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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Defense Threat Reduction Agency **Date:** March 2024

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> / BA 1: <i>Basic Research</i>					R-1 Program Element (Number/Name) PE 0601000BR / <i>DTRA BASIC RESEARCH</i>							
COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	412.577	16.172	14.761	15.311	-	15.311	15.897	16.498	17.128	17.488	Continuing	Continuing
RU: <i>BASIC RESEARCH FOR COUNTERING WMD</i>	412.577	16.172	14.761	15.311	-	15.311	15.897	16.498	17.128	17.488	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Basic Research for Countering Weapons of Mass Destruction (CWMD) project, as the nation’s primary basic research portfolio dedicated to CWMD, is a core strategic investor in future scientific and technological progress across the Defense Threat Reduction Agency’s (DTRA) mission areas. This project concentrates on high-risk, high-payoff basic research, leveraging world-class expertise in academia, government, and industry, to increase the foundational body of scientific knowledge supporting DTRA’s Applied Research and Advanced Technology Development projects. This project aligns with DTRA’s strategic objectives that support policy and planning guidance from the Executive Office of the President, the DoD, and the broader Weapons of Mass Destruction (WMD) threat reduction community. The portfolio addresses this guidance through capability enhancements, projects, and Science and Technology (S&T) investments that support CWMD. Specifically, they include: accelerating the development of standoff radiological/nuclear detection capabilities; securing vulnerable materials; defeating WMD agents; strategic radiation hardened microelectronics; and leveraging science, technology, and innovation through domestic partnerships and agreements.

This project solicits, coordinates, and conducts research to build a robust, forward-looking fundamental research portfolio targeting strategic, mission-focused, basic research with high potential impact for CWMD. The research projects are selected for scientific merit, technical quality, and the potential for innovation. Each research project offers opportunities to expand the knowledge base to help the warfighter, to bring to bear new science solutions with a fresh approach, or to leverage revolutionary approaches to technical surprise, building a foundation for future CWMD solutions. This research will enable new capabilities to control, defeat, disable, and/or dispose of WMD threats.

B. Program Change Summary (\$ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	16.584	14.761	15.311	-	15.311
Current President's Budget	16.172	14.761	15.311	-	15.311
Total Adjustments	-0.412	0.000	0.000	-	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.412	0.000			

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

Project: RU: *BASIC RESEARCH FOR COUNTERING WMD*
 Congressional Add: *Materials Science in Extreme Environments*

	FY 2023	FY 2024
	5.000	-
Congressional Add Subtotals for Project: RU	5.000	-
Congressional Add Totals for all Projects	5.000	-

Change Summary Explanation

There is no change from the previous President's Budget.

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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
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A. Mission Description and Budget Item Justification

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This project aligns with DTRA’s strategic objectives that support policy and planning guidance from the Executive Office of the President, the DoD, and the broader Weapons of Mass Destruction (WMD) threat reduction community. The portfolio addresses this guidance through capability enhancements, projects, and Science and Technology (S&T) investments that support CWMD. Specifically, they include: accelerating the development of standoff radiological/nuclear detection capabilities; securing vulnerable materials; defeating WMD agents; strategic radiation hardened microelectronics; and leveraging science, technology, and innovation through domestic partnerships and agreements.

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

	FY 2023	FY 2024	FY 2025
Title: Project RU: Basic Research for Countering WMD	11.172	14.761	15.311
Description: The Defense Threat Reduction Agency (DTRA) Basic Research Program conducts revolutionary countering-weapons of mass destruction (CWMD) scientific research with broad applicability across multiple mission areas. The research sets conditions for disruptive gains in the effectiveness of technology-enabled concepts of operation not possible through evolutionary excursions from the current state of practice. Basic research builds up U.S. research personnel, and institutional scientific capability and capacity to counter near peer competitors below the threshold of armed conflict.			
FY 2024 Plans:			
- Maintain two University Research Alliances (URAs).			
- Provide four additional post-doctoral experts, two for each URA.			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>Materials Science in Extreme Environments (MSEE) URA:</p> <ul style="list-style-type: none"> - Develop and certify FY 2024-25 MSEE URA Biennial Program Plan and modify, adapt, and change 10 research thrust areas as required to meet new threats. - Extend existing foundational research in three primary research areas supporting DTRA's mission in preparation for possible transition including: enhanced computational modeling for agent defeat scenarios, and quantification of uncertainty in nuclear blast simulation modeling. <p>Interaction of Ionizing Radiation with Matter (IIRM) URA:</p> <ul style="list-style-type: none"> - Develop and certify FY 2024-25 IIRM URA Biennial Program Plan and modify, adapt, and change 12 research thrust areas as required to meet new threats. - Extend existing foundational research in three primary research areas supporting DTRA's mission in preparation for possible transition including: development and assessment of low-cost methods for assessing chip vulnerability, and implementation of AI-driven modeling techniques to develop novel semiconductor systems. <p>FY 2025 Plans:</p> <ul style="list-style-type: none"> - Maintain two University Research Alliances (URAs). <p>Materials Science in Extreme Environments (MSEE) URA:</p> <ul style="list-style-type: none"> - Complete or mature foundational research (progress is performer-specific) in the areas of enhanced computational modeling for agent defeat scenarios, and quantification of uncertainty in nuclear blast simulation modeling. - Finalize experimental scaling of ablation of targets using optical lasers and X-rays validated by experiments to measure and predict shock impact from nuclear blasts. Transition machine learning analysis in hyperspectral imaging, high speed spectroscopy, and in-situ visualization. <p>Interaction of Ionizing Radiation with Matter (IIRM) URA:</p> <ul style="list-style-type: none"> -Complete or mature foundational research (progress is performer-specific) including the development and assessment of low-cost methods for assessing chip vulnerability, and implementation of AI-driven modeling techniques to develop novel semiconductor systems. 			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>-Demonstrate enhanced energy resolution from scintillators through a computationally driven surface engineering of photonic crystal structures. Construct machine learning models that can rapidly identify synthesizable materials which are verifiable by theory, simulation, and experiments.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: The increase from FY 2024 to FY 2025 enables fundamental research in the manufacturing of new radiation-sensitive materials ultimately leading to lower cost radiation detection technologies in support of future warfighting.</p>			
Accomplishments/Planned Programs Subtotals	11.172	14.761	15.311

	FY 2023	FY 2024
<p>Congressional Add: Materials Science in Extreme Environments</p> <p>FY 2023 Accomplishments: Investment enabled the Materials Science in Extreme Environments (MSEE) program to more effectively support DoD's response to emerging threats by providing critical understanding, research transitions, and a highly skilled future workforce. Investments included:</p> <ul style="list-style-type: none"> - Modernization of aging facilities at four Lead Research Area Organization (LRAO) universities to ensure state of the art equipment and facilities are available to the URAs. - Further support of the collaborative workforce development program, Extreme Science Internships. - Support for early career investigators and collaborative opportunities across the URAs for students, postdocs, and principal investigators. 	5.000	-
Congressional Adds Subtotals	5.000	-

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

N/A

Remarks

D. Acquisition Strategy

Procurement methods include competitive selection awards through university partnerships, DTRA's Broad Agency Announcement, and collaborative funding through other organizations.