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 0603123N: *Force Protection 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	121.465	92.962	61.877	0.000	61.877	54.554	54.323	43.751	44.952	Continuing	Continuing
2912: *Force Protection Advanced Technology*	61.086	63.426	59.405	0.000	59.405	52.035	51.757	41.125	42.271	Continuing	Continuing
3049: *Force Protection*	2.177	2.330	2.472	0.000	2.472	2.519	2.566	2.626	2.681	Continuing	Continuing
9999: *Congressional Adds*	58.202	27.206	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	317.675

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 addresses advanced technology development associated with providing the capability of Platform and Force Protection for the U.S. Navy. This program supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial and air) and the protection of those platforms. This PE supports the Future Naval Capabilities (FNC) in the areas of Sea Shield and Cross Pillar Enablers, and Enterprise and Platform Enablers (EPE). The goal of this program is to provide the ability to win or avoid engagements with other platforms or weapons and, in the event of engagement, to resist and control damage while preserving operational capability. Surface Ship & Submarine, Hull, Mechanical & Electrical (HM&E), Missile Defense, Fleet Force Protection and Defense against Undersea Threats, and Emerging Threats activities all support FNC efforts.

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 0603123N: *Force Protection 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	113.502	66.035	0.000	0.000	0.000
Current President's Budget	121.465	92.962	61.877	0.000	61.877
Total Adjustments	7.963	26.927	61.877	0.000	61.877
• Congressional General Reductions		-0.388			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.005			
• Congressional Adds		27.320			
• Congressional Directed Transfers		0.000			
• Reprogrammings	9.653	0.000			
• SBIR/STTR Transfer	-1.290	0.000			
• Program Adjustments	0.000	0.000	61.877	0.000	61.877
• Rate/Misc Adjustments	-0.001	0.000	0.000	0.000	0.000
• Congressional Recision Adjustments	0.001	0.000	0.000	0.000	0.000
• Congressional Add Adjustments	-0.400	0.000	0.000	0.000	0.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: 9999: *Congressional Adds*		
Congressional Add: *Captive Air Amphibious Transporter (CAAT)*	0.000	2.191
Congressional Add: *HBCU Applied Research Incubator*	0.000	0.797
Congressional Add: *High-Temperature Radar Dome Materials*	0.000	1.593
Congressional Add: *Multi-Element Structured Filter Arrays for Naval Platforms*	0.000	3.426
Congressional Add: *NAVAIR Project for Land/Sea-Based Air Systems Maintenance and Air Worthiness*	0.000	1.992
Congressional Add: *Pure Hydrogen Supply from Logistic Fuels*	0.000	2.390
Congressional Add: *AGILE PORT AND HIGH SPEED SHIP TECHNOLOGY*	5.983	1.593
Congressional Add: *M65 BIEMALOIMIDE CARBON FIBER PREREG*	1.596	0.000
Congressional Add: *MANUFACTURING & REPAIR CELL*	2.394	0.000

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 0603123N: *Force Protection Advanced Technology*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Congressional Add: *Remote Continuous Energetic Material Manufacturing*	1.596	0.000
Congressional Add: *SOLID STATE DC PROTECTION SYS*	1.197	0.000
Congressional Add: *Center for Applied Research in Intelligent Autonom*	2.394	0.000
Congressional Add: *SINGLE GENERATOR OPERATIONS LITHIUM ION BATTERY*	3.988	3.983
Congressional Add: *High Power Density Motor Drive*	0.997	2.868
Congressional Add: *Stabilized Laser Designation Capability*	1.995	0.000
Congressional Add: *WIDE AREA SENSOR FOR FORCE PROTECTION TARGETING*	1.596	1.593
Congressional Add: *ACCELERATED FUEL CELLS MANUFACTURABILITY AND THEIR*	2.394	1.593
Congressional Add: *ADVANCED LOGISTICS FUEL REFORMER FOR FUEL CELLS*	2.394	2.390
Congressional Add: *ELECTROCHEMICAL FIELD-DEPLOYABLE SYS FOR POTABLE*	2.791	0.000
Congressional Add: *FORMABLE TEXTILE FOR COMPLEX SHAPED AEROSPACE COMP*	1.596	0.000
Congressional Add: *FUTURE FUEL NON-TACTICAL VEHICLE INITIATIVE*	1.596	0.000
Congressional Add: *LASER PERIMETER AWARENESS SYSTEM*	1.496	0.000
Congressional Add: *MULTI FUEL COMBUSTOR FOR SHIPBOARD FUEL CELLS*	1.596	0.000
Congressional Add: *UNDERGROUND COORDINATION OF MANAGED MESH-NETWORKS*	2.394	0.000
Congressional Add: *Advanced Continuous Active Sonar for UUVs*	2.492	0.000
Congressional Add: *Durability energy saving and sustainability*	0.798	0.000
Congressional Add: *High Temperature Superconductor Trap Field Magnet*	1.995	0.797
Congressional Add: *Improved Stealth and Lower Cost Operations for Shi*	1.596	0.000
Congressional Add: *Integrated Ship and Motion Control Technology*	3.430	0.000
Congressional Add: *Self Healing Target System for Laser and Sniper Ra*	1.596	0.000
Congressional Add: *Strategic/Tactical Resource Interoperability Kinet*	1.117	0.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy	DATE: February 2010
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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Congressional Add: *Ultra-Wide Coverage Visible Near Infrared Sensor f*	1.197	0.000
Congressional Add: *Video and Water Mist Technologies for Incipient Fi*	3.190	0.000
Congressional Add: *Solid Oxide Fuel Cell*	0.798	0.000
Congressional Add Subtotals for Project: 9999	58.202	27.206
Congressional Add Totals for all Projects	58.202	27.206

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 0603123N: *Force Protection Advanced Technology*	PROJECT 2912: *Force Protection 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
2912: *Force Protection Advanced Technology*	61.086	63.426	59.405	0.000	59.405	52.035	51.757	41.125	42.271	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project addresses advanced technology development associated with providing the capability of Platform and Force Protection for the U.S. Navy. This project supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial, and air) and the protection of those platforms. It supports the Sea Shield and Cross Pillar Enablers, and Enterprise and Platform Enablers (EPE) -- Future Naval Capabilities (FNCs). The goals of this project are to provide the ability to win or avoid engagements with other platforms or weapons and, in the event of engagement, to resist and control damage while preserving operational capability.

This Project reflects the alignment of investments for the following ECs: Total Ship Survivability Damage Tolerance and Recoverability; Over-the-Horizon Missile Defense; Two-Torpedo Salvo Defense; Defense of Harbor and Near-Shore Naval Infrastructure Against Asymmetric Threats; Sea Based Missile Defense of Ships & Littoral Installations; Aircraft Integrated Self-Protection Suites; Hostile Fire Detection and Response Spirals 1 and 2; Four-Torpedo Salvo Defense; Shipboard Force Protection in Port and Restricted Waters - Detection and Classification; and Underwater Total Ship Survivability.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FLEET FORCE PROTECTION AND DEFENSE AGAINST UNDERSEA THREATS	15.525	19.663	17.441	0.000	17.441
Fleet Force Protection and Defense against Undersea Threats addresses efforts that include applied research for complementary sensor and processing technologies for platform protection and shipboard technologies to increase the survivability of surface ship and submarine platforms against torpedo threats. The first major goal of this activity is to develop complementary sensor and processing technologies for 21st century warfighting success and platform protection. Current small platforms (both surface and airborne) have little or no situational awareness (SA) or self-protection against air, surface, and					

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
asymmetric threats. This activity will provide tactical aircraft (TACAIR) and other platforms with effective threat warning and self-protection. The technology areas specific to platform protection will develop individual or multi-spectral [Electro-Optic (EO), IR, radio frequency (RF), EM, visual, and acoustic] sensors and associated processing. To defend platforms from current and advanced threats in at-sea littoral environments and in port, these technologies must improve multi-spectral detection and distribution of specific threat information. The Fleet Force Protection portion of this activity includes support to the FNC Enabling Capabilities for: Aircraft Integrated Self-protection Suites; Intent Determination - EO/IR Enhancements; Proof-of-Concept for Non-lethal Approach; Advanced Electronic Sensor Systems for Missile Defense; Hostile Fire Detection and Response Spirals 1 and 2; Defense of Harbor and Near-Shore Naval Infrastructure Against Asymmetric Threats; Four-Torpedo Salvo Defense; and Shipboard Force Protection in Port and Restricted Waters - Detection and Classification. The second major goal of this activity is to develop enabling technologies that will increase the survivability of surface ship and submarine platforms against torpedo threats. Proposed technologies focus on defeating high priority threats including torpedoes (i.e. straight running, wake homing, acoustic homing, air dropped torpedoes, and salvoes of torpedoes). Technologies developed will minimize shipboard impact and require no shipboard organizational maintenance. The Anti-Torpedo Torpedo (ATT) provides technologies that enable an ATT to engage threat torpedoes detected by a surface ship towed sensor system. The ultimate goal is to develop technologies to enable a torpedo defense capability, including ship self-defense against salvo torpedo attacks, to fill the FNC Sea Shield Warfighting Capability Gap/Enabling Capability: Platform Defense against Undersea Threats. Ultimately the goal is to deliver an anti-torpedo-torpedo for use in defeating a four-torpedo salvo attack against a surface platform.					

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
The increase in funding from FY 2009 to FY 2010 is due to the ramping up of the following Future Naval Capability Enabling Capabilities: Shipboard Force Protection in Port and Restricted Waters - Detection and Classification, Four-Torpedo Salvo Defense, Advanced Threat Aircraft Countermeasures, and Helicopter Low-Level Operations (HELO). *FY 2009 Accomplishments:* Sensors & Associated Processing - - Continued new FNC Enabling Capability (EC) Shipboard Force Protection in Port and Restricted Waters - Detection and Classification. This project will develop mission specific electro-optic/infrared sensors to detect, classify, and determine the intent of potential terrorist and special operations force threats to ships and craft in port and transiting restricted waters. - Initiated the Countermeasures for Advanced Imaging Infrared (IIR) Guided Missiles FNC effort by commencing IIR threat surrogate hardware development. - Initiated the Countermeasures for Millimeter Wave Guided Missiles FNC effort by initiating wide band gap monolithic microwave integrated circuit (MMIC) Ka-band development. - Initiated the Multifunction Capabilities for Missile Warning Sensors FNC effort by commencing signal processor development. - Initiated the Helicopter Laser-Based Landing Aids FNC effort by commencing laser technologies development. Underwater Platform Self-Defense - - Continued the development of low-cost, light-weight swimmer detection and localization technologies.- Initiated expanded development of autonomous, underway refueling for Unmanned Sea Surface Vehicle Technologies. - Initiated advanced development of software encoded algorithms for the Anti-Torpedo Torpedo (ATT) sensor and controller that will enable ATT's to successfully engage torpedo salvoes of up to four attacking units.					

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Acquisition Workforce Fund - Funded DoD Acquisition Workforce Fund. *FY 2010 Plans:* Sensors & Associated Processing - - Continue all efforts of FY 2009. Underwater Platform Self-Defense - - Continue all efforts of FY 2009. - Complete development and demonstration of low-cost, light-weight swimmer detection and localization technologies. *FY 2011 Base Plans:* Sensors & Associated Processing - - Continue all efforts of FY 2010. - Complete FNC EC Shipboard Force Protection in Port and Restricted Waters - Detection and Classification. This effort develops mission specific electro-optic/infrared sensors to detect, classify, and determine the intent of potential terrorist and special operations force threats to ships and craft in port and transiting restricted waters. Sensor projects included in this FNC EC include Distributed Millimeter Wave (DmmW) Sensor, Active/Passive Dual Imaging IR (MW/SW) Sensor, and Situational Panoramic Infrared (SPIR) Sensor. Underwater Platform Self-Defense - - Continue all efforts of FY 2010, less those noted as completed above. In support of FNC (Force Projection Advanced Technology), perform the following efforts - - Initiate the development of advanced technologies that support delivery of Navy approved FNC enabling capabilities structured to close operational capability gaps in force projection.					

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Initiate the packaging of advanced force projection technologies into deliverable FNC products and ECs that can be integrated into acquisition programs within a five year period. - Initiate the development of force projection technologies that support naval requirements identified within the Sea Shield and Sea Strike naval capability pillars as well as those applicable to specific naval platforms and those that apply across the naval enterprise.					
MISSILE DEFENSE (MD) This activity describes Missile Defense Science and Technology (S&T) projects of the Sea Shield Future Naval Capability (FNC) program and an OSD-funded Joint Integrated Fire Control (JIFC) demonstration. - Advanced Area Defense Interceptor (AADI) S&T planning and data analysis effort for Navy-Marine Corps Air-Directed Surface-to-Air Missile (ADSAM) live firing demonstration at White Sands Missile Range in May 2009. The metric for AADI was execution of an ADSAM demonstration by the Navy and Marine Corps that establishes the basis for further development of an operational Naval Integrated Fire Control/Counter-Air (NIFC-CA) capability. - Naval Interceptor Improvements (NII) technology upgrades for STANDARD Missile (SM) future missile. Metrics will be to achieve SM performance requirements in specified tactical rain environments and all specified electronic countermeasures environments, while meeting the planned transition date. - Extended Distributed Weapons Coordination (EDWC) algorithms to extend Distributed Weapons Coordination (DWC) Automated Battle Management Aids (ABMA) functionality to include coordination of passive defense measures (emission control, use of decoys, maneuvering). Metrics will be improved probability of negation (Pneg) against advanced ballistic & cruise missile anti-ship threats that may be susceptible to decoys & jamming, while meeting the planned transition date. - Positive Control of Naval Weapons (PCNW) - additional technology upgrades for SM to enable forward relay, remote launch and potentially forward pass engagements. Metrics are classified. - Midcourse and Terminal Algorithms (MTA) for interceptor and associated weapon system enhancements to defeat advanced anti-ship missile threats with high confidence. Specific metrics are classified.	29.986	16.745	24.184	0.000	24.184

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Enhanced Lethality Guidance Algorithms (ELGA) to increase probability of kill versus an expanded threat set including ASBMs and advanced ASCMs. Metrics for this project will be classified. - Enhanced Maneuverability Missile Airframe (EMMA) technology for Navy shipboard missile systems to intercept highly agile maneuvering ASCMs and ASBMs. Metrics for this project will be classified. - Integrated Active & Electronic Defense (IAED) technology basis for response combinations of active and electronic weapons & systems to optimize Pneg against ASBMs and ASCMs, including potential interactions. Metrics will be classified. - Joint Integrated Fire Control (JIFC) S&T planning and preparations, non-FNC expansion of the AADI ADSAM demonstration, to support participation of Army, Air Force and coalition sensor and weapon test assets. The metric for this expanded participation was a series of demonstrations in FY08-09 that showed a technology basis for effective interoperability with Navy and Marine Corps participating systems to defend expeditionary forces from air and missile attacks. Funding decreases in FY 2009 to FY 2010 reflects completion of AADI and JIFC projects. Funding increases from FY 2010 to FY 2011 as a result from EDWC, NII and PCNW project funding migrating from Applied Research (6.2) to Advanced Research (6.3) in their last year of effort before transition to acquisition. The MTA project ramps up in FY2010 while the ELGA and EMMA projects start in FY2010, also accounting for part of this increase. *FY 2009 Accomplishments:* - Continued EDWC, NII and PCNW project efforts. - Initiated MTA project efforts. - Completed AADI project and JIFC effort. *FY 2010 Plans:* - Continue all efforts of FY 2009, less those noted as completed above. - Initiate ELGA and EMMA project efforts.					

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: - Complete EDWC, NII and PCNW efforts. - Continue MTA and ramp up of the ELGA and EMMA projects. - Initiate IAED project effort.					
SURFACE SHIP & SUBMARINE HULL MECHANICAL & ELECTRICAL (HM&E) Activity includes: Signature Reduction, Hull Life Assurance, and Advanced Capability Electric Systems. Signature Reduction addresses electromagnetic (EM), infrared (IR), and acoustic signature tailoring, both topside and underwater. Hull Life Assurance addresses development of new structural system approaches for surface ships and submarines, including the management of weapon effects to control structural damage and the improvement of structural materials. Advanced Capability Electric Systems area addresses electrical and auxiliary systems and component technology to provide improvements in system energy and power density, system operating efficiency, and recoverability from casualties. Advanced Damage Control Countermeasures addresses fire, smoke, and flooding detection using a volume sensor and the use of a hybrid water-mist for electronic space protection. This activity includes support to the Sea Strike, Cross Pillar Enablers, and Enterprise and Platform Enablers (EPE) FNC programs. The increase of funding from FY 2009 to FY 2010 is due to the initiation of new FNC Enabling Capabilities including Underwater Total Ship Survivability, and Affordable Submarine Propulsion and Control Actuator; and the realignment of Compact Power Conversion Technologies from PE 0603236N/ Turbine Engine Technology. The decrease in funding from FY2010 to FY2011 is for the Advanced Naval Power Next Generation Systems (NGIPS) development, a separate effort from the ongoing Compact Power Conversion FNC. The NGIPS effort is ramping down; the FNC efforts will be entering Phase III in FY11.	15.575	27.018	17.780	0.000	17.780

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: - Continued development of diesel fuel reforming technology for molten carbonate and proton exchange membrane fuel cells. - Continued risk reduction activities of advanced superconducting homopolar main propulsion motor with General Atomics. - Continued development of autonomous recovery system for Unmanned Sea Surface Vehicles from a host ship. - Continued development of thermal management technology for shipboard power distribution. - Continued development of Integrated Damage Control Systems which includes Integrated Damage Control Communications and Advanced Magazine Protection System. - Continued compact power conversion technologies FNC transitioned from PE 0603236N/Turbine Engine Technology. - Continued Total Ship Survivability Damage Tolerance and Recoverability efforts which include integrated damage control situation awareness technologies. - Continued expansion of the Next Generation Integrated Power Systems (NGIPS) technology development, to de-risk and demonstrate applicable Medium Voltage Direct Current (MVDC) power dense, efficient, and fault tolerant technologies needed for future surface, and subsurface platforms. - Completed risk reduction activities associated with advanced direct current homopolar motor with General Atomics. - Initiated expanded demonstration of superconductive degaussing coil in a relevant environment. - Initiated Affordable Submarine Propulsion and Control Surface Actuator technologies focused on the development and demonstration of affordable advanced material propellers and torque dense and quiet actuation of submarine control surface efforts. - Initiated Underwater Total Ship Survivability/Payload Implosion and Platform Damage Avoidance efforts. - Initiated preliminary designs of control surface actuator systems.					

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: - Continue all efforts of FY 2009, less those noted as completed above. - Complete preliminary designs of control surface actuator systems. - Complete expanded demonstration of superconductive degaussing coil in a relevant environment. - Initiate detailed design and breadboard demonstration of control surface actuator systems. - Initiate scaled testing and large scale analysis for ship protection systems. - Initiate Compact Power Conversion Technology Phase 2 Critical Component Development. *FY 2011 Base Plans:* - Continue all efforts of FY 2010, less those noted as completed above. - Complete detailed design and breadboard demonstration of control surface actuator systems. - Initiate fabrication of scaled control surface actuator systems. - Initiate Compact Power Conversion Technology Phase 3 large Scale Component Development and testing.					
Accomplishments/Planned Programs Subtotals	61.086	63.426	59.405	0.000	59.405

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
• 0602123N: *FORCE PROTECTION APPLIED RESEARCH*	26.579	21.747	20.769	0.000	20.769	17.226	9.152	1.238	0.000	0.000	96.711

D. Acquisition Strategy

N/A

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E. Performance Metrics

The overall goals of this advanced technology program are the development of technologies which focus on the warfighter and providing the ability to win or avoid engagements with other platforms or weapons and, in the event of engagement, to resist and control damage while preserving operational capability. Overall metric goals are to transition the advanced technology projects into acquisition programs. Each Activity within this PE has unique goals and metrics, some of which include classified quantitative measurements.

Specific examples of metrics under this PE include:
- Demonstrate improved performance of main propulsion electric motors and controllers (50% reduced weight and volume) by FY 2011.
- Demonstration of a Medium Voltage Direct Current (MVDC) architecture containing Commercial Off the Shelf (COTS) components to assess the viability of MVDC distribution for CG (X) cruiser by the end of FY 2011.
- Items included within the Missile Defense Activity description.

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
3049: *Force Protection*	2.177	2.330	2.472	0.000	2.472	2.519	2.566	2.626	2.681	Continuing	Continuing

A. Mission Description and Budget Item Justification

Advanced technologies developed, critical to protecting naval installations, will provide seamless full spectrum protection against asymmetric terrorist attack by improving the ability to: sense developing and immediate threats; shape our responses through improved situational awareness and decision making; shield personnel, mission critical facilities, infrastructure, and operating fleet assets; maintain essential functions; and sustain and restore critical services in the aftermath of an incident. Technologies developed will also seek to reduce the required manpower and skill levels devoted to the force protection mission.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
EMERGING THREATS	2.177	2.330	2.472	0.000	2.472
This activity includes: Advanced technologies developed, critical to protecting naval installations, will provide seamless full spectrum protection against asymmetric terrorist attack by improving the ability to: sense developing and immediate threats; shape our responses through improved situational awareness and decision making; shield personnel, mission critical facilities, infrastructure, and operating fleet assets; maintain essential functions; and sustain and restore critical services in the aftermath of an incident. Technologies developed will also seek to reduce the required manpower and skill levels devoted to the force protection mission. *FY 2009 Accomplishments:* - Continued development of lower cost/higher performance Force Protection sensors and automated detection algorithms, and decision support tools. - Continued interim demonstration of prototype Force Protection sensors. - Continued development of intrusion/incident response countermeasures for Force Protection. - Continued full scale demo of swimmer defense system including sensors and response countermeasures.					

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

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Continued interim demonstration of force protection detection and response system with automated detection and self learning algorithms. - Initiated research to reduce force protection manpower and equipment costs through automation and predictive learning algorithms. - Initiated threat characterization research and perception experiments for sensor performance optimization and model development and validation. Acquisition Workforce Fund - Funded DoD Acquisition Workforce Fund. *FY 2010 Plans:* - Continue all efforts of FY 2009. - Complete full scale demo of swimmer defense system including sensors and response countermeasures. - Complete interim demonstration of force protection detection and response system with automated detection and self learning algorithms. - Initiate development of all weather sensors optimized for installation force protection. - Initiate research to advance sensor fusion capabilities in high density networks with diverse sensor grids. - Initiate research into sensors for use in counter-surveillance around protected facilities. *FY 2011 Base Plans:* - Continue all efforts of FY 2010, less those noted as completed above. - Initiate development of assessment algorithms and information analysis technologies to augment skills or replace persons in operations centers.					
Accomplishments/Planned Programs Subtotals	2.177	2.330	2.472	0.000	2.472

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C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

The overall goals of this advanced technology program are the development of technologies which will provide seamless full spectrum protection against asymmetric terrorist attack by improving the ability to protect naval installations. Overall metric goals are to reduce the required manpower and skill levels devoted to the force protection mission. Specific metric under the Project includes: In-water successful demonstration of warhead lethality against specified threat at required Closest Point of Approach (CPA).

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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*	58.202	27.206	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	317.675

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: Captive Air Amphibious Transporter (CAAT) *FY 2010 Plans:* This effort supports Captive Air Amphibious Transporter (CAAT) research.	0.000	2.191
Congressional Add: HBCU Applied Research Incubator *FY 2010 Plans:* This effort supports HBCU Applied Research Incubator research.	0.000	0.797
Congressional Add: High-Temperature Radar Dome Materials *FY 2010 Plans:* This effort supports High-Temperature Radar Dome Materials research.	0.000	1.593
Congressional Add: Multi-Element Structured Filter Arrays for Naval Platforms	0.000	3.426

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2010 Plans: This effort supports Multi-Element Structured Filter Arrays for Naval Platforms research.		
Congressional Add: NAVAIR Project for Land/Sea-Based Air Systems Maintenance and Air Worthiness *FY 2010 Plans:* This effort supports NAVAIR Project for Land/Sea-Based Air Systems Maintenance and Air Worthiness research.	0.000	1.992
Congressional Add: Pure Hydrogen Supply from Logistic Fuels *FY 2010 Plans:* This effort supports Pure Hydrogen Supply from Logistic Fuels research.	0.000	2.390
Congressional Add: AGILE PORT AND HIGH SPEED SHIP TECHNOLOGY *FY 2009 Accomplishments:* This effort supported the application of agile port and high-speed ship technology to enhance base and force protection through improved in-transit visibility within the defense transportation system, improved port/terminal military cargo throughput productivity and intermodal interface capability, continued development of enabling technologies for high speed ship hull, machinery systems, and beachable/over-beach delivery concepts in support of high speed logistics and military utilization from CONUS and/or prepositioned ships platforms including "sea bases." *FY 2010 Plans:* Continue support of Agile Port and High Speed Ship Technology research.	5.983	1.593
Congressional Add: M65 BIEMALOIMIDE CARBON FIBER PREREG	1.596	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: This effort supported the qualification of a third generation controlled flow prepreg system that offers thermal performance with epoxy like manufacturing benefits designed to reduce the cost of structures built with prepregs by reducing in-post machining and shimming and the improvement of weight consistency.		
Congressional Add: MANUFACTURING & REPAIR CELL *FY 2009 Accomplishments:* This effort supported the development of an enabling capability to manufacture and repair critical materials and parts as and when needed in order to ensure the readiness of operational forces.	2.394	0.000
Congressional Add: Remote Continuous Energetic Material Manufacturing *FY 2009 Accomplishments:* This effort supported the development of infrastructure necessary to develop an energetic material manufacturing technology utilizing a continuous, remote process to compound, granulate and dry the flare composition in a process that does not expose workers to large quantities of the composition.	1.596	0.000
Congressional Add: SOLID STATE DC PROTECTION SYS *FY 2009 Accomplishments:* This effort supported the development of a universal solid-state circuit breaker (USSB) for medium voltage Navy power distribution systems. This effort specifically focused on developing programmable thresholds for electrical fault trip points with increased interruption speed within a hybrid USSB designed to operate in Navy medium voltage applications.	1.197	0.000
	2.394	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Center for Applied Research in Intelligent Autonom *FY 2009 Accomplishments:* This effort supported research to reduce the need for human intervention in unmanned systems operations and maintenance, particularly for unmanned surface vehicles, by providing advances in autonomous control, group behavior and planning, unmanned surface vehicle dynamic control, obstacle detection and management, control in rough conditions, supervisory control, and prognostics.		
Congressional Add: SINGLE GENERATOR OPERATIONS LITHIUM ION BATTERY *FY 2009 Accomplishments:* This effort supported research into increased shipboard fuel efficiency for a fuel cell-based propulsion system compared with conventional turbine engine technologies. *FY 2010 Plans:* Continue support of Single Generator Operations Lithium Ion Battery research.	3.988	3.983
Congressional Add: High Power Density Motor Drive *FY 2009 Accomplishments:* This effort supported improved power density to provide the warfighter the benefits of electric drive. *FY 2010 Plans:* Continue support of High Power Density Motor Drive research.	0.997	2.868
Congressional Add: Stabilized Laser Designation Capability	1.995	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: This effort supported the development of system design requirements and target tracking algorithms for an enhanced, medium altitude laser designation capability for medium altitude aircraft operations that can address moving targets, as well as targets in a Global Positioning System (GPS)-jammed environment.		
Congressional Add: WIDE AREA SENSOR FOR FORCE PROTECTION TARGETING *FY 2009 Accomplishments:* This effort supported the development of a wide area surveillance sensor with day/night capabilities of a sufficient resolution to detect vehicles and individuals for use during forensic backtracking and sociologic pattern analysis and prediction. *FY 2010 Plans:* Continue support of Wide Area Sensor Force Protection Targeting research.	1.596	1.593
Congressional Add: ACCELERATED FUEL CELLS MANUFACTURABILITY AND THEIR *FY 2009 Accomplishments:* This effort supported research into the manufacturing affordability of solid oxide fuel cells for military and commercial applications. *FY 2010 Plans:* Continue support of Accelerating Fuel Cells Manufacturability research.	2.394	1.593
Congressional Add: ADVANCED LOGISTICS FUEL REFORMER FOR FUEL CELLS	2.394	2.390

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: This effort supported the development of fuel cell technology and deployable next-generation systems for use with fuel cell systems and components. *FY 2010 Plans:* Continue support of Advanced Logistics Fuel Reformer for Fuel Cells (Phase II) research.		
Congressional Add: ELECTROCHEMICAL FIELD-DEPLOYABLE SYS FOR POTABLE *FY 2009 Accomplishments:* This effort supported research and development of an energy efficient electrochemical device that generates mixed oxides from saline solution or potentially sea water for the purification/disinfection of potable water.	2.791	0.000
Congressional Add: FORMABLE TEXTILE FOR COMPLEX SHAPED AEROSPACE COMP *FY 2009 Accomplishments:* This effort supported the development of infrastructure necessary to provide a stable, consistent environment to support an aircraft manufacturing program utilizing materials which hold promise for reducing manufacturing costs of aerospace-grade, complex curved structural composite parts by enabling, via the materials, improved formability, greater utilization of automated manufacturing technologies as opposed to the current labor intensive hand lay-up methods.	1.596	0.000
Congressional Add: FUTURE FUEL NON-TACTICAL VEHICLE INITIATIVE *FY 2009 Accomplishments:* This effort supported the demonstration of fuel cell vehicles and enhanced vehicle range refueling capability.	1.596	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: LASER PERIMETER AWARENESS SYSTEM *FY 2009 Accomplishments:* This effort supported the development of a Laser Perimeter Awareness System (LPAS) providing additional coverage with its laser based sensors to detect waterborne threats in littoral areas bordering Naval installations.	1.496	0.000
Congressional Add: MULTI FUEL COMBUSTOR FOR SHIPBOARD FUEL CELLS *FY 2009 Accomplishments:* This effort supported the development of a scaled up Multi-Fuel Combustor capable of integration into a shipboard fuel cell system.	1.596	0.000
Congressional Add: UNDERGROUND COORDINATION OF MANAGED MESH-NETWORKS *FY 2009 Accomplishments:* This effort supported the coordination of underground managed mesh networks designed for persistent surveillance, search and rescue, and reduced manning initiatives on ships. This technology can be used both for sensor communications and tracking service members in highly restricted spaces.	2.394	0.000
Congressional Add: Advanced Continuous Active Sonar for UUVs *FY 2009 Accomplishments:* This effort supported research focused on the marriage of an advanced SONAR capability with the stealth, standoff features, autonomy and endurance of a large Unmanned Undersea Vehicle (UUV).	2.492	0.000
	0.798	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Durability energy saving and sustainability *FY 2009 Accomplishments:* This effort supported research concerning the unique active nanostructures which provide predictable and extended reliability along with energy savings in severe friction and wear conditions.		
Congressional Add: High Temperature Superconductor Trap Field Magnet *FY 2009 Accomplishments:* This effort supported the development of High Temperature Superconductor (HTS) Trap Field Magnet Motors which may be used to help meet power and propulsion requirements for future Navy ships. *FY 2010 Plans:* Continue support of High-Temperature Superconductor Trap Field Magnet Motor research.	1.995	0.797
Congressional Add: Improved Stealth and Lower Cost Operations for Shi *FY 2009 Accomplishments:* This effort supported the creation of a net that eliminates the threat of radar detection and reduces costs and logistics problems common with other netting.	1.596	0.000
Congressional Add: Integrated Ship and Motion Control Technology *FY 2009 Accomplishments:* This effort supported the integration of advancements in intelligent control, advanced motor materials, acoustic silencing, electromechanical power transfer, and high capacity energy storage devices in the challenging shipboard application of high-speed vessel stabilization and ride.	3.430	0.000
Congressional Add: Self Healing Target System for Laser and Sniper Ra	1.596	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: This effort supported the development and demonstration of environmentally friendly, self-healing target systems providing long-term cost savings while reducing the incidence of injury to personnel and maintaining readiness.		
Congressional Add: Strategic/Tactical Resource Interoperability Kinet *FY 2009 Accomplishments:* This effort supported development of migration applications to utilize open source service oriented architecture standards.	1.117	0.000
Congressional Add: Ultra-Wide Coverage Visible Near Infrared Sensor f *FY 2009 Accomplishments:* This effort supported the development of an ultra-wide coverage visible/near infrared (VNIR) sensor with high resolution, high quantum efficiency, very large format VNIR detectors with high fidelity, geospatially accurate optics. These technologies have been integrated into a deployable package suitable for manned, or unmanned, long-range platforms.	1.197	0.000
Congressional Add: Video and Water Mist Technologies for Incipient Fi *FY 2009 Accomplishments:* This effort supported the development of video technologies that can detect incipient fires, both smoke and flame.	3.190	0.000
Congressional Add: Solid Oxide Fuel Cell	0.798	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: This effort supported testing fuel cell performance under various related air-side contaminant conditions and continued to seek reductions in volumetric- and mass-power density by validating an enhanced fuel blower for a SOFC system.		
Congressional Adds Subtotals	58.202	27.206

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Congressional Add.