO LMW develops, acquires and maintains operationally superior and affordable systems to provide assured access for U.S. and coalition forces in the littoral battle space. LMW's efforts are focused to best meet the Joint Warfighting Forces' requirements for dominance in the littorals and persistent access to that battlespace.

The Program Executive Officer, Littoral and Mine Warfare (PEO LMW) is part of the Naval Sea Systems (NAVSEA) Command. Naval Sea Systems Command (NAVSEA) is the largest of the Navy's five system commands. With a fiscal year 2008 investment budget of \$22.4 billion, NAVSEA accounts for one third of the Navy's entire investment budget.

With a force of 53,000 civilian, military and contract support personnel, NAVSEA engineers, builds, buys and maintains the Navy's ships and submarines and their combat systems.

Originally established in 1992 as the Program Executive Officer, Mine Warfare (PEO MIW), the PEO subsequently assumed increased responsibility for Undersea and Littoral Warfare programs and was redesignated as PEO Littoral and Mine Warfare (PEO LMW) in 2002.

LMW is comprised of seven program offices. These include programs in support of Mine Warfare, Littoral Combat Ship Mission Modules, Unmanned Underwater Vehicles, Maritime Surveillance Systems, Afloat Anti-terrorism/Force Protection, Explosive Ordnance Disposal, Joint Counter Radio Controlled Improvised Explosive Device Electronic Warfare, and Naval Special Warfare.

These offices lead the work of 222 programs contributing to the Global War on Terror (GWOT) today and the transformation of American capabilities for tomorrow. PEO LMW is comprised of 114 civilians and 32 military supplemented by Field Activities and other personnel responsible for development, acquisition, and life-cycle support of these programs.

PEO LMW Program Offices:

- \* PMS340 – Naval Special Warfare (SEALS) Program Office
- \* PMS403 – Unmanned Maritime Vehicle Program Office
- \* PMS408 – Explosive Ordnance Disposal/Joint Counter Radio Controlled Improvised Explosive Device Electronic Warfare (EOD/CREW) Program Office
- \* PMS420 – LCS Mission Modules Program Office
- \* PMS480 – Anti-Terrorism/Force Protection Afloat Program Office
- \* PMS485 – Maritime Surveillance Systems Program Office
- \* PMS495 – Mine Warfare Program Office



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# FY08 ANNUAL REPORT



# PROGRAM EXECUTIVE OFFICE LITTORAL AND MINE WARFARE

## PROGRAM OFFICERS AND STAFF



Pictured Left to Right:

CAPT Mike Good, PMS420 Program Manager (PM)  
Al Schuler, PMS480, Deputy Program Manager (DPM)  
CDR Aaron Peters, PMS408 DPM (EOD)  
Michael Alperi, PMS403 DPM  
Theresa Yingling, PEO LMW Executive Assistant  
CAPT Mark Kavanaugh, PMS408 PM  
CAPT Paul Siegrist, PMS403 PM  
Guy Schein, Director of Communications  
Gail Baker, Asst. PEO for Corporate Operations  
Victor S. Gavin, Executive Director PEO LMW

CAPT John Day, PMS480 PM  
E. Anne Sandel, PEO LMW  
CAPT John Hardison, PMS495 DPM  
Donna Carson-Jelley, Chief of Staff  
Paul Hullinger, Chief Financial Officer  
Gary Humes, PMS495 PM  
Philip Marshall, PMS420 DPM  
Michael Ribble, Chief Logistician  
Philip Anderson, PMS408 DPM (CREW)

Not Pictured:

CAPT Patrick Sullivan, PMS340 PM  
Robert Stephenson, PMS340 DPM  
CAPT Joseph Cereola, PMS485 PM  
Roderick MacKinnon, PMS485 DPM



MS. E. ANNE SANDEL, PEO LMW

# A LETTER FROM PEO

The accompanying Fiscal Year 2008 Program Executive Officer Littoral and Mine Warfare Annual Report (PEO LMW Annual Report) provides the Secretary of the Navy (SECNAV), the Chief of Naval Operations (CNO), the Assistant Secretary of the Navy, Research, Development, and Acquisition (ASN RDA), Naval Sea Systems Command (NAVSEA), Resource Sponsors, Warfighters, and all LMW stakeholders information regarding LMW efforts, initiatives, results, and status. It provides information in an easily understood, customer-focused manner consistent with the themes of Citizen-Centric Reporting promoted by the Association of Government Accountants (AGA). This report states LMW's position, vision and condition, its resources and risks, as well as its commitments. Finally, it highlights essential financial issues and significant conditions that may affect future operations.

In FY08, PEO LMW programs made significant contributions in developing, acquiring and

maintaining operationally superior and affordable systems that provide assured access for U.S. and Coalition Forces in the littoral battle space. PEO LMW's efforts were sharply focused to meet the Joint Warfighting Forces' requirements for dominance in the littorals and persistent access to that battlespace. Specific contributions by each Program Office include, but are not limited to:

- The Naval Special Warfare Program Office [PMS340] developed new Naval Special Warfare (NSW) capabilities and provided the latest NSW equipment to our forces including small arms and visual augmentation systems to American Riverine forces, and modernized the SEAL Delivery Vehicles.
- The Unmanned Maritime Vehicle Program Office [PMS403] made significant progress in the development



and testing of Submarine-Launched Unmanned Underwater Vehicles (UUVs), Surface Ship-Launched UUVs, and Unmanned Surface Vehicles (USVs).

- The Explosive Ordnance Disposal/Joint Counter Radio Controlled Improvised Explosive Device Electronic Warfare (EOD/CREW) Program Office [PMS408] produced the latest generation of vehicle-mounted CREW systems. Over 10,000 of these systems were produced and many have been integrated in Mine-Resistant Ambush Protected vehicles.
- The LCS Mission Package Program Office [PMS420] made important strides in shaping our future Navy by rolling out the first LCS Anti-Submarine Warfare mission package and the first LCS Surface Warfare mission package, marking the transition of these capabilities from component testing under laboratory conditions to the beginning of integrated functional testing on the LCS Seaframe.
- The Anti-Terrorism/Force Protection Program Office [PMS480] developed, acquired, installed, and maintained Anti-Terrorism systems for ships and expeditionary forces including the Biometrics Identity Dominance System; the Shipboard Protection System; Riverine C4ISR; and future non-lethal weapons and swimmer defense systems.

- The Maritime Surveillance Systems Program Office [PMS485] contributed significantly to maintaining the Surveillance Towed Array Sensor System (SURTASS) presence required by Theater Commanders. PMS485 played a key role in the reactivation of USNS ABLE into the Fleet, and conducted the simultaneous development and testing of the Compact Low Frequency Active system.
- The Mine Warfare Program Office [PMS495] made significant progress in developing and testing systems that will provide our Strike Groups of the future with their first ever organic in-stride mine avoidance capability, and also guided four MCM ships in our dedicated Mine Warfare forces through modernization to keep pace with the threat.

We are very proud of the progress we in PEO LMW have made this year and I encourage all to read through this report to gain even greater insight.

Very Respectfully,

E. Anne Sandel





# FY08 LITTORAL & MINE WARFARE HIGHLIGHTS



Vehicle has a mounted CREW system. Over 10,000 CREW 2.1 systems have been produced.

## “IED CASUALTIES IN IRAQ DROP SHARPLY”

So read the September 28th headline in Military Times. The paper reported that the number of coalition casualties inflicted by Improvised Explosive Devices decreased 85% since peaking in August 2006. Defeating the IED threat is a national priority and requires relentless effort on the part of many organizations. Since 2005, the Explosive Ordnance Disposal (EOD) and Joint CREW Program Office (PMS408) has borne primary responsibility for countering the Radio Controlled IED threat.

In 2006 and 2007, PMS408 responded to warfighter’s urgent operational needs by acquiring over 1,400 CREW systems using rapid acquisition authority and fielding these systems in the CENTCOM Area of Responsibility. In 2008, PMS408 completed deliveries of the man-portable Quick Reaction Dismounted (QRD) system begun in December 2006.

Concurrently in 2008, PMS408 produced the latest generation of vehicle-mounted CREW systems, JCREW 2.1. Two systems were competitively awarded in 2007 and, as 2008 drew to a close, over 10,000 JCREW 2.1 systems have been produced. Many have been integrated in Mine-Resistant Ambush Protected (MRAP) vehicles for service in theater.

PMS408 and its industry team have performed a crucial role in reducing the No. 1 killer of U.S. troops in Iraq.



USNS ABLE returned to service with PMS485’s CLFA system.

## USNS ABLE REACTIVATION

In 2008, the Maritime Surveillance Systems Program Office (PMS485) played a key role in the reactivation of USNS ABLE (T-20) into the active TAGOS Fleet of ASW surveillance ships in the Pacific. Faced with the impending deactivation of the M.V. CORY CHOUEST, USNS ABLE’s reactivation was critical to maintaining the Surveillance Towed Array Sensor System (SURTASS) presence required by Theater Commanders.

The challenge was compounded by simultaneous development and testing of PMS485’s Compact Low Frequency Active (CLFA) system. PMS485 tested CLFA’s active sonar projectors and handling system while also managing the installation of the CLFA Engineering Development Model (EDM) system into USNS ABLE.

Following installation, PMS485 supported an innovative CLFA test program that enabled the Fleet to employ USNS ABLE as a passive surveillance asset in between active sonar testing. The approach allowed USNS ABLE to participate in RIMPAC 08 and helped PMS485 maintain FY08 SURTASS availability at 98%.



“Never before has the Navy built a ship, complimented with three modular mission packages, that is as versatile and responsive to emerging warfighting requirements. The lessons learned for LCS mission modules need to be captured...for every surface combatant and amphibious ship we design for the U.S. Navy.”

VADM Paul Sullivan,  
Commander,  
NAVSEA

## LCS MISSION PACKAGE ROLLOUT

Building upon the successful delivery of the first Mine Countermeasures (MCM) mission package in 2007, the LCS Mission Modules Program Office (PMS420) rolled out the first Surface Warfare (SUW) and Anti-Submarine Warfare (ASW) mission packages in 2008, completing all three varieties of mission packages on time and on budget.

The SUW mission package roll-out ceremony was conducted July 11th at Naval Surface Warfare Center Dahlgren, VA. Congressman Rob Wittman (R-VA) was the principal speaker. The SUW mission package is designed to improve warfighting capability against enemy small boats in littoral ocean regions. The roll-out ceremony concluded with the first ever demonstration of the modularized MK46 30mm gun.

The ASW mission package roll-out ceremony was conducted September 19th at Naval Base Point Loma in San Diego, CA. Mr. Jim Thomsen, Principal Civilian Deputy to the Assistant Secretary of the Navy for Research, Development and Acquisition, was the principal speaker. The ASW mission package will provide the Navy with persistent, large area ASW detection capability using advanced unmanned vehicles and bi-static ASW systems. The roll-out ceremony featured the first public demonstration of the ASW mission module’s unmanned surface vehicle (USV).

## ADM. STAN ARTHUR CIVILIAN “LOGISTICIAN OF THE YEAR” AWARD



“Your superlative achievements have resulted in substantial and quantifiable benefits to the Navy and have enhanced the logistics profession”

Vice Admiral Michael Loose  
Deputy Chief of Naval Operations for  
Fleet Readiness and Logistics

Deputy Chief of Naval Operations for Fleet Readiness and Logistics announced the recipient of the 2007 Adm. Stan Arthur Civilian Logistician of the Year Award on June 9, 2008.

Vice Adm. Michael Loose announced that Robin Kime, assistant program manager (logistics), Littoral Combat Ship (LCS) Mission Modules Program Office (PMS420), earned the award.

The award recognized Kime’s innovative use of existing infrastructure, extensive collaboration and seamless integration of naval surface and aviation maintenance and logistics techniques in the development of the support concept for the LCS mission modules. Her efforts resulted in improved support alternatives for the LCS mission modules which, as focused warfare mission packages, are developed independent of the ship’s structure.

“Your superlative achievements have resulted in substantial and quantifiable benefits to the Navy and have enhanced the logistics profession,” said Loose when congratulating Kime.

Kime developed the support concept for the LCS mission modules with the Mission Package Support Facility (MPSF). The mission modules enable the LCS to reconfigure for different warfare roles, including surface, anti-submarine and mine warfare missions.



Program Executive Officer Littoral and Mine Warfare (PEO LMW) has life cycle responsibility to design, produce, field, and support Navy Expeditionary Warfare Systems.

The LMW mission is to acquire and deliver Adaptive Force Packages and Mission Systems that assure access to the littoral regions of the world for Naval and Joint Forces, by meeting our commitments to cost, schedule, and technical performance.

LMW is comprised of seven program offices:

- Naval Special Warfare (PMS340)
- Unmanned Maritime Vehicle Systems (PMS403)
- Explosive Ordnance

Disposal and Joint Counter RCIED Electronic Warfare (PMS408)

- Littoral Combat Ship Mission Modules (PMS420)
- Anti-Terrorism/Force Protection Afloat (PMS480)
- Maritime Surveillance Systems (PMS485)
- Mine Warfare (PMS495)

These offices manage 222 programs that meet warfighter requirements for dominance and persistent access to the littoral battlespace. Half of these programs are categorized as Acquisition Category (ACAT) I through IV, Abbreviated Acquisition Program (AAP), or Rapid Development Capability (RDC) and are delineated in the table below.



# FY08 OVERVIEW

CODE	ID	IC	II	III	IVT	IVM	AAP	RDC
PMS340			1	7	18	32		
PMS403								
PMS408			2		7	6	16	
PMS420	1							
PMS480				1				
PMS485								
PMS495		1	5	6	2	3	1	1
<b>Total</b>	<b>1</b>	<b>1</b>	<b>8</b>	<b>14</b>	<b>27</b>	<b>41</b>	<b>17</b>	<b>1</b>

# FUNDS FLOW & INDUSTRIAL BASE



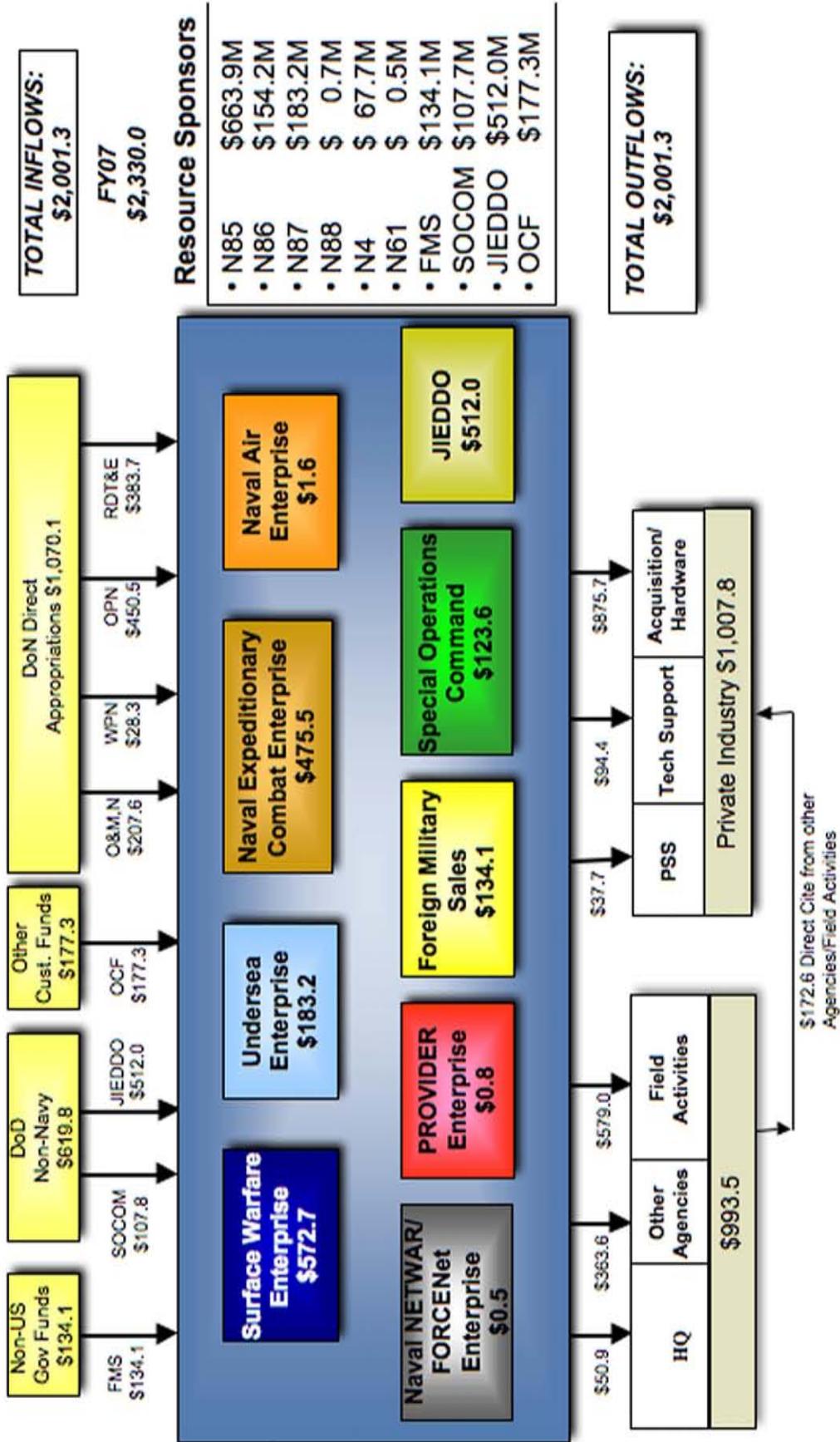
In FY08, LMW received \$1.7B to execute its programs from six Department of the Navy resource sponsors, Special Operations Command (SOCOM) and the Joint IED Defeat Organization (JIEDDO). \$311M was provided from Foreign Military Sales (FMS) and Other Customer Funds (OCF). The following pages summarize the distribution of FY08 funding (page 11), the extent and location of the LMW industrial base (pages 12-13) and the major activity recipients of LMW funding in FY08 (page 14).

The LMW industrial base has activities in 22 states, Washington, D.C. and four countries: the United Kingdom, Norway, Germany and Australia. 35 activities received approximately 80% of LMW funding in FY08, with 50% going to the top five activities.





# PEO LMW FY08 FUNDS FLOW BY APPROPRIATION (\$M)







## PEO LMW FY08 FUNDING BY ACTIVITY

Company/Activity	\$	%
ITT Corp	\$497,571,162	24.9%
NSWC Panama City	\$198,922,800	9.9%
NSWC Crane	\$111,706,227	5.6%
NAVAIR	\$104,934,611	5.2%
NSWC TECHDIV	\$93,400,000	4.7%
US Army	\$72,583,297	3.6%
Lockheed Martin	\$64,934,324	3.2%
Raytheon	\$52,389,000	2.6%
NSWC Dahlgren	\$45,521,831	2.3%
IST	\$37,000,000	1.8%
S&T OEM (TBD)	\$36,900,000	1.8%
CACI	\$31,171,232	1.6%
British Aerospace	\$28,160,550	1.4%
SSC Charleston	\$27,039,098	1.4%
SSC San Diego	\$23,817,161	1.2%
NUWC Newport	\$21,605,419	1.1%
Northrop Grumman	\$15,125,000	0.8%
Military Sealift Command	\$14,863,900	0.7%
Sensor Tech	\$13,606,000	0.7%
SAIC	\$13,387,000	0.7%
NSWC Indian Head	\$10,423,668	0.5%
KDH	\$9,912,000	0.5%
APL Johns Hopkins University	\$9,749,427	0.5%
Rock Island	\$9,373,000	0.5%
Navy Expeditionary Combat Command (NECC)	\$8,689,000	0.4%
ARL University of Texas	\$8,272,000	0.4%
NATICK	\$7,170,000	0.4%
Titan	\$6,835,000	0.3%
Boeing	\$6,764,000	0.3%
MIT LL	\$6,665,000	0.3%
Naval Air Warfare Center	\$6,567,000	0.3%
General Dynamics	\$6,562,834	0.3%
NOLSC	\$5,600,000	0.3%
Thermo Fisher	\$5,215,000	0.3%
NSWC Port Hueneme	\$5,199,200	0.3%
Classified	\$202,072,243	10.1%
All Other Activities	\$181,592,016	9.1%
<b>Total Funding:</b>	<b>\$2,001,300,000</b>	



**NAVAL SPECIAL  
WARFARE  
PROGRAM  
OFFICE  
[PMS340]**



LMW supports the Special Operations Mission Area through its Naval Special Warfare Program Office, PMS340. PMS340 supports the mission of Naval Special Warfare (NSW), which is to provide fully capable Naval Special Operations Forces to defend the United States, as well as its interests, and to plan and synchronize operations against terrorist networks. United States Special Operations Command (USSOCOM) is the head of this mission area and in this capacity plans, directs, and executes the Global War on Terror (GWOT) as the lead combatant command. PMS340 supports USSOCOM and its mission area by providing the latest NSW equipment, while at same time developing new capabilities to ensure America continues to deploy the world's premier team of Naval Special Warfare Warriors.

Special Warfare is a tactical force with strategic impact, with mission areas that span unconventional warfare, direct action, combating terrorism, special reconnaissance, foreign internal defense, information warfare,

security assistance, counter-drug operations, personnel recovery, and hydrographic reconnaissance. Although Naval Special Warfare personnel comprise less than 1% of U.S. Navy personnel, they offer large dividends on a small investment. These units' proven ability to function across the spectrum of conflict and in operations other than war, coupled with their proven ability to provide real time intelligence and eyes on target, offer decision makers immediate and unlimited options in the face of rapidly changing crises around the world.

This capability has not gone unnoticed by this nation's leaders, as Special Warfare Warriors are busier than ever answering "911 calls" from around the globe. PMS340 has responded to the needs of these heroes in a resounding way, finding ways to rapidly insert innovation into the fleet now, developing capability for the future, and supporting the surge in Operational Tempo with exceptional in-service support. Almost all of PMS340's significant contribution to the GWOT is highly classified.

In the unclassified arena, PMS340 has provided small arms and visual augmentation systems to American Riverine forces. Last year, PMS340 completed the Fleet modernization of the five MK 8 MOD 1 SEAL Delivery Vehicles (SDV) on budget and on schedule. These modernizations addressed microcircuit and software obsolescence issues while at the same time providing the vehicles with significantly enhanced situational awareness, payload, and navigational capabilities.

While making an operational

# ACCOMPLISHMENTS



difference with the SDV, PMS340 worked to further extend the capabilities of these vehicles. It commenced development, testing, and integration of the next generation batteries that will power these vessels. Converting to Lithium-Ion technology is particularly noteworthy as it provides the potential to gain in excess of a one-third increase in stored energy, enabling the SDVs to improve their range and mission duration and thereby expanding the tactical alternatives available to the commander in the field. PMS340 will begin final integration and production of these new batteries in FY09.

In FY08, PMS340 worked with the Office of Naval Research (ONR) to initiate and conduct some of the Department of Defense's (DoD) most extensive diver thermal equipment testing and field evaluations in over 20 years. This effort is aimed at protecting Navy divers from the dangers of long-term exposure of both hot and cold water temperatures during mission execution. This effort has resulted in the development of new insulating materials, such as Aero gel, that provide 80% better thermal protection than Thinsulate. When integrated into wet suit and dry suit products, it will be possible to protect the Special Operations Forces (SOF) combat diver through the full spectrum of water temperatures the divers expect to encounter worldwide.

PMS340 also improved Semi-Autonomous Hydrographic Reconnaissance Vehicle (SAHRV) obstacle avoidance

and navigation systems. PMS340 led this effort by delivering enhanced units to forward deployed SEALs. SAHRV is based on the already fielded Remote Environmental Monitoring Unit System (REMUS), which was developed by Woods Hole Oceanographic Institution under ONR auspices. SAHRV represents an excellent example of LMW extending the leverage of Navy investments across multiple missions. (Note: The R-I UUV delivered by PMS408 and described in the Explosives Ordnance Disposal section of this Annual Report is also a REMUS-based vehicle.)

Initial successes in the SAHRV Obstacle Avoidance Program development effort in navigation and control resulted in USSOCOM's Defense Acquisition Challenge Program awarding additional FY08 Research Development Test and Evaluation (RDT&E) funds. PMS340 is directing the technical and business aspects of the Open-Architecture-System (OAS) work in an Open Architecture format and has included Applied Research Laboratories of the University of Texas at Austin (ARL UT) and University of South Florida in its development efforts. With an open architecture design, PMS340 expects to share its SAHRV hardware and software products with the Unmanned Maritime Vehicle Systems Program Office (PMS403), thus leveraging intellectual capital and OAS technology achievements.

PMS340 is also continuing a DAC FY08 RDT&E funded effort to develop a lightweight .50 caliber stabilized gun mount. Of note, this program will leverage

commercial technology from Motion Picture Marine, the owner of whom won an Academy Award for cinematography. Motion Picture Marine's methodology for camera stabilization and taking pictures of moving objects has a direct military application; taking science from Hollywood and applying it to the needs of America's military offers a glimpse into the potential and power of the OA Business Model. At its core, this model hinges on the ability of Government and Industry to harness the tremendous resources of America, no matter where they lie, and find a way to apply these assets to help its Warriors. PMS340 anticipates meeting the challenges of this work and finding means to unlock its potential.





**UNMANNED  
MARITIME  
VEHICLE  
SYSTEMS  
PROGRAM  
OFFICE  
[PMS403]**



PMS403 makes significant contributions in the Undersea Enterprise (USE), particularly in relation to Submarine-Launched Unmanned Underwater Vehicles (UUVs); Surface Ship-Launched UUVs; and Unmanned Surface Vehicles (USVs).

In FY08, PMS403 developed and briefed a Mission Reconfigurable Unmanned Undersea Vehicle System (MRUUVS) Evolutionary Acquisition Strategy up to the ASN level. The Undersea Enterprise Board of Directors concurred with PMS403's Limited Phase I MRUUVS. PMS403 participated in the MRUUVS' Phase 1 Acquisition Coordination Team (ACT). PMS403 provided an overview of the MRUUVS' three-phase acquisition approach, to include the acquisition milestones and schedule; the recommendation to move forward with planning for Pre-OIPT and DON Acquisition Gate Reviews was accepted.

PMS403 also coordinated with the NAVSEA SUBSAFE community to develop the MRUUVS Phase I Recovery Arm SUBSAFE

Departure From Specifications (DFS). Naval Undersea Warfare Center Division Newport (NUWCDIVNPT) developed the technical data package for this submission.

PMS403 also successfully completed the LMRS 40-hour Lithium battery endurance test. This marked the first time a Lithium Thyonil Chloride energy section had ever been installed and tested in the LMRS vehicle. This test brought the Technology Readiness Level (TRL) for this primary battery to level six and significantly reduced a major risk for MRUUVS. It demonstrated that the energy section can operate the UUV (in a static Bollard Pull configuration) for the required endurance at a nominal propulsion speed simulating four knots. The battery cells used in this test were manufactured in late 2001 and were approximately 6.5 years old.

PMS403 attended the inaugural Navy Irregular Warfare Office (NIWO) off-site as a supporting organization to this new OPNAV capability arm. It seated a PMS403 officer in the Navy Irregular Warfare Office (NIWO) to provide program management assistance in the development and deployment of the SEA STALKER UUV. SEA STALKER is being used to demonstrate the warfighting contribution of a Large Diameter UUV. Two versions of the vehicle are anticipated. The surface launched version is being deployed from a DDG in FY09, while the submarine-launched version is being targeted for subsequent deployment from a SSGN using a Dry Deck Shelter.

A Memorandum of Agreement was executed in early October 2008 between OPNAV N87, the

Defense Advanced Research Projects Agency (DARPA) and PEO LMW, identifying PMS403 as the acquisition office for the Collaborative Networked Autonomous Vehicles (CNAV) project when it is ready to move from a technology project to an acquisition program. CNAV will develop autonomous control methods for distributed platforms (UUVs) to execute various cooperative tasking in restrictive littoral waters.

PMS403 also worked on Surface Ship-Launched UUVs. For the Surface Mine Counter Measure (SMCM) UUV (User Operational Evaluation System) UOES 1, PMS403 participated in four separate fleet exercises during the 3rd and 4th quarter FY08. Two of these (Frontier Sentinel in Portsmouth, NH and Honolulu Harbor Exercises) included multiple federal and local government agencies in support of Maritime Homeland Defense (MHD). The Naval Oceanography Mine Warfare Center (NOMWC) UUV Platoon conducted the operations with SMCM UUV-1 vehicles (2 man-portable REMUS 100 UUVs). NOMWC also participated in Rim of the Pacific (RIMPAC) 08 using the same vehicles to collect pre-survey, as well mine detection and classification data, for the Mine Countermeasures Squadron Commander. A broad set of lessons learned addressing launch/recovery, mission programming, vehicle control, and coordination between intra and interagency were captured. The vehicles were tested in very complex and difficult environmental conditions (high clutter, restricted harbors, highly variable sloped bottoms and bottom types, strong and highly variable currents). Results provided valuable



feedback on Fleet mine hunting and survey requirements, tactics and procedures, and adaptation of these systems into Fleet battle rhythms.

In FY08, in the field of Surface Ship-Launched UUVs, PMS403 used the Battlespace Preparation Autonomous Undersea Vehicle (BPAUV) in a MHD multi-government experiment in August in Tampa Bay, Florida. The LCS MCM Mission Package Detachment operated the vehicles and successfully demonstrated the employment of a tactical LCS mission module independently of the LCS platform, exercised all steps in the "Detect-To-Engage" sequence, and conducted a suitability assessment of BPAUV ability to perform change detection, finding all the exercise mines. PMS403 also held the SMCM UUV Industry Day at NRL from July 28 to 29. Approximately 70 industry representatives attended; industry feedback was positive.

In FY08, in relation to USVs, PMS403 successfully transitioned USV programs from PMS420 for LCS MCM and ASW mission packages. The MCM USV completed Full Functional Test on June 12, 2008. The standup of the SEAFOX USV UOES operations have commenced through signed MOAs with Naval Expeditionary Combat Command (NECC) Maritime Expeditionary Security Forces (MESF) Norfolk and San Diego, Naval Special Warfare Group FOUR (NSWG4) Norfolk and Naval Oceanography Operations Command (METOC) Stennis MS. In accordance with these MOAs, five SEAFOX deliveries were made this year: SEAFOX 1 was delivered to

NECC MESF Norfolk on July 16; SEAFOX 2 was delivered to NSWG4 Norfolk on September 10; SEAFOX 3 was delivered to NECC MESF San Diego on September 3; SEAFOX 4 was delivered to NECC RIVGRU ONE on September 10; and SEAFOX 5 was delivered to NOOC Stennis MS on November 10. The units will provide users with proficiency training, experience, and requirements development that will aid with future USV developments. The MOAs provide for the development of Tactics, Techniques, and Procedures (TTPs), Concept of Operations (CONOPs), Standard Operating Procedures (SOPs), Safety documents, participation in fleet exercises and test events, test plans, test reports, training, and Summary Report with lessons learned.

PMS403 conducted an Unmanned Vehicle Summit between PEO (LMW) and PEO (U&W) at NAVAIR on January 25 to discuss potential areas of common interest, such as Acquisition Strategies, Common Command and Control, and Standards. Future discussions to advance potential synergies are planned. Program Manager Captain Siegrist worked throughout the year articulating to various naval leadership the capabilities that unmanned systems bring to the naval forces. Discussions/briefings included: Special Assistant to SECNAV; Naval Research Advisory Committee; MIT Submarine Off-Board Payload Summit; and PACOM and PACFLT Senior Leadership. Captain Siegrist addressed various groups throughout the year to include: NIPO-hosted Navy International

Industry Day; Association for Unmanned Vehicle Systems International (AUVSI) Unmanned Systems Program Review; and two National Defense Industrial Association (NDIA) Conferences.

Lastly, PMS403 briefed programs to the DC chapter of the AUVSI in January and served on a Panel discussion at the AUVSI Unmanned Systems Interoperability Conference, San Diego in October 2007. PMS403 members participated in a two-day lean rapid improvement event with Warfare Center and PEO representatives to examine improving the PEO and Warfare Center alignment of lean events. A Lean Event Design Review Value Stream Analysis was held June 10 to 11. A Suppliers, Inputs, Process, Outputs, Customers (SIPOC) diagram and Current State, Ideal State, and Future State Value Stream Maps were developed. The event culminated with the development of a Rapid Improvement Plan. PMS403 members held a kickoff meeting for the Unmanned Vehicle Common Control project at GTRI. PEO SUB, NAVAIR, ONR, and NSWC PC were all represented at the meeting, in addition to PEO LMW and GTRI. The cross-talk between the organizations was excellent and indicated a sincere desire from all concerned to work closely together to maximize commonality. The team developed a Plan of Action and Milestones (POA&M) for the project during the meeting.

PMS403 conducted a LEAN CDRL Selection/Review Process Value Stream Analysis (VSA) from September 16-18. Representatives from PMS403, PEO LMW, NSWC-PC, and NUWC reviewed the



CDRLs from existing contracts for value added and developed a matrix of recommended CDRLs to include three types of developmental contracts (Technology Demonstration, UOES, and SD&D ACAT), including a list of assumptions to be used when selecting which CDRLs to be included. The team developed current, ideal, and future state maps of the CDRL selection and review processes. PMS403 also teamed with ONR to submit a proposal for TS09 (July 2009) for use of a REMUS 600 UUV with iPUMA. PMS403's goal is to demonstrate Intelligence Preparation of the Environment and Bottom Mapping (Change Detection) to demonstrate the utility of a UUV in a Fleet Exercise. At the end of FY08, PMS403 and PMS495 initiated the transition of three programs from PMS495 to PMS403: the Remote Minehunting System (RMS); the AN/ASQ-20A; and the Unmanned Surface Sweep System (US<sup>3</sup>). Additionally, during the course of the year, PMS403 has been managing (2) Phase II, (2) Phase I, and (1) FY09 approved for solicitation SBIRs:

- N06-185: Deployable Network Communications;
- N06-186: Propelled Tow Body;
- N07-204: At-Sea Fueling;
- N07-205: Reduced USV Motions;
- N09.1 Solicitation: USV Weight Reduction Concepts.



**Explosive Ordnance Disposal/Joint Counter Radio Controlled Improvised Explosive Device Electronic Warfare (EOD/CREW) PROGRAMS [PMS408]**

PMS408 is the PEO LMW Program Office responsible for systems acquisition and life cycle support for the two mission areas that are central to the current Global War on Terror: Joint Counter RCIED Electronic Warfare (Joint CREW) and Explosive Ordnance Disposal (EOD). The Joint Crew Program develops, fields, and sustains electronic countermeasures systems to protect deployed forces against Radio Controlled Improvised Explosive Devices (RCIEDs). The EOD Program provides systems and equipment to EOD forces of all four Services to counter the threat posed by unexploded ordnance (UXO). Both of these programs provide the critical capabilities needed to meet the operational requirement to provide military services with effective, suitable, and supportable systems to counter the threat posed by UXO and Improvised Explosive Device (IEDs) to prevent and reduce combat fatalities.

**JOINT CREW PROGRAM**

A terrorist wielding an IED has become the ubiquitous face of the ongoing conflicts in the

Middle East. While IEDs have been a favorite tool of terrorist groups worldwide for many years, the dramatic use of the IED as a strategic weapon in Iraq, Afghanistan, and around the world has required a concerted and greatly expanded effort to develop and field systems to address this deadly threat. The IED has been the leading cause of troop casualties in Operations IRAQI FREEDOM and ENDURING FREEDOM (OIF/OEF). As a result, in July 2004, DoD established a Counter-IED taskforce dedicated to countering this threat. Subsequently, this taskforce transitioned into the Joint Improvised Explosive Device Defeat Organization (JIEDDO) and expanded its efforts to generate solution sets with national laboratories and Warfare Centers/Directorates via contractors and academia.



A PMS408 Dismounted CREW System in Iraq

In October 2005, the Secretary of Defense designated the Secretary of Navy as the Executive Agent for Military Ground-Based CREW Technology, based on



the Navy's extensive experience with electronic warfare and EOD counter-IED systems. This designation established the U.S. Navy as the primary focal point for DoD CREW technology development, system acquisition, and fielding decisions. The Assistant Secretary of Navy for Research, Development, and Acquisition (ASN RDA) subsequently directed PEO LMW to assume the acquisition and lifecycle support responsibility for the program, and in December 2005, PMS408 was formed by merging the existing EOD Program Office with acquisition professionals dedicated to the Joint CREW mission. Since its formation, PMS408 has maintained its long history of fielding EOD systems and equipment while rapidly standing up the Joint CREW component workforce structure. In 2006 and 2007, PMS408 successfully acquired over 1400 CREW systems using the rapid acquisition authority granted to them by OSD and began fielding these to the CENTCOM Area of Responsibility (AOR).

## 2008 JCREW PROGRAM IN REVIEW

Building on the momentum and pace established by its FY06/07 successes, in 2008, the PMS408 JCREW team accelerated its effort to develop and produce CREW systems for delivery to theater. Each delivered CREW system places critical force protection capability in the hands of U.S., Coalition, and Partner Nation forces. One such system is the Quick Reaction Dismounted (QRD) System (aka Guardian). Guardian is a "man-portable" system worn as a backpack by dismounted soldiers or Marines.

It provides protection from RCIEDs when personnel are operating outside the protective envelope of a mounted or fixed site CREW system. In FY08, PMS408 completed delivery of the final QRD systems to theater that initially began in December 2006.

Concurrently, in FY08, PMS408 brought online two production lines for the latest generation of vehicle-mounted CREW systems. These two systems comprise the JCREW 2.1 Program initiated response to Joint Urgent Operational Needs submitted by CENTCOM, validated by the Joint Requirements Oversight Council (JROC), and funded by JIEDDO. The two systems were selected in 2007 based on a competitive selection process that determined the best technology available in industry to counter the evolving RCIED threat. Two different CREW system architectures were selected to provide tactical employment flexibility by the operational commanders in Iraq and Afghanistan. The first architecture is a reactive jammer with the moniker of CVRJ (CREW Vehicle Receiver Jammer); the

At the close of FY08, the JCREW 2.1 Government-Industry Team had produced over 10,000 JCREW 2.1 systems. Many of the JCREW 2.1 systems are being integrated into Mine-Resistant Ambush Protected (MRAP) vehicles being produced in large quantities for service in theater. These modern CREW systems, combined with the improved blast protection provided by the MRAP vehicles, have been instrumental in lowering U.S. casualties in Iraq. By the end of the year, over 6,000 CVRJ systems had been integrated into U.S. Army and U.S. Air Force MRAPs, with a goal of approximately 8,000 to be ultimately installed. The remaining production quantities of CVRJ and MMBJ 2.1 systems are also being installed in large numbers of "legacy" vehicles in OIF and OEF (e.g., M1114 HMMWVs, HEMTT, and NECC Riverine Squadrons). In late 2008, JIEDDO funded PMS408 to develop a prototype enhancement to the CVRJ system and to evaluate the conversion of the mounted CVRJ to a Fixed Site variant to augment facility force protection capabilities at Forward Operating Bases (FOBs) and other critical infrastructure sites.



"Up-Armored" M1114 with a PMS408 CREW System

second is an active jammer called MMBJ 2.1 (Mobile Multi Band Jammer 2.1).

PMS408 also acquired and fielded CREW systems for employment by Coalition and Partner National Forces. The primary vehicle-mounted CREW system used by international forces is known as Symphony. Symphony takes advantage of "Off-the-Shelf" technology to provide a distinct set of capabilities to Coalition Partners engaged in GWOT operations. First fielded in 2006, the program has expanded to meet the needs of partner nations through a series of purchases. Many of these Symphony systems are now operational with Iraqi forces,



with additional systems scheduled for delivery to other nations in FY09. Additionally, during FY08, Australia purchased CVRJ through a Foreign Military Sale (FMS) request. The total produced quantity of International CREW Systems from FY06-09 is more than 1,000 units. CREW systems acquired by PMS408 are force protection assets that will help enable the critical political and security transitions planned by Multi-National Security Transition Command-Iraq (MNSTC-I) and Combined Security Transition Command-Afghanistan (CSTC-A) to occur.



Iraqi M-1151 with a PMS408 CREW System in Theater

Furthermore, PMS408 remains actively involved in the sustainment of the thousands of mounted, dismounted, and fixed site CREW systems already fielded, providing critical lifecycle support and in-service engineering in the face of an extremely challenging operational tempo. These services require close—sometimes daily—interaction with forward deployed forces in theater to ensure that parts, material, systems, and personnel are allocated where and when needed. The JCREW 2.1 Team's support of OIF/OEF has presented a particular challenge because of the

requirement to execute a very large and expanding series of production delivery requirements across two separate production lines, with multiple, real-time, threat-based engineering changes while maintaining extremely aggressive integration schedules. These schedules have been driven by the need to support the USMC-managed MRAP integration program located at Space and Naval Warfare (SPAWAR) Systems Center in Charleston, SC, as well as the ongoing legacy vehicle integration efforts managed by the U.S. Army CREW program at CECOM in Fort Monmouth, NJ.

While remaining actively engaged in supporting the current war, PMS408 is also responsible for leading a steady transformation of CREW capabilities to address the future global RCIED threat. An evolving set of exploitable technologies across a wider spectral range will create RCIED challenges that U.S. and Allied forces will face in future operations in places not yet known around the world. PMS408 is actively supporting and developing the requirements, concepts, and strategies that will comprise the follow-on generation of CREW systems (aka JCREW 3.X series). Several contracts were awarded in December 2007 for development, testing, and evaluation of new near-term dismounted (3.1) and mounted (3.2) technologies. First articles of these systems are scheduled for evaluation by U.S. forces beginning in FY09. PMS408 is also actively involved with working with other nations to improve existing technology and develop new and innovative technologies to defeat IEDs. To this end, PMS408

is participating in international science and technology working groups and negotiating additional international agreements with the United Kingdom and Australia to develop advanced technology and prototypes to defeat future IED threats.

## EOD PROGRAM

The “companion” office within PMS408 is the EOD Team, which supports the dynamic and complex mission of the Navy and Joint Service EOD communities. Explosive Ordnance Disposal Technicians render safe all types of ordnance: conventional and unconventional; improvised; chemical, biological, and nuclear ordnance; this includes IEDs and Weapons of Mass Destruction (WMD). They perform land and underwater detection, location, identification, render-safe, and recovery (or disposal) of foreign and domestic ordnance. They conduct demolition of hazardous munitions, pyrotechnics, and retrograde explosives using detonation and burning techniques.



MK 2 Mod 0 EOD Robot (Talon) operating in Iraq

They forward deploy and fully integrate with the various Combatant Commanders, Special Operations Force (SOF), and various warfare units within the Navy, Marine Corps, Air Force, and



Army. They are also called upon to support various government and civilian law enforcement agencies.

EOD technicians' missions include many different environments, climates, and areas of the world. In addition, Navy EOD Forces utilize many assets in accomplishing their missions, from open and closed-circuit SCUBA and surface-supplied diving rigs, to parachutes and accompanying gear for insertion from fixed-wing and rotary aircraft, to small boats and tracked vehicles. The PMS408 EOD Team is the lead agent for equipping these forces with the assets, information, and support they need. Like their JCREW counterpart, the assets this group provides perform a continuing crucial role in supporting US and Allied Forces in OIF/OEF and around the world.

The EOD Team supported a variety of systems and equipment during 2008. These include the Man Transportable Robot System (MTRS), which is used by EOD technicians to perform remote reconnaissance at incident sites by locating, examining, and identifying UXO and IEDs. Through the end of FY08, over 1600 of these systems were produced and delivered, with subsequent heavy operational use in theater.

The Reacquire-Identification (R-I) Unmanned Underwater Vehicle enhances existing maritime UUV capability through platform-sensor integration and data processing capability. This system supports amphibious landings, mine countermeasures operations, and hydrographic mapping in the Very Shallow Water (VSW) zone. The R-I UUV achieved successful full operational capability in the fourth

quarter of FY08 and is located at EOD Mobile Unit ONE in Coronado, CA.



Launching a MK-18 MOD 1 Swordfish UUV

In addition to the R-I UUV, the most recent Quadrennial Defense Review (QDR) identified a need to expand the mission of all DoD EOD units to include the identification of nuclear radiation sources. The AN/PDX-2 Radiac Set helps fulfill this need by providing a portable capability that enables special mission EOD forces to rapidly respond to an increasing number of simultaneous threats worldwide. PMS408 deployed over 220 sets to Joint Services EOD forces last year.



Searching Conex Boxes with the AN/PDX-2 Radiac Set

Another EOD system is the Transmitting Set Countermeasure (TSC) AN/PLT-4 system, which is a man portable EOD ECM device intended to provide enhanced protection specifically to EOD technicians while conducting EOD missions against suspected RCIEDs. The system is being fielded as a product improvement to the current EOD system in use, the AN/PLT 6448 (CITADEL). The AN/PLT-4 offers a wider range of coverage against threat devices, and can provide greater protection distances. Initial production began in FY08 with deliveries of 79 systems to the Joint Service EOD forces. PMS408's total Service Inventory Objective is 1556 systems.

In response to a CENTCOM submitted Joint Urgent Operational Need Statement (JUONS), CNO N857 requested that a coordinated response and execution plan be developed between PEO U&W (PMA 263), as the lead program office, with PMS408 in a supporting role, to acquire an EOD Unmanned Aerial System (UAS). The portable EOD UAS will be used by EOD Forces in OIF and OEF to provide tactical reconnaissance,

surveillance, and target acquisition. Funding was provided in March 2008. By August a successful capstone test event was completed. In late September, PEO U&W granted approval for contract award of the EOD UAS systems.



Delivery to EOD forces deployed in support of OIF and OEF should begin in mid-FY09.

The PMS408 EOD/CREW customer base runs across the full range of DoD operations. The Joint Service EOD program is responsible for developing technology and training material for EOD Forces across all the services. The Joint CREW program also has a wide-ranging set of customer commitments. While responding to ongoing, dynamic OIF/OEF user needs for all the Services, the JCREW



EOD UAS Prototype Testing

Team is also responsible for establishing, managing, planning, programming, and executing the

JCREW 3.3 formal acquisition program of record. Both of these programs have multiple resource sponsors and resultant delivery commitments that require active and continuous monitoring and management. Delivery schedules and service provider agreements to deployed forces are integrated in production contracts, service contracts, and inter-Service and inter-Agency memoranda of agreements with various Service customers.



**LCS MISSION  
MODULES  
PROGRAM  
OFFICE  
[PMS420]**

The Littoral Combat Ship (LCS) is a fast, agile, and networked surface combatant optimized for operating in the littorals. It will counter littoral mine, submarine, and surface threats to assure maritime access for Joint Forces. The underlying strength of the LCS lies in its innovative design approach, applying modularity for operational flexibility. Fundamental to this approach is the capability to rapidly install interchangeable mission packages into the seaframe.

The hierarchical concept of modularity that yields a mission package fielded onboard a LCS is described in three layers:

- Mission Systems = Vehicles, Sensors, or Weapons
- Mission Module = Mission Systems + Support Equipment + Standard Interfaces
- Mission Package = Mission Modules + Mission Crew Detachments + Aircraft

PMS420 enables modularity through implementation of an interface control document that allows future adaptation of mission package systems to meet evolving mission requirements and permanent seaframe installation of a computing environment hardware tailored to mission package needs and temporary installation of modular software specifically configured for the planned mission. This computing environment is integrated with the seaframe computing environment to automate tactical data flow on and off of the seaframe.

PMS420 integrates modules within each mission package into LCS Seaframe module stations, or zones, which have defined sizes, structures, and service connections. The Mission Package Computing Environment (MPCE) is installed on the Seaframe as the standard interface with the ship's combat management system, thereby seamlessly integrating the mission package systems' hardware and software environments with those of the ship. Now mission capability, consisting of manned and unmanned systems and sensors, can be packaged – or modularized – in containers and rapidly added or removed to/from a platform.

PMS420 sizes mission modules and systems to fit inside standard ten- or twenty-foot International Organization for Standardization (ISO) support containers, on ISO compliant flat racks, or cradles. The LCS mission package zones (areas of the LCS mission bay) are configured to accommodate the support containers. Using ISO support containers simplifies shipping, storage, the availability of correct handling equipment,



and container movement from shore to ship and ship to shore. Package reconfiguration occurs in homeport or overseas, using pre-positioned mission packages or mission packages transported into the theater by air or sea and staged near the LCS operating area.

In FY08, PMS420 completed rollouts for the first of each type of mission package, installation of the MPCE in each of the first two seaframes; and initial at-sea integration efforts for the Anti-Submarine Warfare (ASW) mission package.

Each mission package provides warfighting capability for one of three focused mission areas: Mine Countermeasures (MCM): detection and neutralization of mine threats; Surface Warfare (SUW): maritime security missions and prosecution of small boats; and Anti-Submarine Warfare: countering shallow water diesel submarine threats.

These mission packages can be exchanged in order to reconfigure the ship for a different mission in a short period of time, giving a Combatant Commander a uniquely flexible response to changing warfighting requirements. To achieve this flexibility, the Navy is developing and procuring specific numbers of mission packages to meet the Fleet's warfighting requirements. The quantity of each mission package type differs based on analysis of projected operational needs; therefore, mission packages are developed and procured separate from the seaframes. This allows the LCS warfighting capability to quickly adapt to evolving threats using

improved technology. This concept also helps to reduce the overall cost of the LCS and will allow a smaller crew to operate and maintain the ship's core systems.

In addition to flexibility, capability will be continually improved as mission systems mature and are added to the mission package. These systems provide warfighting capability that will be continuously improved through an evolutionary acquisition development process. Mission package modular capability provides an open architecture environment that enables future rapid insertion of new technologies, giving the Combatant Commanders a modular, focused mission capability to provide assured access against littoral threats. Innovative industry partners can contribute at periodic intervals to improving warfighting capability due to this open architecture construct. The Navy also benefits because new technologies not only compete for initial inclusion in a focused mission capability, but they compete on a recurring basis to remain the technology of choice for a given capability. This best of breed selection process, guided by operational requirements, is accomplished through a government-led peer review process that identifies, qualifies, and tests candidate technologies from a variety of sources, including academia and commercial ventures.

Additionally, PMS420 is working towards an open business model that will create value in a fast-paced development environment by including a variety of external concepts for solving identified

technical and business problems. Ideally, synergy will emerge as the use of the PEO's key assets and of partnering organizations from government, industry/small businesses, and academia are optimized to create value for all involved. This business model is founded on an evolutionary acquisition process led by PMS420, which facilitates the rapid and incremental incorporation of capability updates. Time-phased capability increments (mission module and related systems) are planned for capability insertion throughout the life of the program.

PMS420 has leveraged the Small Business Innovative Research (SBIR) program to allow small businesses to submit proposals on LCS Mission Modules related topics. The response from small businesses has been outstanding and often results in multiple Phase I awards. Current ongoing SBIR efforts include Power generation for weight and space limited USV systems; Persistent Deployable Communications Network for Unmanned Vehicles; Compact lightweight towed sensor handling systems for Unmanned Sea Vehicles; Unmanned Surface Vehicles (USV) At-sea Fueling; and Reduced Unmanned Surface Vehicle (USV) Motions For Reliable Recovery. PMS420 is currently pursuing under the Navy SBIR Commercialization Pilot Program (CPP) an opportunity for small businesses to address Composite ISO Containers for LCS Mission Modules.



**ANTI-TERRORISM/  
FORCE PROTECTION  
(AT/FP)  
AFLOAT  
PROGRAM  
OFFICE  
[PMS480]**

PMS480 is the PEO LMW Program Office responsible for shipboard and expeditionary systems. In FY08, PMS480 installed three Shipboard Protection System (SPS) Block 1 (AN/SSQ-129) systems onboard USS BENFOLD (DDG 65), USS LABOON (DD 58), and USS DONALD COOK (DG 79); in doing so, PMS480 successfully met Navy Data Environment (NDE), Weapons System Explosive Safety Review Board (WSERSB), and Software Systems Safety Technical Review Panel (SSSTRP) requirements. Furthermore, PMS480 completed development of an initial release of SPS Block 3 (AN/SSQ-129A) and gained approval for initial installation, which is scheduled for early FY09. Minimal WSERSB and SSSTRP findings attest to a diligent safety program in place.

PMS480 proceeded with the development and testing of an Integrated Swimmer Defense (ISD) system. The OPNAV N857 Requirements letter was issued in January 2008; PEO LMW issued an Acquisition Category (ACAT) IV Acquisition Decision Memorandum (ADM) authorizing User Operational Evaluation System (UOES) development. UOES #1 was developed for NAB Little Creek in August; UOES user assessment is underway

and will complete in November, while the UOES #2 Design effort has commenced.

PMS480 continued development of the Identify Dominance System (IDS) hand held biometric collection device. The SIIMON prototype effort was completed in September, including delivery of a performance specification. PMS480 obtained approval of the Personnel Identification (PI) Version 1 CDD by JROCM 181-08 on September 2, 2008 (renamed IDS CDD to Plv1 CDD). OPNAV established POR funding beginning in FY09. A SBIR pre-release in July built upon the SIIMON FY08 prototype/Plv1 CDD; this received fourteen Phase I proposals. The project was selected for United States Secretary of the Navy (SECNAV) Rapid Improvement Event (RIE) with a targeted goal of 25% improvement in IDS POR Initial Operational Capability (IOC).

In the field of joint non-lethal weapons, PMS480 completed the 40mm Joint Non-lethal Warning Munition (JNLWM) Chemical Compatibility Test and the 40mm JNLWM Hazard Test Report. PMS480 also oversaw the PMW 790 efforts to upgrade and improve the existing Naval Coastal Warfare MAST and MIUW systems. This included establishing the NCW Upgrade Program (MIUW/MAST) APB; completing delivery, training, and SOVT for seven MIUW (V)4 Mod 2 Systems; and completing delivery, training, and SOVT for one MAST III System.

PMS480 also continued procurement of C41 for Riverine units. This included completing C41 upgrades to OCONUS Riverine Patrol Boats; continuing procurement of C41 equipment

for RIVERINE Squadron TWO and THREE boats and vehicles; completing procurement of SEAFLIR II systems for RIVERINE boats; and providing funding for procurement of C41 equipment for six Riverine Command boats.

PMS480 established an Individual Protective Equipment (IPE) Pool and associated lifecycle management processes to centrally manage body armor systems and combat helmets required by Navy activities without organic IPE assets deploying to combat zones. This process required an operating inventory of over 12,000 body armor systems and 10,000 combat helmets, as well as the coordinated transfer of 10,000 assets and management oversight for the Commander, Naval Air Force (CNAF) expeditionary IPE pool from CSF Fort Worth to the Mid Atlantic Regional Maintenance Center (MARMC) Chesapeake. PMS480 coordinated funding and procurement of over 12,000 Enhanced Small Arms Protective Insert (ESAPI) ballistic plates to upgrade pool assets to CENTCOM specified protection levels, as well as for over 7,000 combat helmet suspension system retrofit kits required to upgrade pool assets to OPNAV. Other tasks included establishing an interim contract for inspection, repair and cleaning of body armor outer vests and Kevlar inserts. PMS480 procured and initiated operation of the Armor Inspection System (AIS) to perform radiographic inspection and detect mission-compromising defects in ceramic ballistic plates and expanded IPE pool operation to include BUMED Expeditionary Medical Facility (EMF) personnel on short notice when in-theater organic assets were deemed obsolete.



PMS480 also provided over 2,000 body armor systems to support Expeditionary Combat Readiness Center (ECRC) Individual Augmetee (IA) outfitting shortfalls and issued 3,573 body armor systems and combat helmets in support of multiple CNAF squadron EMF detachment and miscellaneous Navy activity deployments. This also entailed inspecting, repairing, and cleaning 4,025 body armor systems, which enabled reutilization for future IPE pool deployment requirements.

Other FY08 accomplishments for PMS480 include: establishing PMS480 Surface Warfare Enterprise (SWE) and Navy expeditionary Combat enterprise Dashboard Metrics; procuring and fielding 2,689 combat helmet suspension system retrofit kits required to upgrade shipboard VBSS Team helmets and 2,821 Concealable Tactical Response Carrier (CTRC) body armor systems to replace an obsolete shipboard ATFP AEL system and increase ballistic protection to the CENTCOM ESAPI standard; fielding 1,515 Lightweight Helmet (LWH) systems to replace obsolete shipboard ATFP Personnel Armor System for Ground Troops (PASGT) combat helmets as directed by the Deputy Defense Secretary (DEPSECDEF); and outfitting six new construction ships with VBSS/EMIO equipment, including upgrade to XTS-2500 radios to enable compliance with Advanced Encryption Standard (AES) and Land Mobile Radio (LMR) requirements. PMS480 was awarded contract for delivery of initial four Carrier (CV) portable weapon simulators to enable efficient completion

OPNAV required semi-annual sustainment training. PMS480 also procured and fielded the following in support of NECC activity requirements: 329 Advanced Combat Helmet (ACH) systems; 168 body armor systems; 161 XTS-5000 hand held radio systems; 108 PRC-152 radio systems; 28 PRC-117 radio systems; 23 PRC-150 radio systems; and 48 sets of Personal Gear Issue (PGI) equipment. PMS480 also procured the following for future delivery in support of NECC activity requirements: 486 Night Vision Device (NVD) systems; 300 PRC-152 radio systems; and 180 sets of PGI equipment.

PMS480 will continue to work the following small business efforts. The first, 21st Century Systems Inc. Phase III SBIR, is a follow-on to SBIR topic N2002-207 for the Sentinel Net software asymmetric threat detection, reporting and situational awareness system for naval force protection. The Sentinel Net software is being used as the core for the Integrated Swimmer Defense UOES. Another, Ocean Power Technologies, Inc. Phase III SBIR – Persistent Surveillance, is a follow-on to SBIR topic NAVY 00-116 Congressional Add funded to test a scalable PowerBuoy system in an ocean test off the coast of Washington State. This “dual use” technology for generating power autonomously for ocean applications will provide a gap filling technology for Maritime Domain Awareness while producing clean, environmentally safe, renewable power. The powerbuoy has potential to be scaled to extend the duration of a littoral sonobuoy. The proposed

SkySight Technologies, LLC Phase I SBIR – Topic N2008-059 project will create an innovative sensor system to augment an outer ring of defense used for queuing, classifying, and tracking go-fast boats, small and commercial craft, swimmers and divers that are a threat to harbors, anchorages, and other high value assets. The proposed technology utilizes a combination of proven sonobuoy sensors and adaptations of current technologies to meet the mission needs. It creates a potential littoral sensor to support the Tactically Integrated Sensors (TIS) AAP. The US Sensor Systems, Inc. The Phase I SBIR – Topic N2008-059 project will adapt the company’s low cost, all-optical sensing technology for a passive, lightweight, reusable, and deployable array for littoral applications. It presents the potential for a passive acoustic sensor to provide a trip-wire for the Integrated Swimmer Defense project. Finally, Phase I SBIR – Handheld Biometric Device topic N08-210 is based on the performance specification derived from the Personnel Identification v1 Capability Development Document. The proposals are under evaluation as of this report, but it is assumed that the technologies fostered under this SBIR will directly support the Navy’s Identity Dominance System program of record.





**MARITIME  
SURVEILLANCE  
SYSTEMS  
PROGRAM  
OFFICE  
[PMS485]**

The Maritime Surveillance Systems Program Office comprises four main components – the Mobile Surveillance System, the Fixed Surveillance System (FSS), the Distributed System Group (DSG), and the Integrated Common Processor (ICP).

The Mobile Surveillance System consists of the Surveillance Towed Array Sensor System (SURTASS), a low frequency passive surveillance system that employs a long array of hydrophones towed from a surface ship designated T-AGOS, and Low Frequency Active (LFA), a vertical source array with active transducers. The LFA sources are deployed and retrieved through a centerwell located amidships and use the passive array as the active receiver. A compact version of LFA (CLFA) was developed and installed on a SURTASS ship. SURTASS/LFA communications include SHF ship-to-shore data transmission, and secure voice and Global Command and Control System - Maritime (GCCS-M) interface for real-time contact reporting. ICP is the signal and information processor and display system



USNS IMPECCABLE

for FSS and SURTASS/LFA that provides detection, classification, localization, and reporting of undersea and surface targets.

The Fixed Surveillance Systems provide long-term, undersea surveillance in open-ocean and littoral waters. FSS consists of the Sound Surveillance System (SOSUS); the Fixed Distributed System (FDS); and FDS-Commercial (FDS-C), a variant of FDS. FDS is a low-frequency passive acoustic surveillance system employing fiber-optic technology. It consists of long arrays and clusters of hydrophones distributed on the sea floor. FDS-C uses COTS items to reduce procurement and lifecycle costs.

The Distributed Systems Group (DSG) was formed to fulfill Anti-Submarine Warfare (ASW) and maritime surveillance capability gaps in shallow or deep water environments after the Advanced Deployable System (ADS) ended.

PMS485 systems provide vital tactical cueing and give the U.S. Navy real ASW tracking power with versatile, wide-area ocean surveillance systems that provide mobility, rapid response, and long endurance. They are the Navy's only primary long range undersea detection capability. Specific mission areas supported include area sanitization, expeditionary force support, and barrier operations. Principle peace time missions are to provide Indication and Warning surveillance of potential hostile submarines in areas of U.S. interest, collect operational

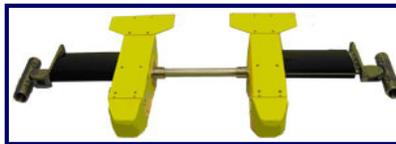
data on these vessels, and support Fleet readiness exercises. During periods of increased tension, these systems can maintain track of potential threat submarines and surface ships, conduct surveillance of seaports, transit lanes, and choke points, and provide area sanitization for carrier strike groups. Direct reporting to the warfighter makes the surveillance "real time." PMS485 continues to support the operation of fixed systems and five SURTASS ships: two active/passive and three passive only. During this past year, the Navy reactivated the USNS ABLE (T-20) and reconfigured the ship so PMS485 could install the CLFA active surveillance system. At the same time, the Navy deactivated the leased M.V. CORY CHOUEST, with PMS485 removing all of CORY's mission equipment prior to her transit back to LaRose, LA.

Given the ongoing ASW needs, as well as continuing requirements to support Maritime Domain Awareness (MDA), PMS485 is continually pushed by Theater Commanders to maintain its high SURTASS/LFA Operational Availability (Ao), well in excess of system requirements. SURTASS ships answered the Fleet's call with consistent results. PMS485 finished FY08 with a SURTASS Ao of 98%. Passively, all five SURTASS ships suffered only 23 days of lost passive operations attributable to system equipment, out of 1146 days scheduled. Actively, the two LFA platforms (prior to CORY's deactivation) suffered only 37 days of lost active operations attributable to system equipment, out of 451 days scheduled (because the passive system can lose operational time due to active problems, the lost day counts are



not additive). PMS485 continued to develop and field a number of mitigation efforts to minimize the serious risk to towed arrays from fishing nets and lines found in the harsh littoral ocean operating areas. A Delta Wing was installed over the Y-joint of all twin-line arrays to reduce net entanglement. The SURTASS Headline And Roll Control (SHARC) was installed in place of paravanes on all twin-line arrays. Currently, SHARC is only available for the smaller headlines, with paravanes still being required to support the longer headlines. A research and development (R&D) effort is planned in FY09 to develop a capability to support the longer headlines. Other FY08 Net Mitigation developments included: a tow cable tensionmeter to provide an indication of tension forward of the towed array; an Array Knowledge Board display to increase the awareness of the array status and indicators of entanglement for the shipboard technicians; an Acoustic Transponder fitted at the tail of each array to help locate an array lost at sea; and a Y-Joint depth sensor to provide an indication of tow depth at the Y-Joint. All net mitigation equipment will be installed on all TL-29A platforms by end of the third quarter of FY09.

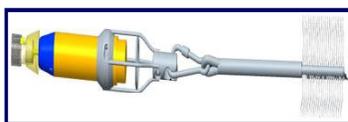
During FY08, PMS485 outfitted USNS ABLE with the TL-29A Twin-Line towed array, giving all T-19 class ships a TL-29A array. The Twin-Line configuration provides directional noise rejection capabilities enabling bearing resolution without needing to turn the ship, which allows increased flexibility for the Commander at sea. This array is based on the TB-29A array architecture used on submarines and can be towed in very shallow waters. Leveraging



SHARC



TOW CABLE TENSIONMETER



ACOUSTIC TRANSPONDER

submarine assets is an excellent way to help the Navy get the most for taxpayer dollars and is a theme that is echoed throughout PMS485's transformational efforts. During FY08, PMS485 retired the Reduced Diameter Array (RDA) from service, which will result in reduced array maintenance costs.

One of the revolutionary changes in ASW systems PMS485 developed is the Low Frequency Active (LFA) system, which is used when a target is too quiet to be detected by the passive SURTASS system alone. For example, LFA allows the Navy to detect smaller and quieter diesel submarines at long range while still allowing enough time to react. LFA is a set of acoustic transmitters suspended by cable beneath the SURTASS vessel. These "projectors" produce an underwater sound pulse or "ping," much as a stereo speaker turns electrical impulses into audible sound waves in the air. These active pulses are capable of detecting and tracking quiet hostile submarines at ranges far in excess of current passive sonar systems. Officials state that at least 41 nations have this type of

hard-to-detect submarine. The Navy has investigated the use of other acoustic and non-acoustic technologies to fill this need, but, to date, only low frequency active sonar is capable of providing the long-range submarine detection capability the Navy needs. In addition to lifecycle support of the LFA system, PMS485 supports an ongoing Active Improvement Program that provides for at-sea testing of LFA systems (and CLFA in the future), post-mission active data analysis, active performance modeling and performance prediction, employment analysis and recommendations, and exercise planning and execution through participation in fleet exercises such as the RENEGADE NET.

In FY08, PMS485 continued development and test of a lighter weight, compact version of LFA. Compact LFA (CLFA) is a variant of LFA designed for use on the smaller T-19 Class SWATH SURTASS ships. The new design reduces the active system weight from 325,000 pounds (lbs.) in LFA to 169,000 lbs. in CLFA. PMS485 is responsible for managing the design, development, procurement, and installation of the CLFA system on SURTASS vessels. PMS485 made significant progress in FY08 on CLFA, including extensive testing of the active projectors and its handling system, installation of the CLFA EDM on USNS ABLE, and initial at-sea developmental testing. USNS ABLE is expected to complete operational testing in FY09 of the complete SURTASS target architecture with CLFA, TL-29A passive array, and ICP processing. Two additional CLFA systems are planned for procurement in FY09 and FY10



with installations in FY11 and FY12. As part of the CLFA developmental test program, PMS485 supported an innovative strategy of passive Fleet use of USNS ABLE in between active at-sea testing. This approach supported USNS ABLE's successful participation in RIMPAC 08 that relieved the Operational Commander from having to transit an operational asset from WESTPAC to support the exercise. After RIMPAC, USNS ABLE completed some additional CLFA Handling System testing and the first at-sea "pinging" of the CLFA Transmit System before transiting to WESTPAC. Once in-theater, she immediately was put to use as a passive-capable operational asset.

A key contributor to the success of USNS ABLE's participation in RIMPAC 08 was the Integrated Common Processor (ICP). ABLE was the first SURTASS platform to receive ICP, with a corresponding installation at the Naval Oceanographic Processing Facility (NOPF) in Whidbey Island, WA. ICP has the capability to process and display data from all fixed and mobile underwater systems. It takes advantage of automation advancement, array technology improvements, hardware insertions, and the common software components of the submarine and surface USW systems. ICP, like the Acoustic Rapid COTS Insertion (ARCI), utilizes an Open Architecture business model, where commercial items are used to the extent practicable, software development is uncoupled from hardware procurement, and innovation is increased through competition and the participation

of academia and "non-traditional" players. Like the TL-29A, ICP will bring commonality between submarine systems and mobile and fixed surveillance systems. PMS485 successfully completed the System Integration Test (SIT) of the Advanced Deployable System (ADS) in November 2007; this ended the development of the ADS by direction of higher authority. This proven system is available for other Distributed Netted Systems to reduce developmental risk or accelerate their acquisition timeline.

The DSG set out to rapidly transition distributed sensor technologies into fielded Navy wide-area queuing systems. Two primary efforts were accomplished in FY08. First, the DSG re-used an existing Phase II SBIR with funding provided by PEO LMW for a highly successful ASW data exfiltration demonstration. This involved Syntronics Corporation and Liquid Robotics Incorporated (LRI). The test scenario was to use a LRI vehicle that harvests wave energy for motion (i.e., the Wave Glider) to maintain station. It towed a float that held a suspended acoustic modem in the water below, and the radio for surface communications above. The demonstration was held in conjunction with an Office of Naval Research ASW sea test for the Deployable Autonomous Detection System (DADS) that featured a diesel electric submarine transiting the DADS field. Upon detection, the DADS nodes would normally send the contact report via an integral acoustic modem to a moored buoy. The LRI system was to demonstrate those same reports could be detected by the towed acoustic modem, and relayed ashore via RF (demonstrating that a moored buoy was not needed for the data exfiltration).

This demonstration was held off San Diego in September 2008 as a risk reduction for future DNS communications requirements. The LRI Wave Glider shows promise for other DNS applications because it can harvest wave energy and maintain station for extended periods.

The other major effort has been to initiate a modeling and simulation (M&S) task to avoid mutual interference in tactical situations between various active ASW sensors. PMS485 partnered with NAVAIR, PMA 264 to develop a Concept of Operations that will eliminate the mutual interference between sonobuoys and SURTASS CLFA sonar. The Acoustic Multi-static Active Interoperability Simulation (AMAIS) task was awarded to Advanced Acoustic Concepts Incorporated (AAC) since they have considerable experience with modeling other sensors in the Surface Aviation Interoperability Lab (SAIL) at NAS Patuxent River. The outcome of the M&S effort should not only enable tactical forces to develop effective CONOPS to avoid mutual interference, but will also engender CONOPS for effective bi-static operations, thereby extending the detection range of SURTASS and providing both surface and air ASW forces additional opportunities to gain contact on targets of interest.



## MINE WARFARE PROGRAM OFFICE [PMS495]

The PMS495 portfolio includes several large, complex systems.

**AN/WLD-1, Remote Minehunting System (RMS)**, is an unmanned, semi-autonomous, diesel powered semi-submersible vehicle that tows a variable depth sensor, the AN/AQS-20A. RMS is capable of real-time Line-of-Sight (LOS) and Over-the-Horizon (OTH) operation. At the end of FY08, PMS495 delivered LRIPs 3 and 4 to the Navy, bringing the total LRIPs delivered to four. During FY08, RMS operated in the Mediterranean Sea off the USS BAINBRIDGE (DDG 96) as part of a joint NATO training exercise. RMS also conducted an Operational Assessment (OA) at the South Florida Test Facility in September 2008.

**AN/AQS-20A Mine Hunting Sonar** is designed for the detection, classification, localization, and identification of sea mines. The AN/AQS-20A has over 1,900 hours of testing tow time, with proven performance on three platforms: MH-53E, MH-60S, and RMS. The system is comprised of acoustic and optical sensors housed in a towed underwater body which can maintain operator-selected depths below the surface or heights above the bottom. During FY08, AN/AQS-20A performance was demonstrated during the RMS TECHEVAL and OA. The AN/AQS-20A entered OPEVAL but the test was suspended due to problems with the MH-60S tow cable recovery system.

**The AN/AES-1, Airborne Laser Mine Detection System (ALMDS)** is a laser-based, high area coverage system that uses Streak Tube Imaging Light Detecting and Ranging (LIDAR) to detect, classify, and localize floating and near-surface moored mines. ALMDS will be deployed from the MH-60S helicopter. FY08 performance testing supported a successful LRIP award of an additional 3 units with the first delivery scheduled for FY10. During FY08, ALMDS entered Weapon System Integration Testing (WSIT) on the MH-60S helo in preparation for TECHEVAL in FY09.

**The AN/ASQ-235 Airborne Mine Neutralization System (AMNS)** provides organic airborne rapid reacquisition, identification, and neutralization against unburied bottom and moored sea mines. AMNS employs the U.S. Navy Common Mine Neutralizer, Archerfish. During FY08, the AMNS Program held a successful MS C and entered into a LRIP contract with 5 units on order. Also during FY08, AMNS entered TECHEVAL Phase 1 and completed 17 successful missions.

**AN/ALQ-220 Organic Airborne and Surface Influence Sweep (OASIS)** will provide an organic, high-speed, magnetic and acoustic influence sweep capability deployed from the MH-60S helo. Forward and aft electrodes generate the magnetic signature, which is engaged after deployment and disengaged prior to recovery and captive carriage. A water-driven acoustic generator creates the acoustic signature. During FY08, the OASIS implemented re-design efforts to mitigate corrosion issues.

**Meanwhile, AN/AWS-2 Rapid Airborne Mine Clearance System (RAMICS)**, is a MH-60S helicopter deployed system capable of reacquiring and neutralizing near-surface and surface (floating) moored mines. It utilizes an electro-optic LIDAR system to reacquire the target and aim a rapid firing MK44 30mm gun using MK258 Mod1 munitions. RAMICS eliminates the man from the minefield, and provides day and night operations. During FY08, RAMICS continued SD&D development, integration and testing efforts.

**Coastal Battlefield Reconnaissance & Analysis (COBRA)** is a Multi-Spectral Imagery (MSI) system that provides the capability to conduct unmanned aerial reconnaissance in the littoral battle space for the detection of minefields, mine lines, and obstacles in the surf zone through the beach exit. The COBRA Airborne Payload Subsystem (CAPS) is a Modular Payload Architecture (MPA) of the MQ-8B Fire Scout Vertical Takeoff and Landing Unmanned Aerial Vehicle (VTUAV). During FY08, COBRA completed data collection flight tests off the MH-53E helo necessary to verify COBRA performance.





## MODERNIZATION PROGRAM

PMS495 is also responsible for the upgrade/modernization of the MCM Ship Class, including modernization, replacement, and production of upgrades to existing systems and the upgrade of in-service airborne systems operating off the MH-53E helo. PMS495 modernized four MCM Ships with Phase 1 Systems (all except EMNS and HFWB); the first MCM Ship was certified for Electronic Chart Display and Information System – Navy (ECDIS-N) paperless navigation, and PMS495 completed delivery of the AN/AQS-24 sonar to HM Squadrons.

**Mine Warfare and Environmental Decision Aids Library (MEDAL)** is the U.S. Navy's MIW Decision Support System, enabling and supporting forces with a single tool for Command and Control. MEDAL provides Tactical Decision Aid (TDA) functionality to the warfighter, along with integrated mission planning, evaluation, and situational awareness capability. MEDAL is available within the Global Command and Control System – Maritime (GCCS-M) system and in a stand-alone laptop version supporting Expeditionary users. During FY08, the program completed a COMOPTEVFOR Observation of Operational

Capability (OOC) of Build 11, with upgrades including a generic planning functionality for unmanned vehicles, end-to-end minefield planning capability, and critical enhancements to support Organic MCM systems such as the RMS.





## STRATEGIC INITIATIVES

The change in Program Executive Officers in 2008 created a natural opportunity to reflect on the future direction of the PEO. In the fall, Ms. Sandel laid out her Strategic Initiatives:

- Expedite fielding of superior warfighting capability
- Take positive and direct action in Workforce Diversity, Agility and Competence
- Accelerate Open Architecture
- Develop Product Line Road maps
- Create opportunities for Small Businesses
- Implement flexible and dynamic Contracting Strategies

## COMMITMENT TO CUSTOMERS

Five years ago, LMW implemented an intensive Quarterly Execution Review (QER) process to monitor and measure our performance in the areas of Program and Financial Execution and Workforce Agility. Last year, LMW began to measure our performance in the eyes of our customers. Do we deliver what we say we are going to deliver on time? Do our products work as well as they should and are they available when needed? Do we support events or exercises as desired by our customers? In short, do we keep our promises to our customers? LMW's most significant FY09 Commitments to Customers are listed on pages 36-38.

## PRODUCT DEVELOPMENT

The accelerating pace of technology development necessitates a more focused approach to technology development and transition to meet warfighting requirements.

The technology transition process must change from one that is cyclical to one that is active and continuous. In several key platform and warfare areas, the Navy established, and found highly useful, a set of technology coordination and alignment processes. In particular, the Navy established SUBTECH (Submarine Technology), CARTECH (Carrier Technology), and SURFTECH (Surface Warfare Technology) processes to coordinate Research and Development (R&D), and to develop community consensus on R&D goals and the investment strategy to support those goals. The successes of the technology coordination and alignment processes suggest that the Naval Expeditionary Warfare area stands to benefit from the same type of arrangement, from the creation of a similar Expeditionary Warfare Technology [EXTECH] process. In 2009, LMW will engage our stakeholders in a conversation about the benefits and challenges presented by pursuing an EXTECH process.

## SMALL BUSINESS

At LMW, Small Business is Big Business. Numerous program office efforts to engage and contract with small and disadvantaged businesses are discussed in the respective reports of accomplishments.

PEOLMW has set a goal of \$100M in Phase III Small Business Innovation Research (SBIR) contracts by the end of FY2010. Phase III awards to date total \$25M.

PEO LMW faces a wide range of technical challenges. Our priority



challenges are listed below. Many of these may best be addressed by small business. To facilitate solutions to these challenges, we have established the position of Technology Development Manager, charged with identifying and promoting new technologies into the acquisition process. LMW strongly encourages companies with potential solutions to contact our Technology Development Manager, Ms. Linda Estepa, at Linda.Estapa@navy.mil.

## PEOLMW PRIORITY TECHNICAL CHALLENGES

**Standoff Detection of Explosives:** Sensors are required to detect explosives from a safe standoff distance and must be able to detect explosives in sealed containers.

**Buried Mine Detection & Classification:** Sensors are required to detect and classify threat mines completely buried below the seabed, at standoff ranges up to 30 meters.

**Precise Navigation for Unmanned Underwater Vehicles (UUVs) and Divers:** Capability is required for both UUVs and divers to accurately and repeatedly determine underwater location.

**Improved Power Sources for Unmanned Maritime and Ground Systems:** Technologies that reduce the size and cost of fuel cells or deliver higher battery density are required for unmanned systems.

**LCS Mission Package Mission System Containers:** An alternative is sought to replace the current steel-based containers while maintaining ISO standards and Grade B shock requirements.

**High Data Rate, Networked Over-the-Horizon Multi-Vehicle Communications:** 25 Mbps data rate communications system

capable of supporting simultaneous operation of four vehicles at distances of at least 30 nautical miles is required.

**Diver Protection:** Technologies are sought that can provide diver protection in hot water (higher than 95 degrees) and/or contaminated water.

**Electro-optic/Infrared (EO/IR) Sensors:** Technologies are sought to significantly improve shipboard EO/IR sensor operational availability and reliability.

**Anti-Swimmer Devices:** Operationally viable capability is required to lethally engage enemy swimmers.

**Surface Launched Littoral Sonobouys:** A cost-effective, sonobouy capable of persistent operation in littoral waters is sought.

**Media and Biometric Data Exploitation Device:** A simple means to pull media and biometric data from cell phones or laptop computers is required.

**Countermine System (CMS) Darts:** A small safe and arming device for CMS darts is required.

**Mine Countermeasures Post Mission Analysis:** Automatic target recognition capability is desired.

**Rapid Airborne Mine Clearance System (RAMICS):** Improve detection and fire control system capabilities to meet probability of reacquisition and neutralization requirements.

**Airborne Laser Mine Detection System (ALMDS):** Technologies are sought to meet Increment 2 search depth requirements.

**Signal Assessment System (SAS):** An increased capability to discriminate hostile trigger signals from a normal background signal environment or legitimate users of

the RF spectrum is sought.

**CREW Systems:** Smaller, more efficient, lower-power components and systems that demonstrate similar or greater performance compared to current systems are required. Improvements are particularly sought for receivers/transceivers, high power amplifiers and processor/modulators.

**CREW Power Amplifier Packaging and Cooling:** Achieving the desired size to cooling ratios will require advanced packaging and cooling techniques and materials.

**CREW Network Centric Operations:** Improved system controllers and next generation network architectures are required to maximize CREW systems ability to communicate with one another and other systems.

## COMMUNITY OUTREACH

We recognize the importance of providing support and education for each member of our team and to foster an open, positive and diversity-centric command climate. PEO LMW emphasizes Ethics and Diversity to each new employee as the foundation for success in developing an agile workforce and one focused on valuing every employee. We continue to devote time and effort to initiatives that support harvesting the strength of the nation's diversity, including Ms. Sandel's membership on the University of Maryland's Women in Engineering Board to her service on the Department of the Navy's Advisory Committee on Hispanic Employment (ACHE).

In 2008, we commissioned a study to help us increase outreach to local schools. The responding proposal included a series of proven programs targeted at disadvantaged and low income student populations. Opportunities



identified to engage in science and engineering include programs such as the FIRST Robotics competition, the Human Powered Submarine competition, the National Foundation for Teaching Entrepreneurship, the Sea Perch program and mentoring partnerships with local high schools and middle schools.

PEO LMW entered into a Navy Community Service Program (NCSP) agreement with the Washington Mathematics Science Technology Public Charter High School (WMST), located in Washington, DC. The school, with an enrollment of 400, offers academic and technical training for students in grades 9-12. PEO LMW and WMST share common interest in fostering the development of the nation's next generation of scientists and engineers. This partnership will create pathways for students to gain exposure to the technologies of today while learning to become more proficient in some of the skills necessary to excel in the 21st century workplace.

We will make our people available to assist WMST students in pursuit of their academic and career interests. This includes PEO LMW volunteers providing students "real world" work situations, working with faculty to encourage students to pursue science and engineering careers, scheduling a job shadowing day, and serving as mentors in support of various planned events such as science fair projects and senior science projects.

PMS403 participated in the Sea Perch program to teach science concepts

through design, build, and test of underwater vehicles. Deputy Program Manager Michael Alperi attended the Prince William County High School District program "kick-off" where he presented the Unmanned Vehicles Program overview to over 500 9th grade students. Congressman Tom Davis was the key note speaker. The program culmination consisted of school teams running their Remotely Operated Vehicle through a series of competitive skill demonstrations at George Mason University at the end of April. Captain Siegrist participated as a judge and trophy presenter for these in-water events.

Howard Berkof (PMS403) and Rob Simmons (PMS408) served as judges at the AUVSI/ONR 11th International Autonomous Underwater Vehicle Competition in San Diego, July 29 to August 3.

In 2009, PEO LMW will support the following initiatives:

1. The 21st Century Engagement, Education

- and Technology Program
2. Co-sponsoring NAVSEA's first Hispanic Small Business Conference
3. Leading NAVSEA's engagement with Advancing Minorities Interest in Engineering (AMIE)

The 21st Century Engagement, Education, and Technology Program (21 CEETP) is a NAVSEA chartered effort focused on addressing the shortage of science, technology, engineering and mathematics (STEM) professionals necessary to maintain U.S. national security and economic success. We will continue our very active participation in this worthwhile endeavor.

PEO LMW will host a conference for Hispanic-Owned Small Businesses (HOSB) that seek opportunities with the U.S. Navy at California State University in Los Angeles, CA on January 27-29. The conference will provide an unprecedented forum where HOSB owners can connect directly with senior Navy and industry leaders to learn, collaborate, and explore ways in which U.S. Navy programs can benefit from the vast product and service offerings of our





nation's HOSBs. The conference will include one-on-one sessions where HOSB representatives will meet with large government prime contractors and government representatives to learn about immediate and upcoming business opportunities.

Furthermore, the conference will foster relationships with minority-serving colleges and universities to attract an increasingly effective and diverse federal workforce for the U.S. government.

PEO LMW serves as NAVSEA's direct liaison with Advancing Minorities Interest in Engineering (AMIE), an organization of Historically Black College and university engineering Deans. The organization seeks to forge corporate/ academic alliances that serve to promote and support quality engineering programs. The NAVSEA/AMIE alliance has developed a scholarship program that awarded 11 scholarships in 2007 and 24 in 2008.





## FY09 COMMITMENTS TO CUSTOMERS

Equipment Deliveries	Qty	Contractor/ Activity	FY09 Schedule			
			Q1	Q2	Q3	Q4
<b>PMS-340</b>						
Swimmer Delivery Vehicle (SDV) Lithium Ion Batteries	3	TMASC		3		
HMU Batteries/Chargers	70 ea	SKC			70 ea	
<b>PMS-403</b>						
Surface Mine Countermeasure (SMCM) UUV Increment 2	2	Bluefin			1	1
AN/AQS-20A Towed Sonar Mine Detecting Set	10	Raytheon	2	3	3	2
Remote Multi-Mission Vehicle (RMMV)	3	Lockheed Martin	2	1		
Seafox #5	1	Northwind Marine	1			
Mine Countermeasure (MCM) USV #2	1	Oregon Iron Works Inc.		1		
Seafox #6	1	Northwind Marine		1		
Unmanned Surface Sweep System (US3) #2	1	ITT		1		
MCM USV Mission Module	2	NSWC Panama City		1		1
<b>PMS-408</b>						
JCREW 2.1 (CVRJ)	669	ITT	48		621	
EOD Robots MK 2 MOD 0	15	Foster-Miller	10	5		
Radiac Set, AN/PDX-2	50	Various / NAVEODTECHDIV	15	15	15	5
Transmitting Set, Countermeasures, AN/PLT-4	321	Advanced Eng & Sciences/ITT	16	123	78	104
Transmitting Set, Countermeasures, AN/PLT-5	40	TBD				40
MK 15 MOD 1 Underwater Imaging System	193	Teledyne / RDI	114		79	
Joint EOD Decision Support System Mobile Field Kit	51	TBD				51
<b>PMS-420</b>						
Surface Warfare (SUW) Mission Package #2	1	NSWC Dahlgren				1
Mine Countermeasures (MCM) Mission Package #2	1	NSWC Panama City				1
<b>PMS-480</b>						
Tactically Integrated Sensor (TIS) Engineering Development Model	1	NUWC Keyport			1	
<b>PMS-485</b>						
ICP Software	5	Lockheed Martin	1	3		1
TL-29A Net Mitigation	5	JHU/APL		3	1	1
GCCS-M 4.X for SURTASS	3	SSC-P	1	1		1
<b>PMS-495</b>						
Airborne Mine Neutralization System (AMNS)	2	Raytheon			1	1



EVENTS	FY09 Schedule			
	Q1	Q2	Q3	Q4
<b>PMS-340</b>				
Complete RAV 813	X			
Complete RAV 815			X	
Complete RAV 817				X
<b>PMS-403</b>				
SMCM UUV Increment 1: Clear Horizon	X			
SMCM UUV Increment 1: Shamal 09		X		
SMCM UUV Increment 1: Panama City Trainex, TEW-L (Eglin AFB)		X		
SMCM UUV Increment 1: Kings Bay/Mayport MHD Survey		X		
SMCM UUV Increment 1: Tentative Key West Coral Demonstration		X		
SMCM UUV Increment 1: Tentative Arabian Gauntlet		X		
SMCM UUV Increment 1: Panama City Trainex		X		
SMCM UUV Increment 1: Corpus Christi MHS		X		
SMCM UUV Increment 1&2: Panama City Trainex			X	
SMCM UUV Increment 1 & 2: Norfolk or New York MHS exercise			X	
SMCM UUV Increment 1 & 2: PACNORWEST MHD Survey			X	
SMCM UUV Acquisition Program MS B		X		
Seafox USV #1-#6: Delivery, Command Training, Testing and Evaluation	X	X	X	X
Seafox RIVGRU: Integration of RON 3, Det 2 Maritime training			X	
SeaFox MESF 2: Integration with MSRON Staff( Assign C2DIV45)			X	
Seafox MESF2: PANAMAX or Southern Partnership				X
SeaFox MESF 5: Deployment to Kuwait			X	X
LCS MCM USV: LCS End-to-End T&E			X	
Talisman Sabre				X
<b>PMS-480</b>				
DDG-58 Shipboard Protection System (SPS) Block 1 System Operation Verification Test (SOVT) Complete	X			
DDG-79 SPS Block 1 SOVT Complete	X			
DDG-75 SPS Block 3 SOVT Complete	X			
Mobile Ashore Support Terminal (MAST) III Upgrades Complete				X
<b>PMS-495</b>				
Complete NAVC2 install on MCM-2 and MCM-11	X			
Complete all MCM-3 CS Modernization efforts			X	
Complete NAVC2 Install on MCM-10				X



Equipment Availability (Ao)	FY09 Ao Threshold (%)
<b>PMS-340</b>	
SEAL Delivery Vehicle (SDV)	74
Semi-Autonomous Hydrographic Reconnaissance Vehicle (SAHRV)	90
Hydrographic Mapping Unit (HMU) MK 107 MOD 0	90
<b>PMS-408</b>	
EOD Robot MK 1 MOD 0	80
EOD Robot MK 2 MOD 0	80
Search-Classify-Map (SCM) UUV MK 18 MOD 1	80
Marine Mammal Systems	75
2.1 CVRJ	90
2.1 MMBJ	90
Jukebox	90
Symphony	90
QRD	90
<b>PMS-485</b>	
SURTASS	88
Low Frequency Active (LFA)	80
<b>PMS-495</b>	
AN/SLQ-48(V)1	70
AN/SLQ-37(V)3	76
AN/AQS-14A/24A	65
MK105 MOD 4	50
MEDAL	90
NAVC2	90





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