Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy										DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 2: *Applied Research*				R-1 ITEM NOMENCLATURE PE 0602114N: *Power Proj Applied Research*							
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	101.584	77.210	98.150	0.000	98.150	138.620	157.519	162.118	169.815	Continuing	Continuing
0000: *Power Proj Applied Research*	82.436	59.524	98.150	0.000	98.150	138.620	157.519	162.118	169.815	Continuing	Continuing
9999: *Congressional Adds*	19.148	17.686	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	138.986

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 supports both advanced technology research and near to mid-term transition opportunities. The advanced research focus is primarily on High Energy Lasers (HEL), Electromagnetic railgun development, high speed weapon propulsion, electro-optic/infrared (EO/IR) sensor technologies. The mid-term effort is focused on developing and demonstrating technologies supporting the Future Naval Capability (FNC) Program Enabling Capabilities (ECs) for Marine and Unmanned Vehicle Tactical Intelligence, Surveillance and Reconnaissance (ISR), Advanced Naval Fires Technology, Hostile Fire Detection and Response, Maritime Weapons of Mass Destruction Detection (MWMD-D), and Dynamic Target Engagement & Enhanced Sensor Capabilities. Within the Naval Transformation Roadmap, this investment will achieve two of four key transformational capabilities required by Sea Strike as well as technically enable the Littoral Sea Control key transformational capability within Sea Shield.

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

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B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	98.651	59.787	0.000	0.000	0.000
Current President's Budget	101.584	77.210	98.150	0.000	98.150
Total Adjustments	2.933	17.423	98.150	0.000	98.150
• Congressional General Reductions		-0.322			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.015			
• Congressional Adds		17.760			
• Congressional Directed Transfers		0.000			
• Reprogrammings	4.039	0.000			
• SBIR/STTR Transfer	-1.106	0.000			
• Program Adjustments	0.000	0.000	98.150	0.000	98.150

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: 9999: *Congressional Adds*		
Congressional Add: *Advanced Helicopter Landing Aid*	0.000	0.797
Congressional Add: *Combustion Light Gas Gun Projectile*	3.988	3.983
Congressional Add: *Electronic Motion Actuation Systems*	0.798	0.797
Congressional Add: *Enhanced EO/IR Sensors*	0.000	2.390
Congressional Add: *Millimeter Wave Imaging*	1.596	1.354
Congressional Add: *Multifunctional Materials, Devices, And Applications*	0.000	1.593
Congressional Add: *Naval Advanced Electric Launcher System*	0.000	1.992
Congressional Add: *Strike Weapon Propulsion*	0.000	3.187
Congressional Add: *Aging Military Aircraft Fleet Support*	1.596	1.593
Congressional Add: *High Energy Conventional Energetics (Phase II)*	3.190	0.000
Congressional Add: *High Power Free Electron Laser Development for Naval Applications*	2.394	0.000

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Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Congressional Add: *Marine Mammal Hearing and Echolocation Research*	1.596	0.000
Congressional Add: *Strike Weapon Propulsion (SWEAP)*	2.394	0.000
Congressional Add: *Unmanned Aerial Vehicle Fuel Cell Power Source with Hybrid Reforming*	1.596	0.000
Congressional Add Subtotals for Project: 9999	19.148	17.686
Congressional Add Totals for all Projects	19.148	17.686

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.

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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
0000: *Power Proj Applied Research*	82.436	59.524	98.150	0.000	98.150	138.620	157.519	162.118	169.815	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project addresses the technology issues involving the Navy's capability to project naval power on the broad seas and in the littoral regions.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
DIRECTED ENERGY AND EM GUNS (FORMERLY ELECTRIC WEAPONS)	48.245	36.895	55.992	0.000	55.992
The goal of this activity is to develop Directed Energy (DE) and Electric Propulsion power weapons for Navy applications. The Directed Energy portion of this activity consists of two elements. The first element involves applied research and development of technologies supporting advanced accelerators with applications to directed energy weapons. The second portion of activity is the Free Electron Laser (FEL) Innovative Naval Prototype (INP) which if successful could be utilized for shipboard applications as a defensive weapon against advanced cruise missiles and asymmetric threats. The other major component in this activity is the Electro Magnetic (EM) railgun program that is focused on developing the technology to launch a long range projectile from Navy ships. This activity also includes NRL investment/performance in these research areas. Decrease from FY 2009 to FY 2010 is due to the reduction of 6.2 investment in the EM railgun and Direct Energy. The amount of the decrease was partially offset by the increase of the Free Electron Laser (FEL) investment in preparation for the FEL demonstration program. The increase in funding from FY10 to FY11 is primarily due to the start of the second contractural phase of the FEL INP program. As a result of the Phase 1A competition, a single contractor was awarded the contract in late FY10 and in FY11 begins the critical design, development and installation portion					

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
of the FEL INP 100kW test and demonstration program. In addition long lead item procurement for the 100 kW FEL will begin in FY11. These long lead items require approximately 15 to 18 months for manufacturing and delivery to the test facility. The other element influencing the funding increase is the additional S&T investment required to develop compact, high performance FEL components such as the high power injector (super conducting and normal conducting Radio Frequency), the mirror/optical components and oscillator system, and the high power amplifiers. Additional development of these components is extremely critical for operation at required INP power levels and also to minimize the footprint FEL in anticipation of eventual ship integration. *FY 2009 Accomplishments:* Directed Energy and Accelerator Research: - Continued cryomodule and FEL component development at the FEL testing and integration facility. - Continued investigation into the application of FEL technology to other areas including advanced materials, optics, bioscience, medical, manufacturing, weaponization, and solid state physics. - Continued 1 micron filamentation, halo limitation, and short Rayleigh range studies. - Continued testing of Radio Frequency (RF) gun High Voltage Power Supply (HVPS) components which are required for the 100 kW high current injector. - Continued applied directed energy and accelerator research in: Compton radiation scattering, multiple dielectric thin film coatings, bunch characteristics of electron beam emittance, high grade electromagnetic field generators, electron beam lattice configuration, novel electron beam generation, novel high flux subatomic particle emission, high gain photonic amplification, fundemental power efficiency conversion. In addition continue the development of physics based models for: characterization of subatomic particle interaction and propagation and modeling for validation of photon control structures. - Initiated Innovative Naval Prototype (INP) program for FEL. EM Gun: - Continued material, physics and thermal property research for both launchers and projectiles.					

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 launcher and projectile development. - Continued preliminary design and lethality studies of projectile, design of next generation pulse power systems, IPT and Bore Life Consortium collaborations. - Initiated development of modeling and simulation capability to support bore life development and testing. Acquisition Workforce Fund: - Funded DoD Acquisition Workforce Fund. *FY 2010 Plans:* Directed Energy and Accelerator Research: - Continue applied DE and accelerator research efforts of FY09. - Continue Innovative Prototype (INP) program for the FEL. Hold Preliminary Design Review (PDR) for both contractors who were selected to participate in Phase 1A of the FEL INP program. Review proposals from the Phase 1A contractors. Downselect and award a contract to a single contractor to proceed forward in Phase 1B and the Critical Design Review (CDR) to be held in FY11. EM Gun: - Continue all efforts of FY 2009. Applied Electromagnetics for High Power Weapons: - Initiate a program to conduct applied research into applied electromagnetics as it applies to lasers, high power microwaves, and advanced sensors, including Modeling and Simulation tools for Directed Energy Weapons. *FY 2011 Base Plans:* Directed Energy and Accelerator Research:					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Continue detailed design efforts required for presentation at the CDR for Phase 1B of the FEL program. Detailed Design efforts include: preparation of design drawings (assembly, control, installation, schematics etc), material and parts listings (long lead item, parts, provisioning lists etc), analyses and reports (e.g. trade off study reports supporting design decisions, modeling & simulation, safety and supportability reports, installation and assembly procedures, testing and maintainability analyses etc.), initial orders for long lead item components (eg cryomodules and RF system components). In addition some preliminary preparations will begin at the test facility selected for installation of the 100 kW FEL system. - Continue S&T on critical FEL components that will be integrated into the final 100 kW demonstration. Further S&T development of these components is required for the successful testing of the 100 kW FEL, to support the scale up of the 100 kW FEL into a megawatt class weapon, and to reduce the overall footprint of the system to support the eventual ship integration of the FEL. Additional S&T investment and development will include the following components: the normal conducting and super conducting RF electron beam injectors, advanced high power cathode technologies, high power compact amplifiers, and advanced mirrors, coatings and optical components capable of handling the significantly higher energies that are present in a 100 kW level FEL. EM Gun: - Complete material, physics and thermal property research for single shot launchers, pulsed power and projectiles for 32MJ muzzle energy launch. - Complete lethality studies of projectile, design of next generation pulse power systems, IPT and Bore Life Consortium collaborations for 32 MJ launchers. - Complete development of modeling and simulation capability to support bore life development and testing. - Complete analysis to verify the models and simulations correlate to results achieved in testing for launchers, pulsed power and projectiles at 32MJ launch. Applied Electromagnetics for High Power Weapons:					

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
- Continue all efforts of FY 2010.					
HIGH SPEED PROPULSION AND ADVANCED WEAPON TECHNOLOGIES	7.900	1.557	1.755	0.000	1.755
The high speed weapons work in this activity is focused on demonstrating propulsion and vehicle technologies for Mach3+ to Mach8 capable weapons. The solid rocket motor Integrated High Performance Rocket Propulsion Technology (IHPRPT) technology development activities will provide improved rocket based weapon performance. The rocket technologies apply to both air dominance and strike weapons and will provide both improved range and speed. Advanced propulsion for Unmanned Combat Air Systems will demonstrate key technologies such as integrated engine core, distortion tolerant fan and power generation essential for long-duration ISR (Intelligence, Surveillance and Reconnaissance)/Strike missions. These integrated technologies are necessary because conventional propulsion systems cannot achieve the desired performance characteristics needed for the highly embedded propulsion systems. This work includes technologies associated with high acceleration capable projectile structures, high temperature and high strength materials to enable projectiles to survive high speed launch environment, improved thermal prediction methodologies and test techniques, wide dynamic pressure adaptable projectile controls and non-explosively launched lethal mechanisms. The high speed projectile technologies are intended to support long range Naval Fire Support weapons. The decrease from FY 2009 to FY 2010 is due to reduction and development funding of the IHPRPT program with final testing to be done in FY 2010. *FY 2009 Accomplishments:* Integrated High Performance Rocket Propulsion Technology (IHPRPT): - Continued development of surface launch component technologies.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Continued program through demonstration of Solid Rocket Motor Phase III goals at the subsystem level. Asymmetric Threat & Laser Control Technologies: - Continued development of propulsion and high temperature materials technologies to enable high speed weapons. - Continued demonstrating dual mode warhead effectiveness in both above and below water detonations. - Completed High Power Microwave (HPM) technology development. - Initiated high speed projectile technology development. *FY 2010 Plans:* High Speed Projectile & Advanced Weapon Technologies (Formerly Asymmetric Threat & Laser Control Technologies): - Continue high speed projectile technology development. - Complete IHPRPT program with final testing. Advanced Propulsion Technologies for Unmanned Combat Air System (UCAS): - Initiate development of technologies for a highly survivable embedded propulsion and power system which requires good thrust specific fuel consumption for missions requiring long range and endurance. *FY 2011 Base Plans:* High Speed Projectile & Advanced Weapon Technologies (Formerly Asymmetric Threat & Laser Control Technologies): - Continue all efforts for FY 2010 less those noted as complete above. - Initiate effort to develop advanced guidance and control technologies for high speed weapons. Advanced Propulsion Technologies for Unmanned Combat Air System (UCAS):					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Continue all efforts for FY 2010.					
NAVIGATION, ELECTRO OPTIC/INFRARED (EO/IR), AND SENSOR TECHNOLOGIES	7.597	3.842	3.437	0.000	3.437
This activity describes Navy Science and Technology (S&T) investments in the areas of EO/IR devices and advanced sensors and includes NRL investment/performance in the technology areas of Electronics, Electronic Warfare, and Communications. Decrease from FY 2009 to FY 2010 is due to a reduction in NRL related EO/IR/Sensor development activities. *FY 2009 Accomplishments:* Electro Optic/Infrared: - Continued development of ultra low noise uncooled nanotechnology infrared sensors. - Continued development nanoatomic sensor nonvolatile memories. - Continued development of electronic field of view and zoom imagers. - Continued the development of an active optics system that can survey a wide area and instantly, non-mechanically zoom-in on an area of interest for target tracking/identification. - Continued development of new processes/methodologies to enable construction of composite countermeasures that fit the engagement timeline while maintaining effectiveness against existing and emerging IR guided threats. - Continued development of high power fiber lasers in mid-IR (2-5 micro-m) based upon highly nonlinear IR transmitting chalcogenide photonic crystal fibers. - Completed THz Imaging project through transition to 6.3 developments. - Initiated effort to develop ultra-high-sensitivity detectors suitable for use in focal plane arrays (FPAs) for the short-wave infrared (SWIR) spectral band. - Initiated effort to develop mid & long wave IR focal plane arrays using graded-bandgap W-type-II superlattices w/much higher detectivity than that of state-of-the-art HgCdTe (MCT). - Initiated development of tunable narrowband infrared absorption technology.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Communications: - Completed covert high bandwidth communications effort. - Completed development of free space laser communications systems with the development of a hybrid infrared system with dramatically lower power requirements at the sensor/transmitter. - Completed development of Micro Air Vehicle (MAV). - Completed small hyperspectral sensor development. Autonomous Systems: - Continued the development of a novel beam steering method in phased array radar using optical fiber based slow light techniques. - Continued the development of machine-vision algorithms and guidance strategies to enable the precision autonomous recovery of small sensor platforms on moving naval vessels. - Continued the development of an autonomous soaring capability and intelligent path planning for extracting energy from the environment thereby conserving onboard fuel stores of autonomous air vehicles. - Completed design and development of a disposable MAV which will enable the airborne delivery and precision placement of miniature EW sensors and payloads. - Completed the design of an advanced auto gyrator that combines a swashplateless rotor system and active stability augmentation for autonomous systems. Electronic Warfare: - Initiated development of an ultra-lean combustor for recuperated gas turbines. *FY 2010 Plans:* Electro Optic/Infrared: - Continue development of tunable narrowband infrared absorption technology.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Complete development of new processes/methodologies to enable construction of composite countermeasures that fit the engagement timeline while maintaining effectiveness against existing and emerging IR guided threats. Autonomous Systems: - Complete the development of a novel beam steering method in phased array radar using optical fiber based slow light techniques. - Complete the development of machine-vision algorithms and guidance strategies to enable the precision autonomous recovery of small sensor platforms on moving naval vessels. - Complete the development of an autonomous soaring capability and intelligent path planning for extracting energy from the environment thereby conserving onboard fuel stores of autonomous air vehicles. Electronic Warfare: - Continue all efforts of FY 2009. *FY 2011 Base Plans:* Electro Optic/Infrared: - Complete development of tunable narrowband infrared absorption technology. Electronic Warfare: - Complete development of an ultra-lean combustor for recuperated gas turbines.					
STRIKE AND LITTORAL COMBAT TECHNOLOGIES The focus of this activity is on those technologies that will support Naval Precision Strike Operations and provide the Navy of the future the ability to quickly locate, target, and strike critical targets ashore.	10.941	7.331	12.013	0.000	12.013

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Decrease from FY 2009 and FY 2010 is due to delay in start of Selectable Ouput Weapons and Mult-Target Laser Designator. Increase from FY 2010 to FY 2011 is due to the initiation of Strike Accelerator Program and FNC new starts. *FY 2009 Accomplishments:* Discriminate and Provide Terminal Guidance for Weapons Targeted at Moving Targets: - Continued development of Weapons Data Link terminal toward weapon scalability and modularity. Dynamic Target Engagement: - Continued development of remote sensor fusion hardware for ground sensors, an ultra endurance UAV, and a GMTI sensor for use on UAVs. - Completed development of Decision Support System for dynamic target engagement. Increased Capability Against Moving and Stationary Targets: - Continued DASH Program component design for the DASH multi-sensor weapon seeker and begin the mmW sensor fabrication and testing. - Continued of the Multi-Mode Sensor/Seeker (MMSS) project. Enhanced Weapons Technologies: - Continued development of passive interferometric imaging system to detect millimeter wave RF anomalies within the background environment by using exotic signal processing techniques. - Continued the development of signal processing techniques to improve situational awareness and autonomous detection of hostile fire events in a dynamic urban clutter environment. Transferred to 0602271N					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Continued the development of techniques to combine current IR/EO technology and recent findings on the characteristics of the eye to classify and identify optical devices and individuals in real time at militarily significant ranges. Transferred to 0602271N - Continued the development of a process to detect hostile camouflaged or hidden targets in shadows and diverse backgrounds of militarily challenging environments. Transferred to 0602271N - Initiated three new products to expand current Counter Air / Counter Air Defense capabilities by providing improved range and end-game maneuverability while decreasing Time-of-Flight. Specific tasks to begin design and development phase are: Counter Air Advanced Medium-Range Air-to-Air Missile (AMRAAM) Improvements / Counter Air Defense Improvement / High Speed Components. - Initiated development and apply emerging technologies that support delivery of Technology Oversight Group approved FNC enabling capabilities structured to close operational capability gaps in power projection; package emerging power projection technologies into deliverable FNC products and ECs that can be integrated into acquisition programs within a five year period; and mature power projection technologies that support naval requirements identified within the Sea Strike and FORCEnet naval capability pillars. *FY 2010 Plans:* Discriminate and Provide Terminal Guidance for Weapons Targeted at Moving Targets: - Weapon Data Link project transitions to PE 0603114N. Increased Capability Against Moving and Stationary Targets: - Continue the Direct Attack Seeker Head (DASH) project by developing and testing of the radar sensor and procurement of the IIR sensor. - Continue the Multi-Mode Sensor/Seeker (MMSS) project. Enhanced Weapon Technologies: - Continue all efforts of FY 2009.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Complete development of passive interferometric imaging system to detect millimeter wave RF anomalies within the background environment by using exotic signal processing techniques. *FY 2011 Base Plans:* Increased Capability Against Moving and Stationary Targets: - Initiate Strike Accelerator program. This effort will provide an advanced airborne capability to accurately identify targets using Advanced Target Recognition (ATR). These capabilities utilizing the F/A-18 E/F, AESA (Active Electronically Scanned Array) Radar and ATFLIR (Advanced Targeting Forward Looking Infrared) sensors will enable Strike Aircraft to quickly ID and Target maritime threats. Enhanced Weapon Technologies: - Continue all efforts of FY 2010, less those noted as completed above. - Initiate development and apply emerging technologies that support delivery of Technology Oversight Group approved FNC enabling capabilities structured to close operational capability gaps in power projection.					
WMD DETECTION The Chief of Naval Operations (CNO) in the Navy Strategic Plan (NSP) has directed that the Navy be able to combat Weapons of Mass Destruction (WMD) at sea and Maritime domain. This activity addresses the development of key technologies for standoff detection of WMD's and component nuclear materials on ships at sea. The program will develop and demonstrate technology for actively detecting fissile material and other weapons of mass destruction. FY 2010 and FY 2011 increases represent the ramping up of the program as continuing technological efforts evolve. The testing of the equipment in realistic maritime environments significantly increases the cost of testing. The Maritime WMD Detection program in FY11 is moving from limited scale laboratory and field experimentation, into more complex, large scale demonstrations of Special Nuclear Material detection technologies. These tests must be conducted in a representative "Navy unique"	7.753	9.899	24.953	0.000	24.953

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
maritime environment which include both over water and under-water applications, and which require the expansion of required safety, simulation and validation of passive and active detection testing techniques. Additionally, the elimination of previously available neutron detection materials has forced an urgent technology development investment in alternatives to current helium based sensors to support the warfighter." *FY 2009 Accomplishments:* - Continued using particle beam (neutrons, gamma rays, muons, and others) to perform standoff detection of fissile material. - Continued investigations into the use of Free Electron Laser (FEL) accelerator technologies for the detection of WMD's and nuclear components & materials. Conducted experiments to determine the ability of the FEL to perform remote detection of nuclear material on surfaces, and chemical biological agents in aerosol clouds. - Continued development of hand-held and portable radiation detector technology to support maritime interdiction operations. - Continued modeling and simulation efforts to determine the ability to use neutron activation analysis to locate smuggled nuclear weapons and material through underwater detection. - Initiated planning for a maritime demonstration of standoff detection of fissile materials. This effort will involve formation of a team comprised of DoD, interagency, and international partners to support the demonstration. *FY 2010 Plans:* Weapons Mass Destruction Detection: - Continue all efforts of FY 2009. *FY 2011 Base Plans:* Weapons Mass Destruction Detection: - Continue all efforts of FY 2010.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Complete investigations of hand held and portable detector technology for maritime interdiction, transition to demonstrations of available technologies in prototypes and other suitable formats. - Complete standoff detection of fissile materials with a demonstration in a maritime environment from a suitable Naval vessel or surrogate. Demonstration will involve a team from DoD, DoE, interagency, academia partners to support the full demonstration. - Initiate the technical development and testing of solid state high energy neutron detector without Helium 3. - Initiate the development of technologies for remote real time imaging of suspected WMD in a maritime environment for both Passive Detection and Active Interrogation, including laboratory and field testing. - Initiate a laboratory demonstration of short range active interrogation for WMD detection. - Initiate the development of technology for and conduct "at sea" testing of underwater radiological WMD Detection from unmanned underwater vehicles (UUVs). - Initiate the development and laboratory testing of a compact Nuetron Generator without need for cyrogenic cooling. - Acquire WMD Special Nuclear Material (SNM) simulator from DoE and conduct high fidelity field testing. - Initiate the development of technology for and conduct radiological WMD Detection from Naval aviation platforms. - Examine system human dose limits and health effects of various Remote Stand Off Detection techniques.					
Accomplishments/Planned Programs Subtotals	82.436	59.524	98.150	0.000	98.150

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602114N: *Power Proj Applied Research*	PROJECT 0000: *Power Proj Applied Research*

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
• 0603114N: *POWER PROJECTION ADVANCED TECHNOLOGY*	23.240	10.759	15.228	0.000	15.228	20.172	19.299	15.568	7.555	0.000	111.821
• 0602131M: *MARINE CORPS LANDING FORCE TECHNOLOGY*	0.000	0.119	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.119

D. Acquisition Strategy

N/A

E. Performance Metrics

This PE develops early components technologies that if successful can be integrated into weapon systems that meet warfighter requirements. Most of the work in this PE can be classified between Technology Readiness Level (TRL) 2 (technology concept and/or application formulation) and TRL 4 (component and/or breadboard validation in laboratory environments). The metrics used to evaluate 6.2 programs are necessarily less precise than those used in 6.3 programs.

The metrics for this PE can be divided into two categories: technological and organizational/functional. Technological metrics address the success of the work performed. The primary technological metrics used in this PE involve laboratory experiments/tests demonstrating proof of the concept for the technology. This demonstration is frequently a hand-assembled functioning breadboard of the concept. The organizational/functional metrics applied to this PE include: transition of the technology to advanced development in a 6.3 PE and applicability of the technology to documented warfighter problems or requirements. Successful implementation of these categories would result in the application of a pass/fail metric and further evaluation for possible transition to a 6.3 development/demonstration program.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602114N: *Power Proj Applied Research*	PROJECT 9999: *Congressional Adds*	

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*	19.148	17.686	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	138.986

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: Advanced Helicopter Landing Aid *FY 2010 Plans:* This effort supports Advanced Helicopter Landing Aid research.	0.000	0.797
Congressional Add: Combustion Light Gas Gun Projectile *FY 2009 Accomplishments:* This effort supported the resolution of weaponization, system, and safety issues associated with combustion light gas gun technology and initiated development of guided projectiles for high acceleration, high velocity launch. *FY 2010 Plans:* Continue this effort to support combustion light gas gun projectile research.	3.988	3.983
Congressional Add: Electronic Motion Actuation Systems	0.798	0.797

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602114N: *Power Proj Applied Research*	PROJECT 9999: *Congressional Adds*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2009 Accomplishments: This effort supported the identification and development of solutions for the scientific and technological challenges inherent to the development of ship board prototype electric linear and rotary actuators. *FY 2010 Plans:* Continue this effort to support Electronic Motion Actuation Systems research.		
Congressional Add: Enhanced EO/IR Sensors *FY 2010 Plans:* This effort supports Enhanced EO/IR Sensors research.	0.000	2.390
Congressional Add: Millimeter Wave Imaging *FY 2009 Accomplishments:* This effort supported the development of advanced photonic detectors for passive millimeter wave imaging. *FY 2010 Plans:* Continue this effort to support Millimeter Wave Imaging research.	1.596	1.354
Congressional Add: Multifunctional Materials, Devices, And Applications *FY 2010 Plans:* This effort supports Multifunctional Materials, Devices, and Applications research.	0.000	1.593
Congressional Add: Naval Advanced Electric Launcher System	0.000	1.992

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 2: *Applied Research*	R-1 ITEM NOMENCLATURE PE 0602114N: *Power Proj Applied Research*	PROJECT 9999: *Congressional Adds*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
FY 2010 Plans: This effort supports Naval Advanced Electric Launcher System research.		
Congressional Add: Strike Weapon Propulsion *FY 2010 Plans:* This effort supports Strike Weapon Propulsion research.	0.000	3.187
Congressional Add: Aging Military Aircraft Fleet Support *FY 2009 Accomplishments:* This effort supported the investigation of the effects of aging on composite structures as well as composite/metallic hybrid structures and the assurance of the airworthiness of composite components. The results of this investigation provided insight into the aging aspects of other composite aircraft structures and influence the use of advanced materials on new aircraft being proposed for military service as well as maintenance of the existing fleet. *FY 2010 Plans:* Continue this effort to support Aging Military Aircraft Fleet Support research.	1.596	1.593
Congressional Add: High Energy Conventional Energetics (Phase II) *FY 2009 Accomplishments:* This effort supported the investigation of the technical areas of detonation physics, explosive molecule synthesis, energetics formulations, and small scale testing to accelerate the development of the novel technologies required to defeat or neutralize the chemical or biological agent and associated weapons and equipment with little or no collateral effect, and defeat hard and deeply buried C3I/WMD targets.	3.190	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
This project supported the urgent requirement of the US to counter new types of asymmetric threats such as weapons of mass destruction using chemical-biological weapons.		
Congressional Add: High Power Free Electron Laser Development for Naval Applications *FY 2009 Accomplishments:* This effort supported research in the injection gun portion of the technology which will substantially reduce the risk and cost of acquisition for shipboard speed of light self-defense against cruise missiles. This project enabled research focused on Naval directed energy weapons in support of fielding shipboard directed energy and electric weapon systems to significantly improve gunfire support for forces ashore.	2.394	0.000
Congressional Add: Marine Mammal Hearing and Echolocation Research *FY 2009 Accomplishments:* This effort supported research conducted by University of Hawaii to study the hearing of captive marine mammals held at Hawaii Institute of Marine Biology on Coconut Island as well as studies on animals held captive in other facilities.	1.596	0.000
Congressional Add: Strike Weapon Propulsion (SWEAP) *FY 2009 Accomplishments:* This effort supported research into the advancement of carbon-carbon material and design simplification of a hypersonic long range cruise missile to reduce the fabrication costs of the engine components.	2.394	0.000
Congressional Add: Unmanned Aerial Vehicle Fuel Cell Power Source with Hybrid Reforming	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 of a high power, lightweight solid oxide fuel cell (SOFC) propulsion system for unmanned air vehicles (UAV) to increase the technology readiness level through systems improvements and testing.		
Congressional Adds Subtotals	19.148	17.686

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Congressional Add