Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy												Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 2: *Applied Research*					R-1 Program Element (Number/Name) PE 0602123N *I Force Protection Applied Res*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	208.810	209.008	122.888	-	122.888	-	-	-	-	-	-
0000: *Force Protection Applied Res*	0.000	116.135	121.508	122.888	-	122.888	-	-	-	-	-	-
9999: *Congressional Adds*	0.000	92.675	87.500	0.000	-	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

America is a maritime nation with global responsibilities that require U.S. naval forces be respected around the world and decisive when it matters. The Office of Naval Research (ONR) was established to guide ongoing research to ensure the technical superiority of the U.S. Navy and Marine Corps. This Program Element (PE) addresses applied research 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. The goal is to provide the ability to deter, or avoid engagements, and if necessary, fight and win against adversary naval platforms or weapons. In the event of conflict, naval platforms must be able to resist and control damage while preserving operational capability. Research is focused on providing technologically superior defense of naval assets and delivering warfighting capabilities at reduced total ownership costs for surface and subsurface platforms through investments in applied research in: a) Power, Energy & Propulsion and b) Platform Design and Engineering. This program develops technologies for reduced observables technology and enhanced capability of naval aviation aircraft platforms in terms of mission effectiveness, platform range, responsiveness, survivability, observability, readiness, safety and life cycle cost. The program addresses technology development to provide substantial improvements in energetic material systems and subsystems, primarily in terms of performance, but also addressing safety, reliability, and affordability concerns. The program supports mission-driven problem solving within the Naval Research and Development Establishment (NR&DE) through agile and rapid prototyping processes, while also promoting implementation of a common, effective innovation process and language.

Today's Sailors and Marines are enabled by naval Science and Technology (S&T). Since 1946, the Office of Naval Research (ONR) has fostered scientific research related to the maintenance of maritime superiority and national defense. ONR manages the Department of the Navy's (DON) portfolio of naval Basic and Applied research, and Advanced Technology Development investments to ensure naval forces can effectively deter conflict, but when called upon, fight, win and come home safe. Current investments hedge against uncertainty, providing solutions to commanders today, and options for the future. The Naval S&T budget supports higher guidance defined by the National Defense Strategy, and responds to requirements identified by the Secretary of the Navy through research priorities set by the Chief of Naval Research, coordinated across the Naval Research Enterprise (NRE), and outlined in the Naval R&D Framework.

This Program Element (PE) funds Applied Research, which is the systematic study to understand the means to meet a recognized and specific need. 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).

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 2022 Navy	Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602123N *I Force Protection Applied Res*

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	215.517	122.281	124.750	-	124.750
Current President's Budget	208.810	209.008	122.888	-	122.888
Total Adjustments	-6.707	86.727	-1.862	-	-1.862
• Congressional General Reductions	-	-0.773			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	87.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.177	0.000			
• SBIR/STTR Transfer	-6.530	0.000			
• Program Adjustments	0.000	0.000	-1.499	-	-1.499
• Rate/Misc Adjustments	0.000	0.000	-0.363	-	-0.363

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 9999: *Congressional Adds*		
Congressional Add: *Power Generation and Storage Research*	4.827	5.000
Congressional Add: *Hybrid Composite Structures Research for Enhanced Mobility*	4.827	0.000
Congressional Add: *Advanced Energetics Research*	9.654	5.000
Congressional Add: *Electric propulsion for military craft and advanced planing hulls*	4.827	0.000
Congressional Add: *Test bed for autonomous ship systems*	3.861	0.000
Congressional Add: *Talent and technology for Navy power and energy systems*	9.171	10.500
Congressional Add: *Compact high flow fan*	3.861	0.000
Congressional Add: *Network cyber security and resiliency*	3.861	0.000
Congressional Add: *Navy alternative energy research, development, testing and deployment*	19.307	0.000
Congressional Add: *Data-model fusion for naval platforms and systems*	4.827	0.000
Congressional Add: *Blue carbon capture/direct air capture*	7.723	0.000
Congressional Add: *Energy resilience efforts*	7.723	0.000
Congressional Add: *Coastal environmental research*	4.827	5.000
Congressional Add: *Platform reliability and advanced technical research*	3.379	0.000
Congressional Add: *Data-Model Fusion*	0.000	3.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 2: *Applied Research*	**R-1 Program Element (Number/Name)** PE 0602123N *I Force Protection Applied Res*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Congressional Add: *Direct Air Capture and Blue Carbon Removal Technology*	0.000	7.500
Congressional Add: *Machine Discovery and Learning*	0.000	2.000
Congressional Add: *Additive Manufacturing of Unmanned Maritime Systems*	0.000	10.000
Congressional Add: *Asia Pacific Technology and Education Program*	0.000	5.000
Congressional Add: *Low Cost Silicon Solar Cells*	0.000	2.500
Congressional Add: *Navy Alternative Energy Research*	0.000	25.000
Congressional Add: *Robust Energy Infrastrucure Project*	0.000	7.000
Congressional Add Subtotals for Project: 9999	92.675	87.500
Congressional Add Totals for all Projects	92.675	87.500

Change Summary Explanation

Funding: not applicable

Technical: not applicable

Schedule: not applicable

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 2	R-1 Program Element (Number/Name) PE 0602123N / *Force Protection Applied Res*	Project (Number/Name) 0000 / *Force Protection Applied Res*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
0000: *Force Protection Applied Res*	0.000	116.135	121.508	122.888	-	122.888	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This project addresses applied research associated with providing the capability of Platform and Force Protection for the U.S. Navy. It supports the development of technologies associated with all naval platforms (surface, subsurface, terrestrial, and air) and the protection of those platforms. Research is focused on providing technologically superior defense of naval assets and delivering warfighting capabilities at reduced total ownership costs for surface and subsurface platforms through investments in applied research in: a) Power, Energy & Propulsion and b) Platform Design and Engineering. This project develops technologies for reduced observables technology and enhanced capability of naval platforms (surface, subsurface, terrestrial, and air) in terms of mission effectiveness, platform range, responsiveness, survivability, observability, readiness, safety and life cycle cost. The project addresses technology development to provide substantial improvements in energetic material systems and subsystems, primarily in terms of performance, but also addressing safety, reliability, and affordability concerns.

This project is broken out into five primary areas of study: Aircraft Technology, Fleet Force Protection and Defense Against Undersea Threats, Advanced Energetics, Surface Ship and Submarine Hull Mechanical & Electrical (HM&E), and Naval Research Enterprise.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Aircraft Technology	35.082	35.661	36.506	0.000	36.506
Description: The Aircraft Technology activity develops technologies for reduced observables technology and enhanced capability of naval aviation aircraft platforms in terms of mission effectiveness, platform range, operational energy, expeditionary capability, responsiveness, survivability, observability, readiness, safety and life cycle cost. It also develops new Naval air vehicle concepts and high impact, saleable naval air vehicle technologies, such as - autonomous air vehicle command and control, helicopter and tilt rotor systems, aerodynamics, propulsion systems, materials, structures and flight controls for future and legacy air vehicles. The Sea-Based Aviation National Naval Responsibility (SBA NNR) Structures and Materials program will develop the next generation structural capability and material response science for aircraft technology in fixed and rotary wing, manned and unmanned airframe technology to achieve reduced weight, increased durability, strength, streamlined manufacturability, reduced life-cycle cost and maintenance/readiness gaps improvements. Program payoffs include increased availability/readiness, reduced sustainment requirements, fatigue/loads life enhancement, reduced weight and improved range, and advanced prognostics design tools.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
These efforts address unique attributes to propulsion, power and thermal management technologies for Naval Aviation, as well as those having higher importance to Naval Aviation and some that are more pervasive to all of military aviation. Related basic research efforts are addressed under 0601153N Defense Research Sciences. ***FY 2021 Plans:*** Research related to Sea Based Aviation National Naval Responsibility (SBA NNR) priorities in Aviation, Propulsion, and Structures and Materials. Research in Aircraft Science & Technology include: - Advanced analytical methods for achieving guaranteed performance in multibody control systems. - Control law synthesis methods to expand the recovery envelope and reduce touchdown loads. - Advanced modeling and analysis methods for ship/aircraft aerodynamic interface. - Air vehicle flying qualities and control. - High lift aerodynamics and control. - Vertical/Short Take-off and Landing (V/STOL) science & technology. - Automated launch and recovery technology. - Mechanical/environmental failure prediction research. Basic and applied research in Flight Dynamics & Control will develop theory, analysis and experimental data to better understand and exploit the natural dynamics of air vehicles operating the in the marine environment. Focus areas in Flight Dynamics & Control include: - Multibody control systems and the ability to demonstrate guaranteed performance relative to a desired end state.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Robust and precise control in the presence of highly turbulent flow fields to increase operational capability and reduce structural requirements for ship-based operations; - Algorithms and sensors to enable precise ship-relative navigation in GPS-denied environments; - Control effectors and vehicle configurations to enable platforms with VTOL utility and fixed-wing efficiency. - Additionally, collaborative research will improve our knowledge of control system interactions between piloted aircraft and human performance. Basic and applied Aerodynamics research will include: -New methods for in situ measurement of ship airwake dynamics; -Advanced computational methods addressing the Navy-unique challenge of a fully coupled aerodynamic interface between ships and aircraft; -Advanced methods for reduced-order modeling of complex flow fields to enable real-time, high-fidelity simulations of ship-based aircraft operations; -Advanced methods for manipulating and more precisely controlling the flow fields around air vehicles operating in the maritime environment. Applied research in aircraft Propulsion and Power concepts for high speed, long endurance and responsiveness include: -High stage-loading and efficient Turbomachinery; -Cooling and thermal management for engines and auxiliary systems; -Advanced materials and coatings;					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
-Diagnostics and control for Integrated Power, Propulsion and Thermal Management; -Highly integrated Propulsion inlets, exhausts, and Dust Ingestion research: including modeling, separating, deposition, coatings and sensing. -Next Generation Air Dominance Enabler applied research in aircraft engine advanced casing treatments, advanced compression system technologies and engine robustness in austere sand and salt environments. Research related to Autonomy include: -High confidence/Safe Autonomous Control in naval environments and on supervisory control of decentralized heterogeneous Unmanned Aircraft Systems (UAS). -Expand efforts on new theory-based methods and processes for rapid and safe adoption of new autonomy capabilities including Verification and Validation, safety, and robustness within complex naval, adversarial environments. -Expand efforts on safe-perception based autonomous control in complex naval environments and on autonomy to support combined unmanned and manned air systems/units. Structures and Materials Research: -High Fidelity Composite Characterization for Rapid Certification of Advanced Structures: application of previously developed advanced characterization methods for current and emerging next generation Composites. This data will feed rapid certification through advanced damage modeling and failure predictions. -Advanced Galvanic Compatibly Theory for Operationally Optimized Material Selection: validation and transition of novel compatibility theory to improve material selection and design in vehicle sustainment and life extension. -Structural Remediation: materials and processes for extending and restoring structural material operational life via advanced repair and remanufacturing process research and development. ***FY 2022 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Research related to Sea Based Aviation National Naval Responsibility (SBA NNR) priorities in Aviation, Propulsion, and Structures and Materials. Research in Aircraft Science & Technology includes: Continuing efforts in the following: - Advanced analytical methods for achieving guaranteed performance in multibody control systems. - Control law synthesis methods to expand the recovery envelope and reduce touchdown loads. - Advanced modeling and analysis methods for ship/aircraft aerodynamic interface. - Air vehicle flying qualities and control. - High lift aerodynamics and control. - Vertical/Short Take-off and Landing (V/STOL) science & technology. - Automated launch and recovery technology. - Mechanical/environmental failure prediction research. Initiating efforts in the following: - Advanced dynamics and topology of coupled human/machine systems. - Precise relative navigation science & technology. - Integrated development environment for cyber secure avionics. - Infrastructure for rapid development, analysis, and experimentation with advanced flight science and technology across academia, government and industry. - Manned/unmanned teaming technology. Basic and applied research in Flight Dynamics & Control will develop theory, analysis and experimental data to better understand and exploit the natural dynamics of both conventional and unconventional air vehicles operating in the marine environment. Focus areas in Flight Dynamics & Control include continuing efforts in the following: - Multibody control systems and the ability to demonstrate guaranteed performance relative to a desired end state. - Robust and precise control in the presence of highly turbulent flow fields to increase operational capability and reduce structural requirements for ship-based operations; - Algorithms and sensors to enable precise ship-relative navigation in GPS-denied environments; - Control effectors and vehicle configurations to enable platforms with VTOL utility and fixed-wing efficiency.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Collaborative research to improve our knowledge of control system interactions between piloted aircraft and human performance. Applied Aerodynamics research for aircraft and weapons platforms will includes: Continuing efforts in the following: - Advanced computational methods addressing the Navy-unique challenge of a fully coupled aerodynamic interface between ships and aircraft; - Advanced methods for reduced-order modeling of complex flow fields to enable real-time, high-fidelity simulations of ship-based aircraft operations; - Advanced methods for manipulating and more precisely controlling the flow fields around air vehicles operating in the maritime environment. Expanding efforts in the following: - Novel diagnostics and techniques for in situ measurement ship airwake dynamics and its coupling to ship motions (sea states) and environmental flow field; Initiating efforts in the following: - Advanced technologies for improved weapons aerodynamics enabling increased range and maneuverability. - Innovative concepts for compact, highly-integrated inlets for air-breathing weapons. Applied research in aircraft Propulsion, Power and thermal management concepts for high speed, long endurance and responsiveness include: Continuing efforts in the following: - Cooling and thermal management for engines and auxiliary systems; - Diagnostics, prognostics and control for Integrated Power, Propulsion and Thermal Management; - Highly integrated Propulsion inlets, exhausts; - Sand, Salt and Dust Ingestion research: including modeling, separating, deposition, coatings and sensing; - Next Generation Propulsion Enablers includes applied research in propulsion, power and thermal management, advanced casing treatments, advanced compression system technologies and engine robustness in austere sand and salt environments. Expanding efforts in the following: - Highly loaded efficient Turbomachinery with improved operability; - Advanced materials and coatings for austere environments; Initiating efforts in the following: - Hybrid propulsion system component technologies for small to mid size VTOL capable UAS.					

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Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Research related to Autonomy includes expanding the following efforts: - High confidence/Safe Autonomous single and multi-vehicle control in naval environments and human interaction with advanced autonomy such decentralized heterogeneous naval systems and interactive machine learning. - New theory-based methods and processes for rapid and safe adoption of new autonomy capabilities including Verification and Validation, safety, risk management, human systems integration, and robustness within complex naval, adversarial environments. - Safe perception based autonomous control in complex naval environments with limited communications and on autonomy to support combined unmanned and manned air systems/units. Structures and Materials Research includes: Continuing the following efforts: - Composites Characterization: development of composites characterization and validation methods for current and next generation composites for rapid certification and sustainment. - Galvanic compatibility tool development for assessing galvanic capability of metals in operational environment - Structural remediation: development of materials and processes for extending and restoring operational life. Initiating efforts in the following: - Hybrid nano-Composites - extend basic research investments in aligned carbon nano-tubes to develop damage tolerant composite structures for composites airframes. - Lightweight flight and transparent armor - Develop flight and transparent armor with improved performance than those currently fielded. - Lightweight multifunctional structures - Lightweight airframes and weapons by integrating functions such as energy storage and antennas in the load bearing structure. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** There is no significant funding change from FY 2021 to FY 2022.					
Title: Fleet Force Protection and Defense Against Undersea Threats	5.534	8.954	7.767	0.000	7.767

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Description: Fleet Force Protection and Defense against Undersea Threats efforts include applied research for complementary sensor and processing technologies for platform protection. Current small platforms (surface, subsurface and airborne) have little to no situational awareness (SA) or self-protection against air, surface, and asymmetric threats. A goal of this activity is to provide these platforms with effective self-protection. The technology areas specific to platform protection will develop individual, multispectral electro-optical (EO), infrared (IR), radio frequency (RF), electro-magnetic (EM), visual and acoustic or chemical sensors/ biosensors and associated processing. To defend platforms from current and advanced threats in at-sea littoral environments and in port, these technologies must improve multispectral detection and distribution of specific threat information. ***FY 2021 Plans:*** Electromagnetic Warfare (formerly Sensors and Associated Processing): - Research conducted by one project in this area provides an increase in the performance of airborne imaging radars by developing a 3D imaging capability for maritime applications. The objective is to develop a new 3D ISAR capability for moving targets to allow better target recognition with reduced time-on-target for reduced platform vulnerability and improved speed and accuracy to discriminate threat from non-threat targets. Materials and Chemistry: - Design and develop inexpensive, miniaturized, low power electrochemical sensors for use in autonomous and distributed sensor networks. Develop real time, standoff, moving target, laser based detection for explosives and hazardous chemicals. Development of chemical vapor sensing strategy for application in marine environment. Development of ultra-high strength sintered ceramics for significant improvements in personnel protection and platform survivability. - Current plans focus efforts on use of metal oxide nanoparticle functionalization of graphene conductometric devices to detect sulfur compounds in vapor and liquid phase aviation; establishing a new paradigm for tunable substrates for efficient sample preconcentration (sensitivity enhancement) and partial separations (selectivity enhancement); and fabrication and optimization of chemical vapor sensor devices made from large-area chemical vapor deposition grown transition metal dichalcogenide films and demonstrate that they can be used					

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Appropriation/Budget Activity 1319 / 2	R-1 Program Element (Number/Name) PE 0602123N / *Force Protection Applied Res*	Project (Number/Name) 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
to create a chemical sensor array that can identify particular chemical analytes of importance to nerve gas/ explosive detection by creating particular opto-electronic fingerprint for each analyte. Undersea Warfare: - Developing acoustics technology and associated signal processing to detect and track small-unmanned aerial vehicles for force and infrastructure protection. Development of a pressure tolerant, inexpensive hydrogen storage based on hydrogenated graphene to increase undersea storage capacity. Development of technologies for active control of acoustic scattering to increase stealth and survivability of unmanned undersea vehicles.					
FY 2022 Base Plans: Electromagnetic Warfare: - Complete research conducted by one project in this area that provided an increase in the performance of airborne imaging radars by developing a 3D imaging capability for maritime applications. Materials and Chemistry: - Continue designing and developing inexpensive, miniaturized, low power electrochemical sensors for use in autonomous and distributed sensor networks in order to provide stand-off detection of explosive hazards in expeditionary missions; developing real time, standoff, moving target, laser based detection for explosives and hazardous chemicals in marine environment; developing chemical vapor sensing strategy for application in marine environment; and developing ultra-high strength sintered ceramics for significant improvements in personnel protection and platform survivability. - Initiate development of high bandwidth modularized airborne ground penetrating radar array and related components as well as integrated near-real-time ground tracking and detection algorithm. - Initiate research and development of modular compact sensors and automated algorithms to rapidly assess, analyze, and report damage to infrastructure for repair following an attack or natural disaster particularly damage to runways, roads, piers, utilities, and buildings. - Complete efforts focused on the use of metal oxide nanoparticle functionalization of graphene conductometric devices to detect sulfur compounds in vapor and liquid phase aviation. Undersea Warfare: - Continue developing acoustics technology and associated signal processing to detect and track small-unmanned aerial vehicles for force and infrastructure protection; developing a pressure tolerant, inexpensive					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
hydrogen storage based on hydrogenated graphene to increase undersea storage capacity; and developing technologies for active control of acoustic scattering to increase stealth and survivability of unmanned undersea vehicles. - Initiate efforts on safe-perception based autonomous control in complex naval environments and on autonomy to support combined unmanned and manned systems/units. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** There decrease from FY 2021 to FY 2022 is due to completing efforts in Electromagnetic Warfare.					
Title: Advanced Energetics ***Description:*** Advanced Energetics efforts address technology development to provide substantial improvements in energetic material systems and subsystems, primarily in terms of performance, but also addressing safety, reliability, and affordability concerns. Goals include: advanced energetic materials for warheads, propellants, and reactive material based subsystems for both defensive and offensive applications. Efforts include: development of new fuels, oxidizers, explosive ingredients and formulations; and reliable simulation tools and diagnostics to develop and design superior-performance, and/or reduced-vulnerability systems tailored to specific warfighter missions. ***FY 2021 Plans:*** - Conduct applied research related to Advanced Energetic materials with a focus on higher tactical weapon performance including speed, range, and overall lethality in addition to proof of concept efforts to develop insensitive explosives, propellants, and munitions without compromising performance. - Research areas include development and evaluation of advanced explosive/propellant/reactive composite ingredients and formulations for the next generation higher performing systems in addition to novel manufacturing/chemical processing/scale-up technologies and process development efforts. This work involves development of high quality, small particle energetic and other formulation-enabling ingredients, novel processing techniques, and advanced energy conversion concepts, and involves both multi-scale theoretical and various dynamic diagnostic experimental efforts.	5.080	5.348	5.475	0.000	5.475

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Conduct research focused on ingredient chemistry and chemical processing technologies, and incorporate molecular design and crystal morphology technology into scale-up and process development. New compliant commodity energetic ingredients will be transitioned to the industrial base as appropriate. - Conduct research in development and application of experimental diagnostics of novel energy conversion concepts to enhance performance, more efficiently exploit available energy, and more effectively couple energy to target for air, surface, and underwater warhead and propulsion applications. - Conduct research in development and application of modeling and simulation to predict dynamic response and effects of energetic processes such as ignition, combustion/deflagration, shock, fragmentation, and detonation in order to predict weapon performance, lethality, and lifecycle for air, surface, and underwater weapon applications.					
FY 2022 Base Plans: - Continue applied research related to Advanced Energetic materials with a focus on higher tactical weapon performance including longer range, reduced time-to-target, and enhancing overall lethality in addition to efforts to develop insensitive explosives, propellants, and munitions without compromising performance. - Continue research focused on development and evaluation of advanced explosive, propellant, and reactive composite ingredients and energetic formulations, in addition to various dynamic diagnostic experimental and multi-scale theoretical efforts for development of next generation higher performing weapon systems. - Expand research focused on ingredient chemistry and chemical processing technologies. This work includes: (i) synthesis, scale up, and evaluation of new energetic (i.e. explosives, oxidizers, fuels) and other formulation-enabling ingredients (i.e. polymer binders, plasticizers), (ii) incorporation of molecular design and particle morphology technology into synthetic scale-up and process development, and (iii) exploration and adaptation of innovative mixing, formulation, and other novel manufacturing processes for agile progression of enhanced energetic formulations. New compliant commodity ingredients, and new scale-up and formulation processes will be transitioned to the industrial base as appropriate. - Expand research in development and application of experimental diagnostics of novel energy conversion concepts to enhance performance, more efficiently exploit available energy, and more effectively couple energy to target for air, surface, and underwater warhead and propulsion applications. This work includes dynamic experimentation in support of design, evaluation and progression of enhanced lethality warhead concepts with focus on smaller form-factor without sacrificing effect on target; and advanced solid rocket motor, air-breathing, gun and other novel tactical propulsion concepts for extended range and reduced time-to-target.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Expand research in development and application of modeling, simulation, and computation to predict dynamic response and effects of energetic processes such as ignition, combustion/deflagration, shock, fragmentation, and detonation in order to predict weapon performance, lethality, and lifecycle for air, surface, and underwater weapon applications. Specific focus areas include applied theory and model development for understanding complex lethality mechanisms and properly assessing target damage for emerging warhead concepts and materials (i.e. high-density reactive materials) in addition to modeling efforts that support progression and transition of advanced tactical propulsion (i.e. ram-jets, high performance solid rocket motor). ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** There is no significant funding change from FY 2021 to FY 2022..					
Title: Surface Ship and Submarine Hull Mechanical and Electrical (HM&E) ***Description:*** Technology programs focused on providing technologically superior warfighting capabilities at reduced total ownership costs for surface and subsurface platforms through investments in applied research and advanced technology development of programs in: a) Power, Energy & Propulsion and b) Platform Design and Engineering. This element also includes the National Naval Responsibility in Naval Engineering (NNR-NE). Specific research themes are: Power, Energy and Propulsion Technology: Efforts address electrical and auxiliary system and component technology to dramatically improve energy and power density, operating efficiency, and recoverability from casualties. A major investment focus is providing the power and energy required for directed energy weapons on current and future surface combatants. Platform Design and Engineering Technology: This project includes the following efforts: - Hydrodynamics: Critical platform design for surface ships hydrodynamics that is focused on the theory, computation, and lab and at-sea experimentation to develop understanding and prediction capabilities for all hydrodynamic phenomena associated with surface ships and small craft, their effects on vessel performance, and concepts for modification. - Platform Structures: Focused on time-varying, structural reliability analysis and prediction for a ship structural system with uncertainty quantification and propagation.	66.177	67.012	68.499	0.000	68.499

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Unmanned Surface Vehicles (USV): Autonomy for USVs and related mission functions aligned with Naval S&T strategic focus on autonomy and unmanned vehicles. - Sea Platform Survivability Technology: Aligned with survivability S&T strategic focus area, research investigates electromagnetic (EM) sources (including major ferro and non-ferromagnetic sources, eddy currents, and Corrosion Related Magnetic Fields (CRM)) that are associated with naval platforms. ***FY 2021 Plans:*** Power, Energy and Propulsion Technology (covers efforts previously called Advanced Naval Power and Energy Systems Research and Technology): - Advanced energy systems research focused on the analysis and optimization of resilient electrical grids and microgrids in the Pacific and across DON critical mission areas. Prior and on-going research has demonstrated the ability of advanced batteries and other power management technologies to greatly enhance the stability and reliability of electrical grids. Results from these demonstrations will be used to evaluate and increase the energy resiliency of critically infrastructures on DON installations. Efforts include enhancing collaborations across academia, industry and DON beneficiaries. - To support both new and existing surface ship and submarine programs, specific new and ongoing efforts are aimed at supporting electrical system reliability, as well as advanced power distribution and control and will utilize the Electric Ship Research and Development Consortium (ESRDC) to develop modeling and simulation tools, system analysis tools and models to provide critical design and operational capabilities for the all-electric ship program, accelerate development and demonstration of technologies, and to reduce risk of technology insertion. These efforts also address the national shortage of naval electrical power engineers. - Next Generation Integrated Power System (NGIPS) and Distribution/Control of Power Advanced Power Systems: focus on power and energy requirements for directed energy weapons and advance sensor systems on current and future surface combatants, as well as for unmanned naval platforms. Platform Design and Engineering Technology (covers efforts previously called Advanced Sea Platform Technology, Sea Platform Survivability Technology, Submarine Security S&T and Autonomy Technology): - Conduct applied research related to critical S&T that supports platform design and advanced capability efforts related to propulsor, surface, and subsurface hydrodynamics; platform performance, and platform					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
structural reliability. Specifically, efforts to utilize advanced analytics (machine learning and artificial intelligence), incorporate environmental effects on platform performance, research related to advancing unmanned sea surface vessel technologies and capabilities. Specific naval engineering and platform design efforts to support set-based design for the Next Generation Attack Submarine SSN(X), and efforts to mitigate technology and susceptibility risk for the COLUMBIA class submarine program and the Future Surface Combatant Force. - Conduct applied research related to critical S&T to investigate efforts related to signature reduction; structural and machinery acoustics; machinery autonomy; and platform survivability (detectability and susceptibility); and acoustic and non-acoustic signatures. Specifically, efforts utilizing advanced analytics (machine learning and artificial intelligence) and the integration of environmental effects on platform performance and detectability, Specific naval engineering and platform design efforts to support the Next Generation Attack Submarine SSN(X), and efforts to mitigate technology and susceptibility risk for the COLUMBIA class submarine program and the Future Surface Combatant Force. Ongoing base program efforts, initiated in FY 2018 and FY 2019, include ocean surface scatter in RF propagation, wake measurement technologies, thermal management systems, high power control modules for ship application, decision support/uncertainty analysis in operational environments, and reactive composite materials. - Conduct research efforts focused on the science and physics based signal detection technologies that, individually or as a system, can impact the security of the SSBN and submarines in general. Efforts looking at both passive and active detection technologies with near term (0-5 years), mid-term (5-10 years) and far term (10-20 years) implications, as well as improving the understanding of the generation, radiation, propagation, scatter, and detection of a variety of signal types (acoustic, chemical, optical, electromagnetic, hydrodynamic and radiological) associated with a submarine's operation. - Ongoing research related to critical multidisciplinary autonomy challenges that cut across areas/domains, including air, sea, undersea and ground. This includes multi-disciplinary research into the science of autonomy focuses on four interrelated areas: scalable and robust distributed collaboration among autonomous systems; human/unmanned system collaboration; autonomous perception and intelligent decision-making; and intelligent architectures for autonomous systems. Ongoing efforts, initiated in FY 2018 and FY 2019, include network information sciences, long-range high-resolution imaging, and decision support/uncertainty analysis for operational environments. In particular, continue research to develop and test autonomy for Unmanned Undersea Vehicle (UUV) missions including understanding of counter-UUV autonomy options; implementations					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
and testing. Autonomy development involving a shared world model and sensor feedback will continue. Extensive in-water testing will continue. Spectrum Superiority: - Continuing research efforts for passive and active long-range high-resolution detection and imaging for increased survivability and situational awareness even in degraded/contested environments. - Demonstrate portable distributed multi-domain sensor and surveillance technologies in portable expeditionary warfare form factor to protect forces in denied and contested EM environments. Reduce size of electronic warfare devices into handheld form factor to counter advanced threats. Electronics: - Develop and explore new high voltage, high efficiency wide bandgap and ultra-wide bandgap power switches for electric propulsion and electric weapons. Current plans are to focus efforts on: Pioneering Vertical GaN High Power Switches; and Ultra-Wide Bandgap Gallium Oxide Power Device Transformative Integrated GaN Power Technology Platform. Materials and Chemistry: - Design and demonstrate a rechargeable Zn-air battery with pulse-power capability that incorporates a Zn sponge anode and trifunctional air cathodes. The resulting rechargeable Zn-air battery prototype will validate a new class of safe, high-performance, rechargeable Zn-air batteries that will provide attractive options for future military and civilian applications. Undersea Warfare: - Conduct research to reduce the time and cost for Submarine hull inspections by creating technologies for non-destructive evaluation (NDE) of submerged elastic surfaces coated with highly absorptive layers.					
FY 2022 Base Plans: Power, Energy and Propulsion Technology:					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Expand advanced energy systems research, which is focused on the analysis and optimization of resilient electrical grids and microgrids in the Pacific and across DON critical mission areas. Results from previous research will be used to evaluate and increase the energy resiliency of critically infrastructures on DON installations. Efforts include enhancing collaborations across academia, industry and DON beneficiaries. - Expand new and existing surface ship and submarine program efforts aimed at supporting electrical system reliability, as well as advanced power distribution and control to support both new and existing surface ship and submarine programs. This will be utilizing the Electric Ship Research and Development Consortium (ESRDC) to develop modeling and simulation tools, system analysis tools and models to provide critical design and operational capabilities for the all-electric ship program, accelerate development and demonstration of technologies, and to reduce risk of technology insertion. These efforts also address the national shortage of naval electrical power engineers. - Continue Next Generation Integrated Power System (NGIPS) and Distribution/Control of Power Advanced Power Systems efforts focused on power and energy requirements for directed energy weapons and advance sensor systems on current and future surface combatants, as well as for unmanned naval platforms, including thermal modeling. - Initiate research efforts associated with High Temperature Superconducting Cables for flexible ship degaussing system design and sustainable deployment for new and existing surface ship and submarine programs. Platform Design and Engineering Technology: - Continue applied research related to critical S&T that supports platform design and advanced capability efforts related to propulsor, surface, and subsurface hydrodynamics; platform performance, and platform structural reliability. Specific efforts include the following: utilize advanced analytics (machine learning and artificial intelligence), incorporate environmental effects on platform performance, research related to advancing unmanned sea surface vessel technologies and capabilities; naval engineering and platform design efforts to support set-based design for the Next Generation Attack Submarine SSN(X), and efforts to mitigate technology and susceptibility risk for the COLUMBIA class submarine program and the Future Surface Combatant Force.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Continue applied research related to critical S&T to investigate efforts related to signature reduction; structural and machinery acoustics; machinery autonomy; and platform survivability (detectability and susceptibility); and acoustic and non-acoustic signatures. Specific efforts include the following: utilize advanced analytics (machine learning and artificial intelligence), integrate environmental effects on platform performance and detectability, naval engineering and platform design to support the Next Generation Attack Submarine SSN(X), and mitigating technology and susceptibility risk for the COLUMBIA class submarine program and the Future Surface Combatant Force. - Continue/expand research efforts focused on the science and physics based signal detection technologies that, individually or as a system, can impact the security of the SSBN and submarines in general. Efforts looking at both passive and active detection technologies with near term (0-5 years), mid-term (5-10 years) and far term (10-20 years) implications, as well as improving the understanding of the generation, radiation, propagation, scatter, and detection of a variety of signal types (acoustic, chemical, optical, electromagnetic, hydrodynamic and radiological) associated with a submarine's operation. - Continue research related to critical multidisciplinary autonomy challenges that cut across areas/domains, including air, sea, undersea and ground. This includes multi-disciplinary research into the science of autonomy focuses on four interrelated areas: scalable and robust distributed collaboration among autonomous systems; human/unmanned system collaboration; autonomous perception and intelligent decision-making; and intelligent architectures for autonomous systems. - Continue research to develop and test autonomy for Unmanned Undersea Vehicle (UUV) missions including understanding of counter-UUV autonomy options; implementations and testing; autonomy development involving a shared world model and sensor feedback; and extensive in-water testing. Spectrum Superiority: - Continue research efforts for passive and active long-range high-resolution detection and imaging for increased survivability and situational awareness even in degraded/contested environments. - Continue/expand research efforts to demonstrate portable sensor technology and machine learning based algorithms capable of identifying and recognizing emitters based off of unique RF characteristics in a complex EM environment.					

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Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Initiate research efforts exploring simultaneous full-spectrum (RF and optical) effects to enable full operations and signature control across the entire electromagnetic spectrum. Electronics: - Continue research to develop and explore new high voltage, high efficiency wide bandgap and ultra-wide bandgap power switches for electric propulsion and electric weapons. Current plans are to focus efforts on: Pioneering Vertical GaN High Power Switches; and Ultra-Wide Bandgap Gallium Oxide Power Device Transformative Integrated GaN Power Technology Platform. Materials and Chemistry: - Complete efforts associated with the design and demonstration of a rechargeable Zn-air battery with pulse-power capability that incorporates a Zn sponge anode and trifunctional air cathodes. Undersea Warfare: - Continue research to reduce the time and cost for Submarine hull inspections by creating technologies for non-destructive evaluation (NDE) of submerged elastic surfaces coated with highly absorptive layers. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The funding increase from FY 2021 to FY 2022 is due to increasing efforts associated with High Temperature Superconducting Cables for flexible ship degaussing system design and sustainable deployment for new and existing surface ship and submarine programs, as well as increasing efforts associated with spectrum superiority.					
Title: Naval Research Enterprise ***Description:*** The Naval Research Enterprise (NRE) supports mission-driven problem solving within the Naval Research and Development Establishment (NR&DE) through agile, rapid prototyping processes, while also promoting implementation of a common, effective innovation process and language. Adopting a common	4.262	4.533	4.641	0.000	4.641

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
innovation process stimulates effective NR&DE-wide collaborations and facilitates NR&DE-wide sharing and implementation of best practices to accelerate the delivery of innovative capabilities to the warfighter. Activities are based on three foundational principles: (1) utilize innovative technical and business pathways that accelerate technology acquisition and deployment to the warfighter and pilot potential efforts as a result of this investigation; (2) leverage the commercial market and attract private investments to accelerate and reduce the cost for defense acquisition and deployment of technologies that provide capabilities to the warfighter; and (3) employ innovative best-practices in contracting that accelerate awards and provide flexibility and speed in technology and acquisition. ***FY 2021 Plans:*** - Fund the development of innovative prototypes at Warfare Centers, Naval Laboratories and related DON organizations solving key warfighter problems that are identified through the Hacking for Defense (H4D) innovation process pipeline. - Efforts will be carried out under a pilot designated Naval Innovations Process Adoption (NIPA) to emphasize the implementation of a common process and language to promote collaborations and facilitate the use of best practices to accelerate the delivery of capabilities to the warfighter. - The NIPA pilot is based on the proven Lean Innovation startup process adapted for defense innovation as Hacking for Defense (H4D). The H4D process employs an innovation pipeline composed of four primary steps, with each step lasting approximately 3 months, so that a prototype is delivered and evaluated within one year. ***FY 2022 Base Plans:*** - Continue development of innovative prototypes at Warfare Centers, Naval Laboratories, Naval Accelerator (NavalX) Tech Bridges and related DON organizations solving key warfighter problems that are identified through the Hacking for Defense (H4D) innovation process pipeline. - Continue/expand efforts that will be carried out under the Naval Innovations Process Adoption (NIPA) program to emphasize the implementation of a common process and language to promote collaborations and facilitate the use of best practices to accelerate the delivery of capabilities to the warfighter.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 0000 / *Force Protection Applied Res*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Initiate NIPA Challenges that solicit and expand the Department of the Navy (DON) industrial base, especially small businesses, to solve warfighter problems. The Challenges will employ the NavalX Tech Bridge network to reach the widest possible industrial base and to promote collaborations across the Naval R&D community. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** There is no significant funding change from FY 2021 to FY 2022.					
Accomplishments/Planned Programs Subtotals	116.135	121.508	122.888	0.000	122.888

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319 / 2					R-1 Program Element (Number/Name) PE 0602123N / *Force Protection Applied Res*				Project (Number/Name) 9999 / *Congressional Adds*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
9999: *Congressional Adds*	0.000	92.675	87.500	0.000	-	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: Power Generation and Storage Research ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Conducted and expanded on-going competitively awarded efforts that improved Li-ion battery safety and increased micro-grid resiliency and efficiency	4.827	5.000
Congressional Add: Hybrid Composite Structures Research for Enhanced Mobility ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	4.827	0.000
Congressional Add: Advanced Energetics Research ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Continue research towards the advanced demonstration of energetic materials in a variety of weapon system applications to include: high performance solid rocket and air breathing propulsion, reactive materials demonstrations and effects in advanced lethality and effectiveness models, advanced warhead concepts to include novel reactive shaped charge configurations, hybrid reactive material warhead demonstrations, and the development and demonstration of any necessary modeling and simulation capabilities for quantification of damage effects on adversary weapon systems, and other potential energetic technologies.	9.654	5.000
Congressional Add: Electric propulsion for military craft and advanced planing hulls ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	4.827	0.000
Congressional Add: Test bed for autonomous ship systems	3.861	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
FY 2020 Accomplishments: N/A ***FY 2021 Plans:*** N/A		
Congressional Add: Talent and technology for Navy power and energy systems ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Develope autonomous command and control of ship power and energy systems, leveraging digital twin technology that protects the ship's power and energy grid. In addition, designed and built a digital twin testbed for physical experimentation with power and energy controls technologies.	9.171	10.500
Congressional Add: Compact high flow fan ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	3.861	0.000
Congressional Add: Network cyber security and resiliency ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	3.861	0.000
Congressional Add: Navy alternative energy research, development, testing and deployment ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	19.307	0.000
Congressional Add: Data-model fusion for naval platforms and systems ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	4.827	0.000
Congressional Add: Blue carbon capture/direct air capture ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	7.723	0.000
Congressional Add: Energy resilience efforts	7.723	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
FY 2020 Accomplishments: N/A ***FY 2021 Plans:*** N/A		
Congressional Add: Coastal environmental research ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Provided a complete, portable, and field-tested ocean electro-magnetic observatory capable of global deployment to observe the fluid dynamics and magnetic signature of the ocean in coastal environments. Installed, calibrated, and collected data for the Navy's Electro-Magnetic Observatory prototype.	4.827	5.000
Congressional Add: Platform reliability and advanced technical research ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** N/A	3.379	0.000
Congressional Add: Data-Model Fusion ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** This project, "Data Model Fusion for Naval Engineering", under the Force Protection line, will provide substantial science and technology work in the area of digital-twins, big data, and autonomy for the US Navy. Working under separate but parallel contracts, MDG and U of M propose to extend initial exploration of data-model fusion from FY20, focusing on methods to combine data-rich and data-sparse problems to provide robust system-level performance prognosis for autonomous platforms. They will perform a series of fundamental research activities and table-top scale demonstrators at U of M, and real-world applications and demonstrations coordinated by MDG.	0.000	3.000
Congressional Add: Direct Air Capture and Blue Carbon Removal Technology ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** This funding will support direct air capture and blue carbon technology development. Advancements in these technologies and their integration with next generation fuel producing and material producing technologies will enhance DON & DoD fuel energy security.	0.000	7.500
Congressional Add: Machine Discovery and Learning	0.000	2.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
FY 2020 Accomplishments: N/A ***FY 2021 Plans:*** Continue to develop emergent artificial intelligence (AI) and machine learning (ML) methods for discovery of energetic systems. Demonstrate use of these new methods to discover and transition defense-critical applications, in particular, significant improvements to undersea weapons of particular interest to the Naval Surface Warfare Center, Indian Head Explosive Ordnance Disposal Technology Division (NSWC IHEODTD), and the Navy, with the goal of significant and dramatic reductions in undersea weapon system size, cost and development time. The deliverable will be a methodology that can be used to discover new energetic materials and, ultimately, new energetics-based systems.		
Congressional Add: Additive Manufacturing of Unmanned Maritime Systems ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** This work will develop advanced composite structures for an unmanned surface vessel (USV) using additive manufacturing techniques. The final USV enabled is expected to provide higher performance, lower weight, lower cost and faster manufacturing times than achievable with conventional technologies. This contract will deliver the USV design, hull manufacturing process demonstrations, full scale hull sections and a sub-scale complete hull.	0.000	10.000
Congressional Add: Asia Pacific Technology and Education Program ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Sponsor applied research supporting the Asia Pacific Technology and Education Program.	0.000	5.000
Congressional Add: Low Cost Silicon Solar Cells ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Low Cost Silicon Solar Cells: North Dakota State University will work on new ways to chemically alter the cyclohexylsilane (CHS) ring, to yield facile processing routes to novel silicon devices (films, rods, quantum dots and associated devices such as thin film transitors and solar cells) and to enhance semiconductor properties with molecularly incorporated dopants.	0.000	2.500
Congressional Add: Navy Alternative Energy Research ***FY 2020 Accomplishments:*** N/A ***FY 2021 Plans:*** Conduct applied research supporting Navy Alternative Energy technologies.	0.000	25.000
Congressional Add: Robust Energy Infrastrucure Project	0.000	7.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 2	**R-1 Program Element (Number/Name)** PE 0602123N / *Force Protection Applied Res*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
FY 2020 Accomplishments: N/A ***FY 2021 Plans:*** Conduct applied research in support of the Robust Energy Infrastructure Project.		
Congressional Adds Subtotals	92.675	87.500

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Not applicable.