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**Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603729N / <i>Warfighter Protection Adv Tech</i>
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	0.000	39.057	46.999	5.100	-	5.100	5.105	5.209	5.314	5.397	Continuing	Continuing
2914: <i>Warfighter Protection Adv Tech</i>	0.000	4.787	4.999	5.100	-	5.100	5.105	5.209	5.314	5.397	Continuing	Continuing
9999: <i>Congressional Adds</i>	0.000	34.270	42.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	76.270

**A. Mission Description and Budget Item Justification**

This PE supports the advanced development and demonstration of technologies to improve warfighter performance, safety and survivability. Naval investment in these areas is essential in order to improve the ability to enhance, maintain, and sustain Warfighter effectiveness.

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 Advanced Technology Development (ATD) that includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment. Efforts in this PE generally have Technology Readiness Levels (TRL) of 4 (component and/or breadboard validation in laboratory environment.), 5 (component and/or breadboard validation in relevant environment.), or 6 (system/subsystem model or prototype demonstration in a relevant environment).

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
Previous President's Budget	40.435	4.999	5.100	-	5.100
Current President's Budget	39.057	46.999	5.100	-	5.100
Total Adjustments	-1.378	42.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	42.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.378	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

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**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** 9999: *Congressional Adds*

- Congressional Add: *Bone Marrow Registry Program*
- Congressional Add: *Warfighter resilience and readiness*
- Congressional Add: *Dynamic modular manufacturing*
- Congressional Add: *Laser protective eyewear research*
- Congressional Add: *Closed-loop sedation and anesthesia system*

Congressional Add Subtotals for Project: 9999

Congressional Add Totals for all Projects

	FY 2022	FY 2023
	25.582	32.000
	3.861	0.000
	4.827	0.000
	0.000	5.000
	0.000	5.000
Congressional Add Subtotals for Project: 9999	34.270	42.000
Congressional Add Totals for all Projects	34.270	42.000

**Change Summary Explanation**

Funding: No significant change.

Technical: Not applicable.

Schedule: Not applicable.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2024 Navy										<b>Date:</b> March 2023		
<b>Appropriation/Budget Activity</b> 1319 / 3					<b>R-1 Program Element (Number/Name)</b> PE 0603729N / <i>Warfighter Protection Adv Tech</i>				<b>Project (Number/Name)</b> 2914 / <i>Warfighter Protection Adv Tech</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>FY 2028</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
2914: <i>Warfighter Protection Adv Tech</i>	0.000	4.787	4.999	5.100	-	5.100	5.105	5.209	5.314	5.397	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

This Program Element supports the advanced development and demonstration of technologies to improve warfighter performance, safety and survivability. Naval investment in these areas is essential in order to improve the ability to enhance, maintain, and sustain Warfighter effectiveness.

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
<b>Title:</b> Naval Noise-Induced Hearing Loss (NIHL) and Warfighter Performance	4.787	4.999	5.100	0.000	5.100
<b>Articles:</b>	-	-	-	-	-
<b>Description:</b> Improve technologies aimed at enhancing warfighter effectiveness and efficiency, including efforts in: biocentric technologies, medical concepts, intelligent and autonomous systems, decision sciences, information warfare and future conflict, manpower, personnel, training, and education, human performance. These efforts will mature technologies in order to better ensure transition into acquisition and procurement programs.					
<b>FY 2023 Plans:</b> Shaping the Maritime Acoustic Environment (This thrust was previously part of the Auditory Neuroscience and Performance FY22 plan. The name was changed to more accurately describe the research.) Continue: - Advanced development and assessment of mitigation strategies to protect Warfighters with enhanced communication systems (communications interfaces with advanced functionalities, speech to text capabilities) and situational awareness (auditory cuing and alerting for spatial audio, auditory sensor network for decision-aiding), for mission effectiveness. Complete: - Advanced development and assessment of mitigation strategies to protect Warfighters with: (i.) an improved communication systems for divers to dampen equipment noise and minimize hearing loss, (ii.) an impulse noise calculator for assessing exposure from small caliber firearms, and (iii.) a hearing protection device training protocol to mitigate hazardous noise exposures in weapons training environments.					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2024 Navy		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 1319 / 3	<b>R-1 Program Element (Number/Name)</b> PE 0603729N / <i>Warfighter Protection Adv Tech</i>	<b>Project (Number/Name)</b> 2914 / <i>Warfighter Protection Adv Tech</i>

**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
<p>Initiate:</p> <ul style="list-style-type: none"> <li>- Development of acoustic camouflage and decoy technologies to identify and exploit acoustic signatures of Naval platforms and systems.</li> </ul> <p>Warfighter Performance and Protection:</p> <p>Continue:</p> <ul style="list-style-type: none"> <li>- Advanced technology development and assessment of materials and protective gear to reduce exposures of Warfighters to directed energy systems.</li> <li>- Development of advanced physiological and cognitive monitoring technologies that incorporate real-time sensing and observation of individual and team responses to environmental and operational stressors (e.g., hyperbaric, hypobaric, cold, hot, humid).</li> <li>- Advanced development of artificial intelligence-driven physiological and biological monitoring devices that will provide real-time prediction of performance to command and leadership in training and operational scenarios.</li> </ul> <p>Complete: N/A</p> <p>Initiate:</p> <ul style="list-style-type: none"> <li>- Enhance and fuse multiple streams of data from aerial, ground, and physiological on-body sensor sources for asymmetric advantage in operational environments.</li> </ul> <p><b><i>FY 2024 Base Plans:</i></b></p> <p>Shaping the Maritime Auditory/Acoustic Environment</p> <p>Continue:</p> <ul style="list-style-type: none"> <li>- Advanced technology development and assessment of enhanced communication systems (communications interfaces with advanced functionalities) and situational awareness (auditory cuing and alerting for spatial audio, auditory sensor network for decision-aiding) for mission effectiveness and mitigate noise to protect Warfighters.</li> <li>- Advanced development and assessment of mitigation strategies to protect Warfighters with: (i.) an improved communication systems for divers to dampen equipment noise and minimize hearing loss, (ii.) an impulse noise calculator for assessing exposure from small caliber firearms, and (iii.) a hearing protection device training protocol to mitigate hazardous noise exposures in weapons training environments.</li> <li>- Development of acoustic camouflage and decoy technologies to identify and exploit acoustic signatures of Naval platforms and systems.</li> </ul> <p>Warfighter Performance and Protection</p>					

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**B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)**

	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
<p>Continue:</p> <ul style="list-style-type: none"> <li>- Advanced technology development and assessment of materials and protective gear to reduce exposures of Warfighters to directed energy systems.</li> <li>- Development of advanced physiological/cognitive monitoring technologies that incorporate real-time sensing, observation, and location of individual and team responses to environmental and operational stressors (e.g., smoke, cold, heat, immersion).</li> <li>- Advanced development of artificial intelligence-driven physiological and environmental monitoring devices that will provide real-time prediction of personnel status to command and leadership in operational scenarios.</li> </ul> <p>Complete:</p> <ul style="list-style-type: none"> <li>- Development of a prototype platform that will enhance and fuse multiple streams of data from environmental and physiological on-body sensor sources for personnel tracking and health status monitoring in emergency scenarios.</li> </ul> <p>Initiate:</p> <ul style="list-style-type: none"> <li>- Advanced development of countermeasures against extreme environmental exposures (i.e. extreme heat, cold, smoke) to enhance warfighter survivability in operational or emergency scenarios.</li> <li>- Advanced technology development efforts in areas including: expeditionary medicine, diver performance, and information warfare.</li> </ul> <p><b>FY 2024 OCO Plans:</b> N/A</p> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> There is no significant funding change from FY 2023 to FY2024.</p>					
<b>Accomplishments/Planned Programs Subtotals</b>	4.787	4.999	5.100	0.000	5.100

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
9999: <i>Congressional Adds</i>	0.000	34.270	42.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	76.270
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

Congressional Interest Items not included in other Projects.

**B. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2022	FY 2023
<b>Congressional Add:</b> Bone Marrow Registry Program	25.582	32.000
<p><b>FY 2022 Accomplishments:</b> Develop the scientific, medical and technological advances required to support military contingencies caused by injury to the blood-forming system from toxic substances. Continue to develop, test and mature the ability to address contingency events wherein civilian or military personnel are exposed to marrow toxic agents, primarily ionizing radiation or chemical weapons containing nitrogen mustard in four focus areas: Contingency Preparedness, Development of Science and Technology for Rapid Identification of Matched Donors, Immunogenetic Studies in Transplantation and Clinical Research in Transplantation. Develop an ecosystem around concurrent physiologic and environmental monitoring wearable devices to include new environmental sensors.</p> <p><b>FY 2023 Plans:</b> The first objective is to develop the scientific, medical and technological advances required to support military contingencies caused by injury to the blood-forming system from toxic substances. The aim is to provide HLA matched hematopoietic progenitor cells for casualties from donors during a contingency response and support for hematopoietic progenitor cell donors from the Department of Defense.</p> <p>The second objective is to develop, test, and mature the ability of the NMDP Coordinating Center and NMDP contracted network sites (network sites to address contingency events wherein civilian or military personnel are exposed to marrow toxic agents, primarily ionizing radiation or chemical weapons containing nitrogen mustard gas) for contingency preparedness activities, and to integrate NMDP's role with federal, state and local agencies. Additional work includes immunobiologic and clinical research activities that promote studies to advance the science and technology of HCT transplantation to improve outcome and quality of life for military patients. An additional aim is to develop technology for rapid identification of donors to provide the best matched donor for hematopoietic cell transplantation as quickly as possible for service members in need. To this end, the goal is to</p>		

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2022</b>	<b>FY 2023</b>
test various HLA strategies and protocols to determine which approach matches a recipient to donor in shortest 'diagnosis-to-match' time interval.			
<b>Congressional Add:</b> Warfighter resilience and readiness <b>FY 2022 Accomplishments:</b> Conduct warfighter resilience and readiness advanced technology development <b>FY 2023 Plans:</b> N/A		3.861	0.000
<b>Congressional Add:</b> Dynamic modular manufacturing <b>FY 2022 Accomplishments:</b> Conduct dynamic modular manufacturing advanced technology development <b>FY 2023 Plans:</b> N/A		4.827	0.000
<b>Congressional Add:</b> Laser protective eyewear research <b>FY 2022 Accomplishments:</b> N/A <b>FY 2023 Plans:</b> Leveraging bio-derived compounds, which exhibit heat-resistance, for the manufacture of protective structures for hypersonic projectiles.		0.000	5.000
<b>Congressional Add:</b> Closed-loop sedation and anesthesia system <b>FY 2022 Accomplishments:</b> N/A <b>FY 2023 Plans:</b> Acquire in-silico and animal-based data, as well as compliance test reports supporting the safety of the overall system in order to support the FDA Investigational Device Exemption (IDE) application. The IDE application will be the main deliverable under this program.		0.000	5.000
<b>Congressional Adds Subtotals</b>		34.270	42.000
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A			
<b>Remarks</b>			
<b>D. Acquisition Strategy</b> N/A			