Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Navy										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603782N: *Mine and Expeditionary Warfare Advanced Technology*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	31.804	21.941	6.048	-	6.048	11.864	17.926	24.496	30.277	Continuing	Continuing
2917: *Shallow Water MCM Demos*	27.631	21.941	6.048	-	6.048	11.864	17.926	24.496	30.277	Continuing	Continuing
4027: *Naval Innovative Science and Engineering*	2.580	-	-	-	-	-	-	-	-	0.000	2.580
9999: *Congressional Adds*	1.593	-	-	-	-	-	-	-	-	0.000	1.593

A. Mission Description and Budget Item Justification

The efforts described in this Program Element (PE) are based on investment directions as defined in the Naval S&T Strategic Plan approved by the S&T Corporate Board (Feb 2009). This strategy is based on needs and capabilities from Navy and Marine Corps guidance and input from the Naval Research Enterprise (NRE) stakeholders (including the Naval enterprises, the combatant commands, the Chief of Naval Operations (CNO), and Headquarters Marine Corps). It provides the vision and key objectives for the essential science and technology efforts that will enable the continued supremacy of U.S. Naval forces in the 21st century. The Strategy focuses and aligns Naval S&T with Naval missions and future capability needs that address the complex challenges presented by both rising peer competitors and irregular/asymmetric warfare.

This PE primarily develops and demonstrates prototype Mine Countermeasures (MCM) and Expeditionary Warfare system components that support capabilities enabling Naval Forces to influence operations ashore. Third-world nations have the capability to procure, stockpile and rapidly deploy all types of naval mines, including new generation mines having sophisticated performance characteristics, throughout the littoral battlespace. Real world operations have demonstrated the requirement to quickly counter the mine threat. Advanced technologies must rapidly detect and neutralize all mine types, from deep water to the inland objective. This program supports the advanced development and integration of sensors, processing, warheads and delivery vehicles to demonstrate improved Naval Warfare capabilities. It supports the MCM-related Future Naval Capabilities (FNC) Enabling Capabilities (ECs). Within the Naval Transformation Roadmap, this investment will achieve one of three key transformational capabilities required by Sea Shield as well as technically enable the Ship To Objective Maneuver (STOM) key transformational capability within Sea Strike.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Navy	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603782N: *Mine and Expeditionary Warfare Advanced Technology*

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	30.256	21.941	9.135	-	9.135
Current President's Budget	31.804	21.941	6.048	-	6.048
Total Adjustments	1.548	-	-3.087	-	-3.087
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-0.179	-			
• SBIR/STTR Transfer	-0.604	-			
• Program Adjustments	-	-	-2.975	-	-2.975
• Section 219 Reprogramming	2.332	-	-	-	-
• Rate/Misc Adjustments	-	-	-0.112	-	-0.112
• Congressional General Reductions Adjustments	-0.001	-	-	-	-

Congressional Add Details ($ in Millions, and Includes General Reductions)

	FY 2010	FY 2011
Project: 9999: *Congressional Adds*		
Congressional Add: *JEOD Driver Situational Awareness Sys*	1.593	-
Congressional Add Subtotals for Project: 9999	1.593	-
Congressional Add Totals for all Projects	1.593	-

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603782N: *Mine and Expeditionary Warfare Advanced Technology*	PROJECT 2917: *Shallow Water MCM Demos*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
2917: *Shallow Water MCM Demos*	27.631	21.941	6.048	-	6.048	11.864	17.926	24.496	30.277	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project primarily develops and demonstrates prototype MCM technologies that support a range of capabilities enabling Naval Forces to influence operations ashore. Third-world nations have the capability to procure, stockpile and rapidly deploy all types of naval mines, including new generation mines having sophisticated performance characteristics. Recent operations have demonstrated the requirement to counter the projected mine threat. Advanced technologies are required to rapidly detect and neutralize all mine types, from deep water to the inland objective. This project supports the advanced development and integration of sensors, processing, warheads and delivery vehicles. It supports the MCM-related FNC ECs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: MINE/OBSTACLE DETECTION	19.347	18.423	6.048
Description: This activity focuses on developing and demonstrating technologies that support detection, classification, identification and multi-sensor data fusion of mine and obstacle data to speed tactical timelines and increase operator standoff. Efforts include: electro-optic sensors/systems to enable Unmanned Aerial Vehicle (UAV) rapid minefield reconnaissance and precise mineline location from Very Shallow Water (VSW) through the Beach Zone (BZ); sensors/systems to enable cooperating Unmanned Underwater Vehicles (UUVs) to perform wide-area reconnaissance and assault lane reconnaissance/preparation from shallow water through the Surf Zone (SZ); sensor development for detection and classification of buried mines; technologies for MCM Mission Modules for the new Littoral Combat Ships (LCS); and sensor data fusion to enable a theater mine warfare common operating picture and own ship protection. This activity supports the development and transition of technologies for the MCM-related FNCs. This S&T investment supports the Joint Requirements Oversight Council of the Joint Chiefs of Staff and Office of the Chief of Naval Operations (OPNAV) validated requirements for MCM. This S&T investment of mine and obstacle detection provides critical S&T transitions to the Mine Warfare Mission package of the Navy's new LCS. This investment in MCM S&T is reported as part of OPNAV's annual report to Congress in the MCM Certification Plan. This plan is reviewed and approved by the Office of the Secretary of Defense, and any deviations in ONR's reported S&T funding for MCM throughout the Future Years Defense Plan must be reported and justified through Navy and OSD. Further, the MCM S&T investment plan structure is reviewed and authorized by the Navy's Technology Oversight Group that approves ECs, their supporting products, and funding profiles. The FY 2010 to FY 2011 funding decrease is due to the completion Future Naval Capability (FNC) - SHD-07-03 - Tactical UAV Sensor for Detection of Minefields (Buried Mines) in the Beach Zone.			

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603782N: *Mine and Expeditionary Warfare Advanced Technology*	**PROJECT** 2917: *Shallow Water MCM Demos*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012

The FY 2011 to FY 2012 funding decrease is due to the completion of Future Naval Capability (FNC) - SHD-07-01 - Buried Mine Sensor and Processing Development for Detection, Classification and Identification of Buried Sea Mines; MCM Data Fusion Techniques Using Multiple Unmanned Sensors and Systems; MCM Systems for Littoral Combat Ship, Advanced Flight, Mission Modules; and Undersea Cooperative Cueing and Intervention for MCM Operations.

FY 2010 Accomplishments:

- Continued advanced processing development for Low Frequency Broad Band to enable rapid detection, classification and identification of buried sea mines.
- Continued development of multi-platform fusion from high-resolution mine hunting systems (e.g. AN/AQS-20) for improved mine detection and avoidance.
- Continued multiple unmanned system MCM data fusion techniques for reduction in false alarms and reduction in tactical timelines.
- Continued technology development for multiple UUV Undersea Cooperative Cueing and Intervention in support of MCM operations.
- Continued planning for assault breaching systems exercise involving the mine detection systems.
- Completed development of Tactical Unmanned Aerial Vehicle (TUAV)-based SZ/BZ buried minefield detection capability.
- Completed field testing of prototype airborne buried mine sensors.
- Completed integration of buried mine sensors onto airborne platform and begin flight testing.
- Completed technology development, integration and early demonstration planning for MCM Mission Module systems for Advanced Flight LCS.
- Initiated development of iPUMA/Synthetic Aperture Sonar system to provide the first non marine mammal based mine detection and classification capability for confined or highly obstructed areas.
- Initiated development of Small Acoustic Color/Imaging Sonar system to provide the first non marine mammal detection, classification and identification capability for very shallow water (VSW) and reduce the false-alarm rate by x20 for all VSW mine threats.
- Initiated development of Long Range Low Frequency Broadband (LRLFBB) Sonar to significantly increase the minehunting area coverage rate.
- Initiated Phase 2 of Advanced Mission Module Technology Development.

FY 2011 Plans:

- Continue all FY 2010 efforts, less those noted as completed above.
- Complete planning and demonstration for combined assault breaching systems exercise involving the mine detection systems.
- Complete technology development for multiple UUV/Unmanned Surface Vehicle (USV) Undersea Cooperative Cueing and Intervention in support of MCM operations.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603782N: *Mine and Expeditionary Warfare Advanced Technology*	PROJECT 2917: *Shallow Water MCM Demos*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Complete Phase 2 of Advanced Mission Module Technology Development with a final demonstration. - Complete development of multi-platform fusion of high-resolution mine hunting systems (e.g. AN/AQS-20) for improved mine detection and avoidance. - Complete multiple unmanned system MCM data fusion techniques for reduction in false alarms and reduction in tactical timelines. ***FY 2012 Plans:*** - Continue all FY 2011 efforts, less those noted as completed above. - Initiate development of the compact Modular Sensor Suite for real time detection and classification of surface and near surface moored and drifting mines. - Initiate development of Mine Drift Prediction Tactical Decision Aid.			
Title: MINE/OBSTACLE NEUTRALIZATION ***Description:*** Mine and Obstacle Neutralization activity is focused on improving the capability to neutralize mines and obstacles from deep water through the beach exit zone. Efforts include the development of technologies for: stand-off breaching of mines and obstacles in the SZ/BZ; minesweeping and jamming of sea mines; and Autonomous Underwater Vehicle (AUV) neutralization of sea mines. Stand-off breaching efforts demonstrate a mine and obstacle breaching capability that is enabled by precision weapon guidance and Intelligence, Surveillance, and Reconnaissance (ISR), and delivered by Naval Tactical Aircraft (TACAIR) and USAF Bombers. Tactical performance of existing unitary bombs is being demonstrated. Other efforts will demonstrate a tactical countermine dart and dispenser concept. The minesweeping effort develops a mission package for deployment on Unmanned Surface Vehicles (USVs). Also, efforts will focus on improving an existing breaching weapon fuze and developing a precision assault lane marking navigation capability. This activity supports the development and transition of technologies for the MCM-related FNC ECs. The FY 2010 to FY 2011 funding decrease is due to the completion of Future Naval Capability (FNC) - AUV Technology for Neutralization of Mines in the Very Shallow Water; Precision Assault Navigation in Mined Environments and Assault Lane Marking; and Standoff Assault Breaching Weapon Fuze Improvement. The FY 2011 to FY 2012 funding decrease is due to the completion of Future Naval Capability (FNC) - AUV Technology for Neutralization of Littoral Mines. ***FY 2010 Accomplishments:*** - Continued development of an autonomous mine neutralization system for VSW MCM. - Continued development of an AUV system for neutralization of littoral mines.	8.284	3.518	-

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603782N: *Mine and Expeditionary Warfare Advanced Technology*	**PROJECT** 2917: *Shallow Water MCM Demos*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
- Continued planning for assault breaching systems exercise involving the unitary warheads, precision navigation and lane marking. - Completed development effort to extend effectiveness of unitary warheads to greater depths and initiated planning of flight demo with Naval Special Clearance Team 1. - Completed technology development of precision navigation capability for targeting, safe navigation through assault lanes including lane marking. - Completed flight demonstration of the Joint Direct Attack Munition (JDAM) Assault Breaching System (JABS) with tactical mines in very shallow water. - Completed development of an autonomous mine neutralization system for VSW MCM. - Completed development of advanced Mine Warfare Mission module capabilities in support of the LCS Mine Warfare mission. - Initiated development of autonomous behaviors to improve neutralization efficiency of littoral sea mines. - Initiated Phase 2 of Advanced Mission Module Technology Development.			
FY 2011 Plans: - Continue all FY 2010 efforts, less those noted as completed above. - Complete assault breaching systems exercise involving the unitary warheads, precision navigation and lane marking. - Complete development of AUV system/technologies for neutralization of littoral sea mines. - Complete development of autonomous behaviors to improve neutralization efficiency of littoral sea mines. - Complete Phase 2 of Advanced Mission Module Technology Development with a final demonstration. - Initiate and complete demonstration of autonomous neutralization of littoral sea mines.			
Accomplishments/Planned Programs Subtotals	27.631	21.941	6.048

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• 0602782N: *MINE AND EXPEDITIONARY WARFARE APPLIED RESEARCH*	15.934	11.308	6.951	0.000	6.951	2.046	1.257	0.505	0.000	0.000	38.001

D. Acquisition Strategy

Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603782N: *Mine and Expeditionary Warfare Advanced Technology*	PROJECT 2917: *Shallow Water MCM Demos*

E. Performance Metrics

The overall metrics of this advanced technology program are the development of technologies supporting the Mine and Expeditionary Warfare challenges of reducing the MCM tactical timeline from months to days and eliminating the need for Navy divers and manned equipment to enter minefields. Another important metric is the scheduled transition of 6.3 advanced technology projects from the FNCs program into Navy and Marine Corps acquisition programs at agreed upon Technology Readiness Levels. Technology-specific metrics include: Mine warfare data fusion capabilities yielding a 10%-25% reduction in time and risk to mine hunting activities; Mine hunting sensors - Probability of Detection = 95%, Probability of Identification of Proud Mines = 90%, Probability of Classification of Buried Mines = 80%; Unmanned Systems for MCM sized for inclusion in the Littoral Combat Ship Mine Warfare Mission Package; MCM sensors sized, packaged and capable of 12 hour missions with a search rate greater than .05 square nautical mines per hour; Mine sweeping: Modular magnetic and acoustic influence sweeping systems packaged for deployment from Unmanned Surface Vehicles; Minesweeping single sortie coverage > 9.4 square nautical miles at 20 nautical miles per hour during a 4 hour mission up to Sea State 3; Surface-laid mine and obstacle breaching capability > 90% in the Beach Zone (BZ) using unitary warheads, and > 80% in the Surf Zone (SZ).

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603782N: *Mine and Expeditionary Warfare Advanced Technology*	PROJECT 4027: *Naval Innovative Science and Engineering*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
4027: *Naval Innovative Science and Engineering*	2.580	-	-	-	-	-	-	-	-	0.000	2.580

A. Mission Description and Budget Item Justification

Funding supports research and development efforts as directed under Section 219 of the fiscal year 2009 Duncan Hunter National Defense Authorization Act.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Naval Innovative Science and Engineering	2.580	-	-
Description: Funding supports research and development efforts as directed under Section 219 of the fiscal year 2009 Duncan Hunter National Defense Authorization Act. ***FY 2010 Accomplishments:*** Section 219 (Naval Innovative Science and Engineering) included in the FY 2009 Duncan Hunter National Defense Authorization Act, established mechanisms whereby the director of a naval laboratory may utilize up to three percent of all funds available to the laboratory to sponsor individual projects for: 1. Innovative basic and applied research that is conducted at the laboratory and supports military missions; 2. Development programs that support the transition of technologies developed by the defense laboratory into operational use; 3. Development activities that improve the capacity of the defense laboratory to recruit and retain personnel with needed scientific and engineering expertise; and 4. The revitalization and recapitalization of the laboratories.			
Accomplishments/Planned Programs Subtotals	2.580	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable.

E. Performance Metrics

The overall metrics of Section 219 is to increase retention and recruitment; number of advanced degrees, patent awards, and technical papers; successful technology transition to the warfighter; and laboratory ability to conduct innovative research.

Exhibit R-2A, RDT&E Project Justification: PB 2012 Navy			DATE: February 2011
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COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
9999: *Congressional Adds*	1.593	-	-	-	-	-	-	-	-	0.000	1.593

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011
Congressional Add: JEOD Driver Situational Awareness Sys	1.593	-
FY 2010 Accomplishments: This effort developed better analytical tools and up-to-date training curriculum to Joint Explosive Ordinance Disposal Diver (JEOD) forces so they can not only better detect adversaries' evolving tactics, training, and procedures (TTPs) but can rapidly adapt to and defeat the enemy's evolving capabilities in the battlefield while minimizing casualties.		
Congressional Adds Subtotals	1.593	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not applicable.

E. Performance Metrics

Congressional Interest Items not included in other Projects.