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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Office of the Secretary Of Defense **Date:** March 2024

Appropriation/Budget Activity 0400: Research, Development, Test & Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)	R-1 Program Element (Number/Name) PE 0603716D8Z I Strategic Environmental Research and Development Program (SERDP)
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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
Total Program Element	732.920	86.466	60.387	58.838	-	58.838	57.612	58.406	59.361	60.474	-	-
470: Strategic Environmental Research and Development Program (SERDP)	732.920	86.466	60.387	58.838	-	58.838	57.612	58.406	59.361	60.474	-	-

Note

New Start (Y/N): No

A. Mission Description and Budget Item Justification

The Strategic Environmental Research and Development Program (SERDP) mission is to improve DoD readiness and environmental performance by providing new scientific knowledge and developing cost-effective technologies. The SERDP does this by addressing high-priority DoD environmental technology requirements such as addressing polyfluoroalkyl substance (PFAS) contamination, developing fluorine-free fire suppression formulations, and improving corrosion resistance for weapons systems and platforms. Technologies developed by SERDP enhance military operations, improve military systems' effectiveness, enhance military training/readiness, sustain DoD's training and test ranges and installation infrastructure, and help ensure the safety and welfare of military personnel and their dependents. The keys to the growing list of SERDP technological successes are the ability to respond aggressively and proactively to priority defense environmental needs; the pursuit of world-class technical excellence; and an emphasis on continuous technology transfer.

B. Program Change Summary (\$ in Millions)

	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025 Base</u>	<u>FY 2025 OCO</u>	<u>FY 2025 Total</u>
Previous President's Budget	88.411	60.387	62.046	-	62.046
Current President's Budget	86.466	60.387	58.838	-	58.838
Total Adjustments	-1.945	0.000	-3.208	-	-3.208
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.945	-			
• Total Adjustment	-	-	-3.208	-	-3.208

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

Project: 470: Strategic Environmental Research and Development Program (SERDP)

Congressional Add: PFAS remediation and disposal technology and program increase

	FY 2023	FY 2024
	15.000	-

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

Congressional Add: *AFFF replacement, disposal, and cleanup technology*

Congressional Add Subtotals for Project: 470

Congressional Add Totals for all Projects

	FY 2023	FY 2024
	15.000	-
	30.000	-
	30.000	-

Change Summary Explanation

No change in FY 2025 from previous President's Budget.

FY 2025 increase from FY 2024 for PFAS alternatives, studies in fate and transport, and development of more effective clean up technologies. Increasing costs of at-sea operational Unexploded Ordnance (UXO) remediation testing and expansion of resource conservation efforts onto more bases.

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Appropriation/Budget Activity 0400 / 3					R-1 Program Element (Number/Name) PE 0603716D8Z / <i>Strategic Environmental Research and Development Program (SERDP)</i>					Project (Number/Name) 470 / <i>Strategic Environmental Research and Development Program (SERDP)</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	
470: <i>Strategic Environmental Research and Development Program (SERDP)</i>	732.920	86.466	60.387	58.838	-	58.838	57.612	58.406	59.361	60.474	-	-	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

The SERDP's mission is to improve DoD mission readiness and environmental performance by providing new scientific knowledge and developing cost-effective technologies. SERDP does this by addressing high-priority DoD environmental technology requirements such as addressing polyfluoroalkyl substance (PFAS) contamination, developing fluorine-free fire suppression formulations, and improving corrosion resistance for weapons systems and platforms. Technologies developed by SERDP enhance military operations, improve military systems' effectiveness, enhance military training/readiness, sustain DoD's training and test ranges and installation infrastructure, and help ensure the safety and welfare of military personnel and their dependents. The keys to growing list of SERDP technological successes are the ability to respond aggressively and proactively to priority defense environmental needs; the pursuit of world-class technical excellence; and an emphasis on continuous technology transfer.

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

	FY 2023	FY 2024	FY 2025
Title: Environmental Restoration (ER)	17.040	16.869	16.483
Description: Investments in Environmental Restoration reduce the DoD's environmental cleanup liability (currently greater than \$30 billion) by developing technologies for the cost-effective detection, characterization, containment, and remediation of contamination in soil, sediments, and water. These investments directly assist the DoD with compliance with the Resource Conservation & Recovery Act (RCRA), the National Environmental Policy Act (NEPA), and the Clean Water Act, among others.			
FY 2024 Plans: Development of PFAS destruction technologies, both thermal and non-thermal, will continue, with an increased emphasis on technologies for in situ destruction of per- and polyfluoroalkyl substances (PFAS) and aqueous film-forming foam (AFFF) residue that avoid the expense of pump-and-treat methods. Studies of the ecological impacts of PFAS mixtures initiated in FY 2022 will continue. New projects will be initiated to better understand the lifecycle and movement of PFAS in the subsurface, to improve our ability to measure PFAS in the environment, and to improve management of PFAS-impacted stormwater.			
FY 2025 Plans: New projects will be initiated to better understand transformation of PFAS found in soil and groundwater at AFFF-impacted sites and improve management of PFAS-impacted groundwater-to-surface water at DoD facilities, Development of PFAS destruction			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>technologies will continue that avoid the expense of pump-and-treat methods or off-site disposal. Studies will continue on the ecological impacts of PFAS mixtures and developing an understanding of transport potential of PFAS in concrete and asphalt.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2024 to FY 2025 increase (\$2.4 million) is the result of new studies required to understand fate and transport of PFAS in the ecosystem (groundwater, soil, surface water) for developing more effective and expansive clean-up technologies.</p>			
<p>Title: Munitions Response (MR)</p> <p>Description: Investments under Munitions Response involve development of detection, classification, and remediation technologies for unexploded ordnance (UXO) to address the significant DoD liability in the Military Munitions Response Program under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Investments are also made to improve active range clearance. Remediation techniques with explosive ordnance disposal (EOD) personnel outside the danger zone is a program goal and robotic methods are a key technology under consideration.</p> <p>FY 2024 Plans: Testing will continue for both acoustic and electromagnetic sensor systems for detecting UXOs in estuaries and wetlands developed over the past three years at standard test sites with high sensitivity and selectivity in discriminating UXO from inert debris.</p> <p>FY 2025 Plans: Methods to classify UXO using remote tools will be developed. Methods to remotely remediate UXO underwater using ship launched tools will be developed. Remediation techniques with explosive ordnance disposal (EOD) personnel outside the danger zone is a program goal and robotic methods are a key technology under consideration.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2024 to FY 2025 decrease (\$1.8 million) is the result of technologies maturing to demonstration and validation efforts under the Environmental Security Technology Certification Program.</p>	4.540	5.730	5.344
<p>Title: Resource Conservation and Resilience (RC)</p> <p>Description: Investments in Resource Conservation and Resilience focus on development of the science and technologies required to sustain training and testing ranges and meet compliance obligations according to the Sikes Act, Endangered Species Act, and NEPA. This includes management strategies and tools to enable installation staff to carry out their duties more effectively and development of data and models to enable base planners to increase resilience of their facilities in accordance with regulations, including the National Historic Protection Act, Archaeological Resources Protection Act, Native American Graves Protection and Repatriation Act, and Protection of Historic Properties 36 CFR Part 800.</p>	19.916	23.279	22.893

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p><i>FY 2024 Plans:</i> New projects will be initiated to develop models to aid installation planning staff to cope with the interaction of natural hazards, invasive species, and ecosystem transformations. Projects will continue to support the effects of multiple stressors on threatened and endangered species that impact DoD mission activities, and build upon the successful technology acceleration strategy of the SERDP National Innovation Landscape Network. Projects will also continue that develop models, tools, and data that evaluate the installation systems resilience to compounded threat and natural hazards, such as interactions of hurricanes and wildfire. Lastly, new projects will advance our understanding and modeling of wildland fire smoke emissions and develop tools for smoke management from prescribed fires.</p> <p><i>FY 2025 Plans:</i> New projects will be initiated to advance the understanding and methods of invasive species management and DoD-relevant threatened, endangered, and at-risk species responses to multiple stressors. Scenario modeling tools capable of integrating installations and ecosystem will be developed to assess threats associated with weather extremes and the impacts on installations. The National Innovation Landscape Network sites will be extended to Hawaii and Colorado.</p> <p><i>FY 2024 to FY 2025 Increase/Decrease Statement:</i> The FY 2024 to FY 2025 increase (\$0.7 million) will grow investment in projects that focus on key DoD geographies experiencing rapid change from invasive species, wildland fire threats, species declines, and models of community development encroachment. Areas with high concentrations of DoD installations such as Alaska, Southern California, Sonoran Desert, Pacific Islands, and the Southeast US possess unique challenges from compounded natural hazards on mission activities.</p>			
<p><i>Title:</i> Weapons Systems and Platforms (WP)</p> <p><i>Description:</i> Investments in Weapons Systems and Platforms are focused on development of technologies and materials that reduce the waste and emissions associated with the manufacturing, maintenance, and use of DoD weapons systems and platforms to reduce current and future environmental liabilities. These investments directly assist the DoD in compliance with the Clean Air Act, the Clean Water Act, the American Innovation and Manufacturing (AIM) Act, and NEPA.</p> <p><i>FY 2024 Plans:</i> Continue efforts on understanding the interactions of fuel molecules with a foam blanket at multi-scales using experiments and modeling with the goal of developing firefighting formulations with improved performance against gasoline fires and in the presence of saltwater and at extreme temperatures to further address the intent of Sec 323 of the 2020 NDAA. Initiate projects to develop PFAS-free textile coatings that are hydrophobic and have potential to be oleophobic. Begin quantifying PFAS emissions from PFAS-containing explosives and flares simulating open burning conditions. Begin developing methodologies to improve the selectivity and efficiency of synthetic organic chemistry processes for preparation and demilitarization of energetic</p>	14.970	14.509	14.118

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>molecules through use of field effects (e.g., electrochemical, biological catalytic). Identify promising processing methods and formulations for solid rocket propellants to eliminate isocyanate binders. Develop novel chromium-free treatments to reduce use of chromium and cadmium in corrosion mitigating coatings to address DFARS Case 2020-D031, through development of novel molybdenum-inhibitors and Schiff bases. Begin to develop processes for refractory alloy recycling for powder metallurgy and additive manufacturing applications to reduce cost, energy, and environmental impact.</p> <p>FY 2025 Plans: Use surfactant molecule and film dynamics and structure-based models to develop improved PFAS-free firefighting formulations with improved foam stability and improved firefighting performance in the presence of contaminants and at extreme operational temperatures to further address the intent of Sec 323 of the 2020 NDAA. Develop promising PFAS-free textile coatings that are omni-phobic (i.e., hydrophobic and oleophobic) and are durable. Initiate projects for alternatives to PFAS in energetics processing and in explosives and pyrotechnics operations, and quantify PFAS emissions from burning of fluoropolymer-bound energetics. Continue to develop field effects processing to more selectively and efficiently prepare and demilitarize energetic molecules, to meet proposed EPA requirements. Develop medium to large caliber rocket propellants that do not use isocyanate-based binders with similar specific impulse values relative to state-of-the-art aluminized-rocked propellants and develop robust non-isocyanate coatings with good adhesion and promising durability. Continue to develop corrosion-mitigating advanced military coating systems with reduced environmental impact (DFARS Case 2020-D031). Identify best processes for refractory alloy recycling for powder metallurgy and additive manufacturing applications to reduce cost, energy, and environmental impact. Develop novel refrigerants and refrigeration methods with low global warming potential and do not cause significant fire and toxicity risks to soldiers in crew compartments.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: The FY 2024 to FY 2025 increase is to expand development of PFAS alternatives in mission critical weapons systems and platforms usages such as explosive formulations.</p>			
Accomplishments/Planned Programs Subtotals	56.466	60.387	58.838

	FY 2023	FY 2024
Congressional Add: PFAS remediation and disposal technology and program increase	15.000	-
FY 2023 Accomplishments: The focus for the FY 2023 congressional add was on further developing both novel PFAS destruction technologies as well as improving existing PFAS destruction technologies, with particular attention on improving our understanding of the mechanisms of PFAS destruction as well as the ultimate		

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	FY 2023	FY 2024
disposition of PFAS after treatment. The funding enabled progress on dozens of new, innovative technologies for destruction of PFAS in waters and solids.		
Congressional Add: AFFF replacement, disposal, and cleanup technology	15.000	-
FY 2023 Accomplishments: Determined that hydrogen bonding to promote the stability of the surfactant layer at the interface between the fuel and foam, and foam and air is critical and thus molecular dynamics will be a key tool going forward to improve foam stability. Continued to develop siloxane surfactants and found that sulfobetaine siloxanes reduce extraction into gasoline and improve foam stability. Developed a number of potential surfactant, polymeric, and nano-particle additives that have improved foam stability and/or fire suppression capability in bench-level experiments. Developed models on water mist fire suppression systems for aircraft hangers that provides understand of their effectiveness and limitations.		
Congressional Adds Subtotals	30.000	-

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

N/A

Remarks

D. Acquisition Strategy

N/A