Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy											Date: May 2017	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602114N *I Power Proj Applied Research*							
COST ($ in Millions)	**Prior Years**	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	88.940	41.371	13.553	-	13.553	17.736	17.739	17.818	18.054	Continuing	Continuing
0000: *Power Proj Applied Research*	0.000	71.078	41.371	13.553	-	13.553	17.736	17.739	17.818	18.054	Continuing	Continuing
9999: *Congressional Adds*	0.000	17.862	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.862

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. 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 directed energy, high speed weapon propulsion, and electro-optic/infrared (EO/IR) sensor technologies.

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

B. Program Change Summary ($ in Millions)	**FY 2016**	**FY 2017**	**FY 2018 Base**	**FY 2018 OCO**	**FY 2018 Total**
Previous President's Budget	87.223	41.371	39.925	-	39.925
Current President's Budget	88.940	41.371	13.553	-	13.553
Total Adjustments	1.717	0.000	-26.372	-	-26.372
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.873	0.000			
• SBIR/STTR Transfer	-1.156	0.000			
• Program Adjustments	0.000	0.000	-26.372	-	-26.372
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Navy	Date: May 2017
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602114N *I Power Proj Applied Research*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2016	FY 2017
Project: 9999: *Congressional Adds*		
Congressional Add: *Program Increase*	13.034	0.000
Congressional Add: *Force Protection Research*	4.828	0.000
Congressional Add Subtotals for Project: 9999	17.862	0.000
Congressional Add Totals for all Projects	17.862	0.000

Change Summary Explanation

The funding decrease from FY 2017 to FY 2018 reflects the realignment of the Solid State Laser - Technology Maturation (SSL-TM) and Electro Magnetic (EM) Railgun programs to the newly established program element 0602792N Innovative Naval Prototypes.

Technical: Not applicable.

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 2	R-1 Program Element (Number/Name) PE 0602114N / *Power Proj Applied Research*	Project (Number/Name) 0000 / *Power Proj Applied Research*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
0000: *Power Proj Applied Research*	0.000	71.078	41.371	13.553	-	13.553	17.736	17.739	17.818	18.054	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 Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Title: DIRECTED ENERGY	27.806	10.956	4.556	0.000	4.556

Description: The goal of this activity is to develop Directed Energy (DE) technology for Navy applications. The DE program addresses the requirements of future Navy combatants to provide ship defense against the emerging threats that are proliferating throughout the Navies of the world. The Directed Energy portion of this activity consists of two elements.

FY 2016 to FY 2017 decrease in funding is due to Solid State Laser Maturation Program (SSL-TM) program entering the fabrication and testing phase.

Effective in 2018, the SSL-TM funding moves to the new innovative naval prototype (INP) PE - 0602792N Innovative Naval Prototypes.

FY 2016 Accomplishments:
Directed Energy and Accelerator Research:

-Continued to develop the most promising component technologies such as 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 for potential alignment in a Free Electron Laser.

Solid State Laser - Technology Maturation (SSL-TM):

-Continued the development of technologies suitable for a solid state laser weapon system, including technologies for maritime beam director, targeting and laser subsystems, which are capable of supporting future Navy missions to defeat small boat swarms, UAV swarms, and provide potential ISR disruption and/or defeat.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
This work supports future prototype developments and will include laser subsystem (potentially both slab and fiber solid state systems) and required beam director scientific studies. The focus of the effort will be to support the development and advancement of future Navy Solid State Laser prototypes, including the development of lethality studies and atmospheric characterization. These scientific studies are critical to understand and support missions identified for a layered defensive capability, in the maritime environment, which shall include robust modeling and simulation of atmospheric absorption and turbulence. -Conducted lethality testing for notional solid state laser designs. This will include scientific studies of laser erosion, pitting, and ablation of various target materials for improved modeling and simulation that will support development of the governing technical requirements for a beam director and targeting system capable of performing Navy surface ship self-defense missions. -Continued studies of atmospheric absorption and turbulence, suitable to evaluate notional maritime beam director subsystems, and including studies in adaptive optics for improved lethality performance in low altitude, maritime surface conditions. These scientific studies are critical to understanding the impact of boundary layer and sea-water-air turbulent mechanics on future laser weapons systems and interfaces. -Continued trade studies on innovative solid state laser subsystems designs, based off industry available technologies or those technologies identified by the High Energy Laser Joint Technology Office (HEL JTO). These investments will be considered "break through" type of investments, which require additional scientific study to determine their potential for near term capability improvements in a future naval prototype system. -Continued scientific studies on laser subcomponents, including laser pump diodes and laser gain media, which have the potential to support future acquisition programs, but are based on solid state laser technologies. Efforts in this area will focus on emerging commercial technologies and government sponsored research, which are suitable for use in a maritime domain. Research and technology developments will include advancements suitable for use by either solid state slab or solid state fiber optic laser subsystems - and which if matured, would enable rapid scientific advancements and improve specific systems performance against key performance parameters. -Continued scientific trade studies of notional predictive avoidance systems, which examine the control interfaces between sensors and future prototypical naval laser weapons, which would provide an inherent "safe-arm" function for the projection of laser power at long range (potentially beyond typical visible, line of sight distances.) Of particular concern is the designs for safety in future laser weapons to halt laser energy propagation, while performing Navy surface ship self- defense missions, and avoid inadvertent illumination of non-threat forces (e.g. friendly sensors or platforms.) -Conducted component and subcomponent laboratory tests.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Conducted Preliminary Design Review (PDR) for Tactical Laser Core Module (TLCM).					
FY 2017 Plans: Directed Energy Research: -Continue all efforts of FY 2016 unless noted as completed above Solid State Laser - Technology Maturation (SSL-TM): - Continue all efforts of FY 2016 unless noted as completed above. - Conduct Critical Design Review (CDR) for Tactical Laser Core Module (TLCM) planned during FY 2017					
FY 2018 Base Plans: Directed Energy Research: Initiate research in component technologies and basic understanding of laser/material interactions to enable higher power, more lethal High Energy Laser, high power Microwave/Radio Frequency, and Ultra Short Pulse Laser weapons capabilities. Some examples of research include the development of novel laser and beam directory architectures, improved sensor and illuminator technologies including materials and coating, improved HEL electrical to optical efficiency, improved laser sources with enhanced spectrum control, reduced system jitter and improved precision aim point maintenance. Other research areas that will be explored are the syntheses of target recognition, pose/trajectory estimation, autonomous aim point selection and maintenance including tracking through intermittent viewing conditions such as waves and clouds, understanding atmospheric characterization and modeling tools, blooming, laser/material/target interactions, novel laser sources in MWIR-LWIR (4-12 microns), USPL propagations and synergistic effects of USPL with HEL beams. Research will continue in Counter Directed Energy Weapons (CDEW), in response to the development of high energy laser (HEL) and high-power microwave (HPM)/high-power radio frequency (HPRF) threats. Complete effort to develop a fiber based high power laser operating in the eye safe regime beyond 2 microns Electronics (NRL) Develop & apply innovative S&T in plasmas, pulsed power, electromagnetic acceleration, particle beams, high-energy & ultra-short-pulse lasers (USPL), and non-linear optics to support current and future Navy and DoD needs.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Solid State Laser - Technology Maturation (SSL-TM): - Effective 2018, SSL-TM effort is realinged to the new innovative naval prototype (INP) PE - 0602792N Innovative Naval Prototypes. ***FY 2018 OCO Plans:*** N/A					
Title: HIGH SPEED PROPULSION AND ADVANCED WEAPON TECHNOLOGIES	3.905	3.813	4.712	0.000	4.712
Description: The high speed weapons work in this activity is focused on demonstrating propulsion and vehicle technologies for Mach3+ to Mach8 capable weapons. 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 Surface Fire Support weapons. The increase in FY2018 is due to increased investment in Hypersonic Propulsion. ***FY 2016 Accomplishments:*** -Continued high speed hypersonic weapons technology program to provide exploratory development of enabling very long range hypersonic boost-glide missiles and hypersonic ship-launched projectiles. -Continued development of advanced computational and experimental techniques for hypersonic boundary layer transition. -Continued High Temperature thermal management research. -Continued Ultra-high temperature materials research for hypersonic leading edges and nose tips. -Continued technology maturation of advanced airframes and controls, high G-force components and miniaturization of electronics. -Continued effort to develop advanced guidance and control technologies for high speed weapons. -Continued high temperature capable thermal management, insulator and ablative technology investigations. -Continued high speed propulsion and integrated airframe technology development to enhance system range, responsiveness and reliability. -Continued investigations into advanced material solutions to high speed airframes and air systems operating in maritime environments.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Transitioned the Hyper Velocity Projectile (HVP) program to an FNC. ***FY 2017 Plans:*** -Continue all efforts of FY 2016 unless noted as completed above. ***FY 2018 Base Plans:*** -Examples of current investments include topics relevant for development of high speed/hypersonic aerodynamics technologies to support exploratory development to enable very long range hypersonic boost-glide missiles and hypersonic ship-launched projectiles. Specific research and development plans include: development of very long range hypersonic boost-glide missiles and hypersonic ship-launched projectiles; advanced computational and experimental techniques for hypersonic boundary layer transition; high temperature thermal management research; ultra-high temperature materials research for hypersonic leading edges and nose tips; technology maturation of advanced airframes and controls; high G-force components and miniaturization of electronics; advanced guidance and control technologies for high speed weapons; insulator and ablative technology investigations; high speed propulsion and integrated airframe technology development to enhance system range, responsiveness, and reliability; and advanced material solutions to high speed airframes and air systems operating in maritime environments. ***FY 2018 OCO Plans:*** N/A					
Title: NAVIGATION, ELECTRO OPTIC/INFRARED (EO/IR), AND SENSOR TECHNOLOGIES ***Description:*** This activity describes Navy Science and Technology (S&T) investments in the areas of Electro Optic/Infrared (EO/IR) devices and advanced sensors and includes investment/performance in the technology areas of EO/IR, Electronic Warfare (EW)and Electromagnetic Warfare , and Communications. FY 2016 to FY 2017 increase is due to ramp-up of EW Sensor Technology. FY 2018 decrease is due to the completion of EW Electro Optic/Infrared efforts. ***FY 2016 Accomplishments:*** Electronic Warfare: -Initiated development of methodology to concatenate nanoparticle structures for spectral control of obscurant material	4.659	5.755	2.555	0.000	2.555

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Continued development and prove a method of more efficiently transporting EW sensors using a low Reynolds Number regime boundary layer control system. -Continued development of a water assisted take-off process for electronic warfare sensors. -Continued development of advanced fuel cell technology for UAS to increase on-station time of EW sensors. -Continued efforts for Unmanned Aerial System (UAS) Based EW: The objective is to develop a System of Systems (SoS) able to artificially create the appearance of a realistic naval force to many adversary surveillance and targeting sensors simultaneously. It will benefit the warfighter by providing battle space confusion to adversary surveillance and targeting systems both above and below water, creating seamless cross-domain countermeasure coordination, and enabling rapid advanced technology/capability insertion to counter emerging threats. Technology developments will include reconfigurable and modular EW payloads, Distributed Decoy and Jammer Swarms (DDJS), effective acoustic countermeasures (CM), and Multiple Input/Multiple Output Sensor/ CM (MIMO S/CM) for false force generation to both above and below water sensors. -Continued development of ultra-low noise uncooled nanotechnology infrared sensors. -Continued development of 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, nonmechanically 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 effort to develop mid & long wave IR focal plane arrays using graded-band gap W-type-II. Superlattices with much higher detectivity than that of state-of-the-art HgCdTe (MCT). -Continued development of next generation IR focal plane sensor and countermeasures to defeat it. -Continued research to apply manifold modeling and optimal control techniques to airborne EO/IR sensor systems. -Continued development of novel photovoltaic and autonomous soaring technology to enable long range EW sensor delivery systems Electro Optic/Infrared: -Continued development of next generation IR focal plane sensor and countermeasures to defeat it. -Continue research to apply manifold modeling and optimal control techniques to airborne EO/IR sensor systems.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Completed development of structured dielectric elastomers for electromechanical devices and deformable optics. -Completed development of magneto-optic materials and ultra-high sensitivity, room-temperature magnetic field sensors. ***FY 2017 Plans:*** Electronic Warfare: -Continue all efforts of FY 2016 unless noted as completed above. -Complete development of advanced fuel cell technology for UAS to increase on-station time of EW sensors. Electro Optic/Infrared -Complete development of next generation IR focal plane sensor and countermeasures to defeat it. -Complete research to apply manifold modeling and optimal control techniques to airborne EO/IR sensor systems. ***FY 2018 Base Plans:*** Electronic Warfare: -Continue all efforts of FY 2017 unless noted as completed above. -Complete development of novel photovoltaic and autonomous soaring technology to enable long range EW sensor delivery systems. -Complete development of methodology to concatenate nanoparticle structures for spectral control of obscurant material. Electro Optic/Infrared: -Conduct multiple efforts of EO/IR threats through both active and passive countermeasures technologies and assuring deployment capabilities are available to achieve the proper disposition of materials for extended durations. Electronics					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Create and explore new concepts, components, techniques, and subsystems for the detection of UV, visible, and infrared radiation to support current and future Navy and DoD needs. ***FY 2018 OCO Plans:*** N/A					
Title: STRIKE AND LITTORAL COMBAT TECHNOLOGIES ***Description:*** 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. The increase in FY 2018 reflects the increased investment at the Naval Research Laboratory in Advanced Radio Frequency/Electro-Optical (RF/EO) Sensor & Seeker Technology research. ***FY 2016 Accomplishments:*** Increased Capability Against Moving and Stationary Targets: -Continued the development and demonstration of new Electronic Protection (EP) techniques that can discriminate advanced jamming false targets from true targets and also suppress false targets so that true targets can be readily detected. -Completed development of multi-static electronic protection techniques against advanced jamming systems. Enhanced Weapon Technologies: -Continued 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. -Continued development and applied 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.	0.763	0.909	1.730	0.000	1.730

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Strike Accelerator: -Continued Strike Accelerator program. This effort will provide an advanced airborne capability to accurately identify targets using Advanced Target Recognition (ATR). These capabilities are utilizing the F/A-18 E/F, AESA (Active Electronically Scanned Array) Radar and ATFLIR (Advanced Targeting Forward Looking Infrared) sensors. Multi-Target Laser Designator: - Continued research for advanced optical techniques to defeat SWARM attacks. Selectable Output Weapon: -Continued Selectable Output Weapon Sea Strike Project. High Energy Fiber Laser System: -Continued development an advanced laser beam control, pointing mechanism and power subsystem to support an airborne laser weapon system. This system will provide the detection and defeat of current and future threats. ***FY 2017 Plans:*** -Continue all efforts of FY 2016 unless noted as completed above. ***FY 2018 Base Plans:*** Continue all efforts of FY 2016/2017 unless noted as completed above. Conduct applied research in Advanced RF/EO Sensor & Seeker Technologies for Navy and Marine Corp operations and systems. Electromagnetic Warfare (NRL): Technology development is ongoing to address capabilities to understand the defeat mechanism for operations of ISR platforms using non-traditional frequencies as well as protecting current capabilities against electronic attack through enhanced concepts. The non-traditional integration of ISR capabilities is being implemented into a major Commercialization Pilot Program (CPP) funded effort at NRL to validate expectations at minimal cost to this program and expand the capability of a significant testing resource. ***FY 2018 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
N/A					
Title: ELECTROMAGNETIC GUNS	33.945	19.938	0.000	0.000	0.000
Description: 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. EM railgun is being considered for multi-mission applications including USMC Naval Surface Fire Support, anti-surface warfare (ASUW) and ship self defense from missiles and small boat threats. The FY 2016 to FY 2017 funding decrease reflects the completion of majority of long lead barrel buys with continued barrel testing required. The FY 2017 to FY 2018 funding decrease reflects the realignment of the Electro Magnetic (EM) Railgun program to the new innovative naval prototype (INP) PE 0602792N Innovative Naval Prototypes. ***FY 2016 Accomplishments:*** -Continued additional next generation pulsed power fabrication as part of a multi-module, multi-year build to increase full scale rep rate capability from 20MJ to 32MJ muzzle energy capability. -Continued effort to understand the technology required to launch hypervelocity projectiles in only a 4 meter long barrel at 10 rounds per minute. -Continued launcher development -Continued material, physics and thermal property research for single shot launchers, pulsed power and projectiles for 32MJ muzzle energy launch; and initiated assessments from next generation, rep rate, and operational environments. -Continued IPT and Bore Life Consortium collaborations for 32 MJ launchers. -Continued material applications and component design assessments for next generation repetitive fires. -Continued development of modeling and simulation capability to support bore life development and testing for rep rate bore life development assessments. -Continued pulsed power development and fabrication required to support repetitive rate testing. ***FY 2017 Plans:*** -Continue all efforts of FY 2016 unless noted as completed above. -Complete majority of long lead barrel buys with continued barrel testing required. -Complete effort to understand the technology required to launch hypervelocity projectiles in only a 4 meter long barrel at 10 rounds per minute.					

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 0000 / *Power Proj Applied Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
-Complete additional next generation pulsed power fabrication as part of a multi-module, multi-year build to increase full scale rep rate capability from 20MJ to 32MJ muzzle energy capability. ***FY 2018 Base Plans:*** N/A ***FY 2018 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	71.078	41.371	13.553	0.000	13.553

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

This PE develops early components technologies that 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: FY 2018 Navy			Date: May 2017
Appropriation/Budget Activity 1319 / 2	R-1 Program Element (Number/Name) PE 0602114N / *Power Proj Applied Research*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	17.862	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	17.862

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017
Congressional Add: Program Increase ***FY 2016 Accomplishments:*** Additional funds will be utilized towards researching efforts to develop high energy weapons. These could potentially include Electromagnetic Railgun (EMRG) development and directed energy initiatives. Increased investments in the Electro Magnetic (EM) railgun would go towards the further development of a weapon which could be considered for multi-mission applications including USMC Naval Surface Fire Support, anti-surface warfare (ASUW) and ship self-defense from missiles and small boat threats. Funds used towards the development of Directed Energy (DE) technologies for Navy applications will go towards addressing requirements of future Navy combatants to provide ship defense against emerging threats that are proliferating throughout the Navies of the world. ***FY 2017 Plans:*** N/A	13.034	0.000
Congressional Add: Force Protection Research ***FY 2016 Accomplishments:*** Investments in the Electro Magnetic (EM) railgun would go towards the further development of a weapon which could be considered for multi-mission applications including USMC Naval Surface Fire Support, anti-surface warfare (ASUW) and ship self-defense from missiles and small boat threats. Funds used towards the development of Directed Energy (DE) technologies for Navy applications will go towards addressing requirements of future Navy combatants to provide ship defense against emerging threats that are proliferating throughout the Navies of the world. ***FY 2017 Plans:*** N/A	4.828	0.000
Congressional Adds Subtotals	17.862	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: FY 2018 Navy		Date: May 2017
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602114N / *Power Proj Applied Research*	**Project (Number/Name)** 9999 / *Congressional Adds*

D. Acquisition Strategy

N/A

E. Performance Metrics

Congressional Interest Items not included in other Projects.