Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy										DATE: February 2010	
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 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	34.570	30.256	21.941	0.000	21.941	9.135	16.357	21.204	25.800	Continuing	Continuing
2917: *Shallow Water MCM Demos*	33.373	28.663	21.941	0.000	21.941	9.135	16.357	21.204	25.800	Continuing	Continuing
9999: *Congressional Adds*	1.197	1.593	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.109

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 2011 Navy	DATE: February 2010
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 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	34.501	28.782	0.000	0.000	0.000
Current President's Budget	34.570	30.256	21.941	0.000	21.941
Total Adjustments	0.069	1.474	21.941	0.000	21.941
• Congressional General Reductions		-0.126			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		1.600			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.798	0.000			
• SBIR/STTR Transfer	-0.729	0.000			
• Program Adjustments	0.000	0.000	21.941	0.000	21.941

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: 9999: *Congressional Adds*		
Congressional Add: *JEOD DRIVER SITUATIONAL AWARENESS SYS*	1.197	1.593
Congressional Add Subtotals for Project: 9999	1.197	1.593
Congressional Add Totals for all Projects	1.197	1.593

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

FY11 from previous President's Budget is shown as zero because no FY11-15 data was presented in President's Budget 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy			DATE: February 2010
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 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
2917: *Shallow Water MCM Demos*	33.373	28.663	21.941	0.000	21.941	9.135	16.357	21.204	25.800	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 Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
MINE/OBSTACLE DETECTION	19.497	19.278	18.423	0.000	18.423
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 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 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					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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 Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
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. *FY 2009 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 development of Tactical Unmanned Aerial Vehicle (TUAV)-based SZ/BZ buried minefield detection capability. - Continued multiple unmanned system MCM data fusion techniques for reduction in false alarms and reduction in tactical timelines. - Continued technology development, integration and early demonstration planning for MCM Mission Module systems for Advanced Flight LCS. - Continued technology development for multiple UUV Undersea Cooperative Cueing and Intervention in support of MCM operations. - Complete buried mine sensing identification processing development. - Complete development and final flight testing of ROAR system against surface laid mines and obstacles. - Initiate field testing of prototype airborne buried mine sensors. - Initiate integration of buried mine sensors onto airborne platform and begin flight testing. - Initiate planning for assault breaching systems exercise involving the mine detection systems. Acquisition Workforce Fund					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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 Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Funded DoD Acquisition Workforce Fund. *FY 2010 Plans:* - Continue all FY 2009 efforts, less those noted as completed above. - Complete development of Tactical Unmanned Aerial Vehicle (TUAV)-based SZ/BZ buried minefield detection capability. - Complete field testing of prototype airborne buried mine sensors. - Complete integration of buried mine sensors onto airborne platform and begin flight testing. - Complete technology development, integration and early demonstration planning for MCM Mission Module systems for Advanced Flight LCS. - Initiate 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. - Initiate 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. - Initiate development of Long Range Low Frequency Broadband (LRLFBB) Sonar to significantly increase the minehunting area coverage rate. - Initiate Phase 2 of Advanced Mission Module Technology Development. *FY 2011 Base 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/USV Undersea Cooperative Cueing and Intervention in support of MCM operations. - 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.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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 Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Complete multiple unmanned system MCM data fusion techniques for reduction in false alarms and reduction in tactical timelines.					
MINE/OBSTACLE NEUTRALIZATION	13.876	9.385	3.518	0.000	3.518
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 investment reduction in FY 2010 reflects the completion and transition of major programs/projects during FY 2010. The investment reduction in FY 2011 reflects the completion and transition of major programs/projects during FY 2011. *FY 2009 Accomplishments:* - Continued development of an autonomous mine neutralization system for VSW MCM. - Continued development of advanced Mine Warfare Mission module capabilities in support of the LCS Mine Warfare mission. - Continued development effort, to extend effectiveness of unitary warheads to greater depths and initiated planning of flight demo with Naval Special Clearance Team 1.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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 Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Continued technology development of precision navigation capability for targeting, safe navigation through assault lanes including lane marking. - Continued development of an AUV system for neutralization of littoral mines. - Initiate planning/preparation for flight demonstration of the JDAM Assault Breaching System (JABS) with tactical mines in very shallow water. - Initiate planning for assault breaching systems exercise involving the unitary warheads, precision navigation and lane marking. *FY 2010 Plans:* - Continue all FY 2009 efforts. - Complete development effort to extend effectiveness of unitary warheads to greater depths and initiated planning of flight demo with Naval Special Clearance Team 1. - Complete technology development of precision navigation capability for targeting, safe navigation through assault lanes including lane marking. - Complete flight demonstration of the JDAM Assault Breaching System (JABS) with tactical mines in very shallow water. - Complete development of an autonomous mine neutralization system for VSW MCM. - Complete development of advanced Mine Warfare Mission module capabilities in support of the LCS Mine Warfare mission. - Initiate development of autonomous behaviors to improve neutralization efficiency of littoral sea mines. - Initiate Phase 2 of Advanced Mission Module Technology Development. *FY 2011 Base 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.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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 Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- 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 demonstration of autonomous neutralization of littoral sea mines.					
Accomplishments/Planned Programs Subtotals	33.373	28.663	21.941	0.000	21.941

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	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

N/A

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 2011 Navy			DATE: February 2010
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COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
9999: *Congressional Adds*	1.197	1.593	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.109

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: JEOD DRIVER SITUATIONAL AWARENESS SYS	1.197	1.593
FY 2009 Accomplishments: This effort supported the development of a self-contained, rugged, waterproof, and portable device capable of providing critical intelligence and essential technical information for use by the Navy and other government organizations responsible for protecting the nation's seaports and maritime operations. *FY 2010 Plans:* Continues support of Joint Explosive Ordinance Disposal Diver Situational Awareness System research.		
Congressional Adds Subtotals	1.197	1.593

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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** 9999: *Congressional Adds*

E. Performance Metrics

Congressional Interest Items not included in other Projects.