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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Office of the Secretary Of Defense **Date:** April 2022

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604016D8Z I <i>Department of Defense Corrosion Program</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	145.307	5.240	3.241	3.166	-	3.166	3.166	3.194	3.184	3.181	Continuing	Continuing
015: <i>Corrosion Protection Projects</i>	145.307	5.240	3.241	3.166	0.000	3.166	3.166	3.194	3.184	3.181	Continuing	Continuing

Note

New Start (Y/N): No

A. Mission Description and Budget Item Justification

This program supports the Department's initiative to Build Sustainable and Long-Term Advantage.

The Department of Defense (DoD) initiated the Corrosion Program in 2003 in response to 10 U.S.C. 2228, which requires the Secretary of Defense to accomplish a number of actions including the implementation of a corrosion prevention/mitigation strategic plan for the DoD equipment and infrastructure. The DoD Corrosion Prevention and Control Strategy was revised and signed in January 2021.

Corrosion remains a significant contributor to maintenance costs for the DoD equipment and facilities. The average annual cost of corrosion to the DoD Major Weapon Systems between 2004 and 2021 was greater than \$16 billion. Between 16% and 25% of total maintenance costs are attributable to corrosion, depending on the type of system. As a result, corrosion also directly contributes to weapon system downtime, reducing system availability.

The DoD Corrosion Program's strategic goal is to demonstrate targeted and effective material and nonmaterial solutions that reduce the corrosion impacts on availability and affordability of the DoD weapon systems and infrastructure. The goal can be achieved through the implementation of changes or solutions in one or more of the following focus areas: accountability; technology development and transition; policy; updated specifications and standards; and workforce development and outreach.

To implement the DoD Corrosion Strategy, the DoD Corrosion Program focuses on (a) Activities and (b) Technology Development and Implementation. Technology development and implementation includes demonstrating and validating mature technologies and advanced research on technologies aimed at reducing cost and increasing availability of the DoD weapon systems and facilities. Activities include research studies and technical support.

Demonstration/validation projects are specific corrosion prevention/mitigation efforts funded by the CPO in the Office of the Secretary of Defense (OSD) with the objective of developing, testing, qualifying, and implementing new technologies. A number of low-risk, high-payoff technologies promise to vastly improve the service life and significantly reduce the maintenance costs and improve the availability and safety of weapon systems and facilities essential to maintain support for the warfighter. A total of 85 projects have been completed including a follow-on assessment of their return-on-investment estimates. The overall return on investment as estimated by the Military Departments is 17:1

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Appropriation/Budget Activity	R-1 Program Element (Number/Name)
0400: <i>Research, Development, Test & Evaluation, Defense-Wide I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	PE 0604016D8Z / <i>Department of Defense Corrosion Program</i>

Advanced research includes Test and Evaluation projects, research studies, and research performed by academic institutions to include the Armed Forces' Academies. The primary objectives are: (1) generate products that contribute to the scientific understanding of material degradation and protection mechanisms, (2) explore the feasibility of technologies or processes for future demonstration/implementation projects, (3) generate knowledge products that contribute to ability to make data-driven decisions to prioritize corrosion prevention investments. Research areas include:

- Improved and validated data analytics and predictive modeling
- Accelerated corrosion test method development
- Improved surface treatments and coatings
- New materials and materials processing techniques

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	5.323	3.259	0.000	0.000	0.000
Current President's Budget	5.240	3.241	3.166	0.000	3.166
Total Adjustments	-0.083	-0.018	3.166	0.000	3.166
• Congressional General Reductions	-	-0.018			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.083	-			
• Adjustments to Budget Year	-	-	3.166	-	3.166

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

Project: 015: *Corrosion Protection Projects*

Congressional Add: *DoD Workforce Painter Training*

	FY 2021	FY 2022
	2.000	0.000
Congressional Add Subtotals for Project: 015	2.000	0.000
Congressional Add Totals for all Projects	2.000	0.000

Change Summary Explanation

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Office of the Secretary Of Defense										Date: April 2022		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0604016D8Z / Department of Defense Corrosion Program				Project (Number/Name) 015 / Corrosion Protection Projects			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
015: Corrosion Protection Projects	145.307	5.240	3.241	3.166	0.000	3.166	3.166	3.194	3.184	3.181	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) initiated the Corrosion Program in 2003 in response to 10 U.S.C. 2228, which requires the Secretary of Defense to accomplish a number of actions including the implementation of a corrosion prevention/mitigation strategic plan for the DoD equipment and infrastructure. The DoD Corrosion Prevention and Control Strategy was revised and signed in January 2021.

Corrosion remains a significant contributor to maintenance costs for the DoD equipment and facilities. The average annual cost of corrosion to the DoD Major Weapon Systems between 2004 and 2019 was greater than \$16 billion. Between 16% and 25% of total maintenance costs are attributable to corrosion, depending on the type of system. As a result, corrosion also directly contributes to weapon system downtime, reducing system availability.

The DoD Corrosion Program's strategic goal is to demonstrate targeted and effective material and nonmaterial solutions that reduce the corrosion impacts on availability and affordability of the DoD weapon systems and infrastructure. The goal can be achieved through the implementation of changes or solutions in one or more of the following focus areas: accountability; technology development and transition; policy; updated specifications and standards; and workforce development and outreach.

To implement the DoD Corrosion Strategy, the DoD Corrosion Program focuses on (a) Activities and (b) Technology Development and Implementation. Technology development and implementation includes demonstrating and validating mature technologies and advanced research on technologies aimed at reducing cost and increasing availability of the DoD weapon systems and facilities. Activities include research studies and technical support.

Demonstration/validation projects are specific corrosion prevention/mitigation efforts funded by the CPO in the Office of the Secretary of Defense (OSD) with the objective of developing, testing, qualifying, and implementing new technologies. A number of low-risk, high-payoff technologies promise to vastly improve the service life and significantly reduce the maintenance costs and improve the availability and safety of weapon systems and facilities essential to maintain support for the warfighter. A total of 85 projects have been completed including a follow-on assessment of their return-on-investment estimates. The overall return on investment as estimated by the Military Departments is 17:1.

Advanced research includes Test and Evaluation projects, research studies, and research performed by academic institutions to include the Armed Forces' Academies. The primary objectives are: (1) generate products that contribute to the scientific understanding of material degradation and protection mechanisms, (2) explore the feasibility of technologies or processes for future demonstration/implementation projects, (3) generate knowledge products that contribute to ability to make data-driven decisions to prioritize corrosion prevention investments. Research areas include:

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Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604016D8Z / <i>Department of Defense Corrosion Program</i>	Project (Number/Name) 015 / <i>Corrosion Protection Projects</i>		
<ul style="list-style-type: none"> • Accelerated corrosion test method development • Improved surface treatments and coatings • New materials and materials processing techniques 				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>Title: Corrosion Prevention and Control Projects and Activities</p> <p>Description: Corrosion prevention and control projects and activities are conducted in support of the support of the strategic plan to reduce the impact of corrosion on the cost and availability of DoD equipment and facilities. Projects initiated in FY 2020 include:</p> <ul style="list-style-type: none"> •Zinc-rich Aerosol Products for Touch-up Painting of Steel Substrates – Increased efficiency of maintenance processes •Improved Surface Preparation and Coatings for Corrosion Control of Aluminum Substrates – Extending intervals between coating applications •Pressure Sensitive Adhesive Appliques for Quick Field Repair of Topcoat Damage – Improved field-level maintenance •Weld-Through Coatings for Prevention of Crevice Corrosion in Skip-Welded Joints – Service life extension for ground vehicles •COVID-19 Disinfectant Material Corrosion Compatibility testing – Understanding potential maintenance impacts resulting from disinfectant application <p>Support for advanced research in the areas of improving the accuracy of the algorithm for extracting corrosion information from maintenance data, aircraft structural repair using additive manufacturing, optimizing aircraft washdown intervals, corrosion sensor development, analytical corrosion prediction methods, mitigation of biologically induced corrosion, and prediction of environmentally assisted cracking was continued.</p> <p>Projects initiated in FY 2021 include:</p> <ul style="list-style-type: none"> •Environmentally Friendly Coating Assessment for Non-Immersed Marine Environment for structures located in coastal environments. •Gentoo Coating Application to HH-60G Tail Landing Gear Yoke to reduce corrosion inspection requirements and improve the durability of the yoke between inspection cycles; improving HH-60 readiness. •Improved Landing Gear Durability for F/A-18E/F Super Hornet evaluating the application of multiple corrosion prevention technologies to improve the landing gear system to improve readiness and reduce cost. •Ship Class Topside Corrosion Control Configuration (CT3C) Implementation multiple corrosion prevention technologies to improve the improve ship operational sustainment and reduce cost •Property-driven determination of acceptable criteria in MIL-DTL-46027 (weldable aluminum armor) for enhanced sustainability and readiness to evaluate the corrosion susceptibility characteristics and impact due desensitization of aluminum alloys. Evaluating aerospace applications for Zn-Ni coatings as an alternative to Cd coatings to improve corrosion performance while reducing environmental and human safety impacts. 		3.240	3.241	3.166

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Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604016D8Z / <i>Department of Defense Corrosion Program</i>	Project (Number/Name) 015 / <i>Corrosion Protection Projects</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2021	FY 2022	FY 2023
<p>Activities executed included:</p> <ul style="list-style-type: none"> • Delivery of corrosion control and coatings training to field- and depot-level workforce • Development of computer-based corrosion prevention design, management, and sustainment training for the acquisition workforce and facilities engineers • Validation of Cost of Corrosion data for Navy Surface Ships • Technical revisions to three corrosion-related military specifications <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> • Year two increment funding for FY 2021 long term Corrosion Demonstration/Validation Projects • Continue support for advanced research projects <p>FY 2023 Plans:</p> <p>Fund year 3 of 3 for the following projects:</p> <ul style="list-style-type: none"> •Gentoo Coating Application to HH-60G Tail Landing Gear Yoke to reduce corrosion inspection requirements and improve the durability of the yoke between inspection cycles; improving HH-60 readiness. <p>Fund years 3 and 4 for the following projects:</p> <ul style="list-style-type: none"> •Improved Landing Gear Durability for F/A-18E/F Super Hornet evaluating the application of multiple corrosion prevention technologies to improve the landing gear system to improve readiness and reduce cost. •Ship Class Topside Corrosion Control Configuration (CT3C) Implementation multiple corrosion prevention technologies to improve the improve ship operational sustainment and reduce cost <p>Initiate FY 2024 Demonstration and Implementation Project process; Initiate a CPC Test and Evaluation project or studies.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: The FY 2022 Program Adjustment will result in a decrease in the investment in corrosion Demonstration/Validation Projects and Advanced Research projects.</p>			
Accomplishments/Planned Programs Subtotals	3.240	3.241	3.166

	FY 2021	FY 2022
Congressional Add: DoD Workforce Painter Training	2.000	0.000
FY 2021 Accomplishments: (1) Identified current best practices at various depots, (2) Identified parameters for various painter training methodologies utilized within DoD Depot environment(s),		

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Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604016D8Z / <i>Department of Defense Corrosion Program</i>	Project (Number/Name) 015 / <i>Corrosion Protection Projects</i>
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	FY 2021	FY 2022
(3) Identified painter training needs and gaps. Assessed multiple painter training methodologies and technologies, (4) Delivery of corrosion control and coatings training to field- and depot-level workforce		
FY 2022 Plans: • Deliver year 2 of 2 targeted corrosion control and coatings training to field- and depot-level workforce. • Conduct evaluation and qualitatively analyze impact training on various depot environments		
Congressional Adds Subtotals	2.000	0.000

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

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Office of the Secretary Of Defense **Date:** April 2022

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604016D8Z / Department of Defense Corrosion Program	Project (Number/Name) 015 / Corrosion Protection Projects
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Corrosion Policy and Oversight	MIPR	Various (Army, Navy, Air Force) : Various	117.342	2.677	Oct 2021	0.565	Oct 2022	1.350	Oct 2023	-		1.350	Continuing	Continuing	-
Subtotal			117.342	2.677		0.565		1.350		-		1.350	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Research Studies	C/FFP	Various : Various	2.402	-		1.142	Sep 2022	0.100	Sep 2023	-		0.100	Continuing	Continuing	-
Technical Support	MIPR	Various (Army, Navy, Air Force) : Various	-	0.325	Jun 2021	0.158	Jun 2022	0.158	Jun 2023	-		0.158	Continuing	Continuing	-
Technical Support	Option/FFP	Leidos, Inc. : Virginia	0.496	-		-		-		-		-	Continuing	Continuing	-
Technical Support	C/FFP	Excet Inc. : Maryland	-	0.210	Jun 2021	0.221	Jun 2022	0.210	Jun 2023	-		0.210	Continuing	Continuing	-
Research Studies	MIPR	Various (Army, Navy, Air Force) : Various	-	-		-		0.292	Mar 2023	-		0.292	Continuing	Continuing	-
Subtotal			2.898	0.535		1.521		0.760		-		0.760	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Critical Compatibility Testing - COVID19 (FY20 Congressional-Add)	MIPR	Various (Army, Navy, Air Force) : Various	0.850	1.841	Jun 2021	-		-		-		-	Continuing	Continuing	-
Subtotal			0.850	1.841		-		-		-		-	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Office of the Secretary Of Defense **Date:** April 2022

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604016D8Z / Department of Defense Corrosion Program	Project (Number/Name) 015 / Corrosion Protection Projects
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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Corrosion Policy and Oversight	C/FFP	Logistics Management Institute : McLean, VA	23.194	0.000		0.956	Feb 2022	0.854	Feb 2023	-		0.854	Continuing	Continuing	-
Corrosion Policy and Oversight	Option/FFP	LMI : McLean, VA	1.023	-		-		-		-		-	Continuing	Continuing	-
SBIR/STTR Funding	Allot	OSD : Virginia	-	0.123	Jun 2021	0.120	Jun 2022	0.123	Jun 2023	-		0.123	Continuing	Continuing	-
USD(A&S) Management Reserve	Allot	USD(A&S) : Virginia	-	0.064	Jun 2021	0.064	Jun 2022	0.064	Jun 2023	-		0.064	Continuing	Continuing	-
Corrosion Policy and Oversight Mgmt Services	Allot	Corrosion Policy and Oversight : Alexandria, VA	-	-		0.015	Oct 2022	0.015	Oct 2023	-		0.015	Continuing	Continuing	-
Subtotal			24.217	0.187		1.155		1.056		-		1.056	Continuing	Continuing	N/A
Project Cost Totals			145.307	5.240		3.241		3.166		-		3.166	Continuing	Continuing	N/A

Remarks
N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Office of the Secretary Of Defense **Date:** April 2022

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604016D8Z / Department of Defense Corrosion Program	Project (Number/Name) 015 / Corrosion Protection Projects
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Corrosion Protection Projects																												
Zinc-rich aerosol products for touch-up painting of steel substrates			█	█																								
Improved surface preparation and coatings for corrosion control of aluminum substrates			█	█																								
Pressure sensitive adhesive appliques for quick field repair of topcoat damage			█	█																								
Weld-through coatings for prevention of crevice corrosion in skip-welded joints			█	█																								
COVID-19 disinfectant material corrosion compatibility testing		█	█	█																								
Implementation of Zinc-Nickel (IZ-C17 +Zn-Ni) Electroplating as an Alternative to Cadmium	█	█	█	█																								
Gentoo™ Coating Application to HH-60G Tail Landing Gear Yoke								█	█	█	█																	
Improved Landing Gear Durability for F/A-18E/F Super Hornet								█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Ship Class Topside Corrosion Control Configuration (CT3C) Implementation								█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Environmentally Friendly Coating Assessment for Non-Immersed Marine Environment								█	█	█	█																	
Improving the accuracy of the algorithm for extracting corrosion information from maintenance data	█	█	█	█																								
Aircraft structural repair using additive manufacturing	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Optimizing aircraft washdown intervals	█	█	█	█																								
Corrosion sensor development	█	█	█	█																								
Analytical corrosion prediction methods	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Mitigation of biologically induced corrosion	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Prediction of environmentally assisted cracking	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
DoD Workforce Painter Training		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Office of the Secretary Of Defense **Date:** April 2022

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0604016D8Z / <i>Department of Defense Corrosion Program</i>	Project (Number/Name) 015 / <i>Corrosion Protection Projects</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Corrosion Policy and Oversight</i>				
Zinc-rich aerosol products for touch-up painting of steel substrates	3	2020	4	2021
Improved surface preparation and coatings for corrosion control of aluminum substrates	3	2020	4	2021
Pressure sensitive adhesive appliques for quick field repair of topcoat damage	3	2020	4	2021
Weld-through coatings for prevention of crevice corrosion in skip-welded joints	3	2020	4	2021
COVID-19 disinfectant material corrosion compatibility testing	2	2020	4	2021
Implementation of Zinc-Nickel (1Z-C17 +Zn-Ni) Electroplating as an Alternative to Cadmium	3	2016	4	2021
Gentoo™ Coating Application to HH-60G Tail Landing Gear Yoke	2	2021	1	2023
Improved Landing Gear Durability for F/A-18E/F Super Hornet	2	2021	4	2024
Ship Class Topside Corrosion Control Configuration (CT3C) Implemetation	2	2021	4	2024
Environmentally Friendly Coating Assessment for Non-Immersed Marine Environment	2	2021	4	2022
Improving the accuracy of the algorithm for extracting corrosion information from maintenance data	1	2020	4	2020
Aircraft structural repair using additive manufacturing	4	2018	1	2023
Optimizing aircraft washdown intervals	4	2018	1	2021
Corrosion sensor development	4	2018	4	2020
Analytical corrosion prediction methods	4	2018	1	2023
Mitigation of biologically induced corrosion	4	2018	1	2023
Prediction of environmentally assisted cracking	4	2018	1	2022
DoD Workforce Painter Training	2	2020	4	2021