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

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603273N / <i>Science & Technology for Nuclear Re-entry Systems</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	0.000	65.735	112.329	-	112.329	118.618	124.635	120.320	122.866	Continuing	Continuing
3095: <i>Nuclear Delivery Systems</i>	0.000	0.000	65.735	112.329	-	112.329	118.618	124.635	120.320	122.866	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element and Project supports Department of Defense (DOD) priorities for enduring science and technology (S&T) for nuclear re-entry systems. This effort will provide pre-program of record advanced technology development that will effectively address evolving threats and maintain operational effectiveness while also aligning with the highest level guidance for nuclear forces. This effort will contribute to preserving the viability of the nuclear deterrent in a cost-effective manner by reducing technical and programmatic risk associated with execution of the overall nuclear modernization program. These ends will be reached by developing technologies to inform future system requirements, establishing interagency partnerships for re-entry system test platform development, and coordinating with existing programs for next generation strategic system development.

The Strategic Weapons System (SWS) greatly benefited from steady Research and Development (R&D) investments during a succession of development and production programs between 1955 and 1990. Because development of a Trident D5 missile follow-on system did not begin immediately, as had been done for previous systems (A1, A2, A3, C3, C4), research and development funding for submarine launched ballistic missile (SLBM) systems significantly declined in the early 1990s. As the U.S. moved to a paradigm of nuclear force sustainment, enterprise investments aimed at improving delivery system capability to counter new threats were reduced. Consequently, the pipeline for advanced technology development for nuclear delivery systems atrophied. The Department of Defense (DoD) has recognized the need to begin investing in new delivery systems, but there has been a significant, several decades long reduction in foundational nuclear R&D invests made outside of major acquisition programs. The gap in R&D investments has driven programs, which are often risk averse and schedule driven to mature existing technology as part of the acquisition program to control risk. This approach can result in fielding technologies that are not adequately suited to adapt to future threats. Another consequence of this decade's long reduction has been a reduction in workforce capable of supporting advanced technology development. A workforce with skills and requisite clearances needed to solve next-generation technical challenges and a right-sized technology maturation pipeline remain a common threat of high risk across the nuclear enterprise.

Enabling SWS flexibility and affordability is critical to ensure survivability and credibility of the weapon system. In conjunction with STRATCOM Priorities and collaboration with Air Force, the Nuclear Delivery Systems (NDS) funding will identify and mature technologies for the Reentry System (Aeroshell, Fuzing, and Guidance) and SWS enablers that can be readily incorporated into life-extended or next-generation flight and shipboard systems. These technologies will focus on responding to an evolving target base and develop capabilities for changes in missions, adversaries, war-fighting priorities, or emergent deterrence requirements.

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B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	0.000	65.735	84.310	-	84.310
Current President's Budget	0.000	65.735	112.329	-	112.329
Total Adjustments	0.000	0.000	28.019	-	28.019
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	28.019	-	28.019

Change Summary Explanation

The increase of \$46.594M from FY 2023 to FY 2024 is due to ramp up of technology development, maturation, and integration activities, as well as related efforts to support commencement of initial ground testing in FY 2024. Additionally, the increase provides for D5LE advanced missile interface S&T to enable end-to-end system level tests of S&T subsystems in addition to the planned component testing, aiding future possible transition to programs of record.

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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
3095: <i>Nuclear Delivery Systems</i>	0.000	0.000	65.735	112.329	-	112.329	118.618	124.635	120.320	122.866	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This S&T effort will focus on development of modern technologies, subsystems and components for reentry systems and the demonstration and maturation of those technologies to a Technology Readiness Level of 6 in relevant ground and flight test environments. These activities will reduce the operational, programmatic and technological risk facing modernization of Navy reentry systems.

The Nuclear Delivery Systems funding preserves critical SWS survivability against credible threats such as Ballistic Missile Defense Systems and Anti-Submarine Warfare (ASW) on SSBN (OHIO and COLUMBIA) platforms. SWS efficacy will be less dynamic in responding if technological enhancements and developments do not outpace these corresponding threats. The most significant portion of the funding will focus on investments to develop prototypes for integration and demonstration in FY 2025 through FY 2027 to outpace the threat and de-risk future programs. These technologies are enablers for sustaining and life extending programs, allowing SSP to accomplish the following:

- Technology Maturation - Mature and demonstrate technologies in Reentry (i.e. Aeroshell, Fuzing, and Guidance) that will enable efficient insertion of SWS capability into future programs through the adaptability and flexibility. Aeroshell refinement will be completed to support the capability demonstration.
- Reentry Enablers Advancements - Technology maturation of certain reentry subsystem and SWS subsystems directly in support of reentry will be investigated to support the adaptability and flexibility needed to support the reentry capability demonstrations.

The SWS NDS R&D also consists of funding to support the demonstration and test of the technologies developed under this project in a relevant environment. Advancing these technologies to a Technology Readiness Level of 6 or greater will allow for the transition into current and future weapon systems. The demonstrations will consist of:

- Ground tests in FY 2024 through FY 2026.
- Advanced ground tests via hardware in the loop facilities to integrate multiple subsystems across the SWS architecture in FY 2024 through FY 2027.
- Integration cost for Flight Experiments - As part of the SWS yearly flight demonstrations the funding will support the integration of the technologies onto scheduled and funded flight test.

Further information can be provided at a higher classification level.

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

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Enabling Technology	0.000	38.906	68.801	0.000	68.801

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

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Articles:	-	-	-	-	-
<p>Description: Develop and mature advanced technologies and concepts to support advanced Nuclear Delivery Systems and SWS requirements and address emerging threats. Rapidly respond to evolving warfighter priorities and emerging requirements via development of SWS enabling technologies, and capability demonstrations.</p> <p>FY 2023 Plans: Enabling Technology - Initiate development of advanced fuzing solutions that are able to maintain operational effectiveness against emerging targeting challenges and develop alternative safety and surety features required for nuclear systems. - Initiate development of NDS guidance system software to enable reentry Guidance, Navigation and Control (GN&C) technologies to support SWS integration ground testing and future flight tests. - Analyze guidance hardware changes to support further enabling reentry GN&C technologies. - Develop fire control and mission planning software to allow for enabling technology evaluation and support SWS integration ground testing and future flight test opportunities. - Initiate studies and evaluation for targeting effectiveness. - Initiate studies and evaluation for data transfer capability to flight system components.</p> <p>Further information can be provided at a higher classification level.</p> <p>FY 2024 Base Plans: - Continue development of advanced fuzing solutions that are able to maintain operational effectiveness against emerging targeting challenges and develop alternative safety and surety features required for nuclear systems. - Continue development of NDS guidance system software to enable reentry Guidance, Navigation and Control (GN&C) technologies to support SWS integration ground testing and future flight tests. - Continue to analyze guidance hardware changes to support further enabling reentry GN&C technologies. - Continue to develop fire control and mission planning software to allow for enabling technology evaluation and support SWS integration ground testing and future flight test opportunities. - Continue studies and evaluation for targeting effectiveness. - Continue studies and evaluation for data transfer capability to flight system components. - Begin long-lead item procurement and preparation for component testing - Begin development of advanced sensor technology for subcomponent parts</p>					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
Further information can be provided at a higher classification level.					
FY 2024 OCO Plans: N/A					
FY 2023 to FY 2024 Increase/Decrease Statement: The increase from FY 2023 to FY 2024 is due to ramp of technology development, maturation, and integration activities; as well as related efforts to support commencement of initial and integrated/advanced ground testing in FY 2024.					
Title: Reentry Capability Demonstration 1					
Articles:					
	0.000	10.907	25.848	0.000	25.848
	-	-	-	-	-
FY 2023 Plans: Reentry Capability Demonstration 1 - Begin development of Aeroshell technologies to support future threats and flexibility. - Begin development of Fuzing technologies to support future threats and flexibility. - Begin design and conduct assessments to Trident flight test and strategic warhead/Reentry Body (RB) design concepts. - Initiate development of system architecture models of the capability demonstration effort. - Develop program execution plan for the experiment. - Models to describe the system architecture of proposed experiment effort.					
Further information can be provided at a higher classification level.					
FY 2024 Base Plans: Reentry Capability Demonstration 1 - Continue development of Aeroshell technologies to support future threats and flexibility. - Continue development and integration concepts of Fuzing technologies to support future threats and flexibility. - Continue design and conduct assessments to Trident flight test and strategic warhead/Reentry Body (RB) design concepts. - Continue development of system architecture models of the capability demonstration effort. - Maintain program execution plan for the experiment. - Models to describe the system architecture of proposed experiment effort. - Begin Long lead procurement of hardware to support flight testing					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
<p>- Begin development of detailed technical design of experiment and preparation for preliminary design review (PDR)</p> <p>RCD 1 and RCD 2 have different objectives and require different S&T efforts to achieve their specific objectives which are captured under the respective RCDs. Further information can be provided at a higher classification level.</p> <p>FY 2024 OCO Plans: N/A</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: The increase from FY 2023 to FY 2024 is due to ramp of technology development, maturation, and integration activities, as well as related efforts to support commencement of initial ground testing in FY 2024.</p>					
<p>Title: Reentry Capability Demonstration 2</p> <p align="right">Articles:</p> <p>FY 2023 Plans: Reentry Capability Demonstration 2</p> <ul style="list-style-type: none"> - Begin development of Aeroshell technologies to support future threats and flexibility. - Begin development of Fuzing technologies to support future threats and flexibility. - Begin design and conduct assessments to Trident flight test and strategic warhead/Reentry Body (RB) design concepts. - Initiate development of system architecture models of the capability demonstration effort. - Develop program execution plan for the experiment. - Models to describe the system architecture of proposed experiment effort. - Begin design and development of flight demonstration reentry body concept including system architecture, power, radio frequency sub-system, telemetry transmitter, and inertial measurement unit. <p>Further information can be provided at a higher classification level.</p> <p>FY 2024 Base Plans: Reentry Capability Demonstration 2</p> <ul style="list-style-type: none"> - Continue development of Aeroshell technologies to support future threats and flexibility. 	0.000	11.033	17.680	0.000	17.680
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
<ul style="list-style-type: none"> - Continue development and integration concepts of Fuzing technologies to support future threats and flexibility. - Continue design and conduct assessments to Trident flight test and strategic warhead/Reentry Body (RB) design concepts. - Continue development of system architecture models of the capability demonstration effort. - Maintain program execution plan for the experiment. - Begin Long lead procurement of hardware to support flight testing - Begin development of detailed technical design of experiment and preparation for preliminary design review (PDR) <p>RCD 1 and RCD 2 have different objectives and require different S&T efforts to achieve their specific objectives which are captured under the respective RCDs. Further information can be provided at a higher classification level.</p> <p>FY 2024 OCO Plans: N/A</p> <p>FY 2023 to FY 2024 Increase/Decrease Statement: The increase from FY 2023 to FY 2024 is due to ramp of technology development, maturation, and integration activities; as well as related efforts to support commencement of initial ground testing in FY 2024.</p>					
<p>Title: Advanced Technology Demonstration</p> <p align="right">Articles:</p> <p>FY 2023 Plans: Advanced Technology Demonstration</p> <ul style="list-style-type: none"> - Establish baseline infrastructure for evaluating and integrating technologies for a reentry capability demonstration. - Initiate the NDS Strategic Guidance Hardware independent validation & verification capability in various environments. - Develop NDS performance measures for the modeling and simulation activities to assess capability and performance effectiveness. <p>Further information can be provided at a higher classification level.</p> <p>FY 2024 Base Plans:</p>					
	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
	0.000	4.889	0.000	0.000	0.000
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Continue evaluation of effectiveness and implementation strategies, to include design architecture studies.					
FY 2024 OCO Plans: N/A					
FY 2023 to FY 2024 Increase/Decrease Statement: The decrease from FY 2023 to FY 2024 is due to extending system architecture studies into FY 2024 to accommodate the extension of concept studies through FY 2023, with additional technology development activities beginning in FY 2025.					
Accomplishments/Planned Programs Subtotals	0.000	65.735	112.329	0.000	112.329

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

N/A

Remarks

D. Acquisition Strategy

Contracts will be awarded to those sources who were engaged in program and are currently engaged in the production and/or operational support on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (c) (1) and (3) implemented by FAR 6.302.-1, 3, 4