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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 5: System Development &amp; Demonstration (SDD)</i>					<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</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>
Total Program Element	1,100.616	8.889	11.759	10.442	-	10.442	14.577	12.295	16.556	16.841	Continuing	Continuing
2232: <i>CV/CVN Launch and Recover</i>	1,100.616	8.889	11.759	10.442	-	10.442	14.577	12.295	16.556	16.841	Continuing	Continuing

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

CV Launch & Recover System - This Navy unique project addresses the System Development and Demonstration (SDD) of systems required to recover and launch Navy/Marine Corps Aircraft (Fixed/Rotary Wing and Vertical/Short Take Off and Landing) operating aboard aircraft carriers, amphibious assault ships, and air capable ships. This program element includes the following:

- (1) Aircraft Launch & Recovery Equipment Modernization
- (2) Aircraft Launch and Recovery Equipment Service Life Management program

This program is funded under SYSTEM DEVELOPMENT AND DEMONSTRATION because it includes those projects that have passed Milestone B approval and are conducting engineering and manufacturing development tasks aimed at meeting validated requirement prior to full-rate production decision.

<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	8.924	11.759	12.544	-	12.544
Current President's Budget	8.889	11.759	10.442	-	10.442
Total Adjustments	-0.035	0.000	-2.102	-	-2.102
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.035	0.000			
• Program Adjustments	0.000	0.000	-2.180	-	-2.180
• Rate/Misc Adjustments	0.000	0.000	0.078	-	0.078

**Change Summary Explanation**

Funding: The decrease in FY2022 is due to SBIR reduction.

FY 2023 was updated to reflect more accurate cost for ARC prototype and due to testing slipping in FY 2024.

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<b>Appropriation/Budget Activity</b> 1319: <i>Research, Development, Test &amp; Evaluation, Navy / BA 5: System Development &amp; Demonstration (SDD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	

Schedule: Updated schedule to include Milestones and Systems Engineering Technical Review (SETR) events for more clarity.

ARC Block Upgrade Development end moved from Q1 FY2023 to Q4 FY2026.

ARC Prototype Production start date moved from Q4 FY2022 to Q2 FY2023 and end date moved from Q4 FY2023 to Q2 FY2026.

ARC Block Upgrade Testing start date moved from Q1 FY2024 to Q3 FY2025 and end date moved from Q2 FY2026 to Q4 FY2028.

Technical: N/A

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

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</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
2232: <i>CV/CVN Launch and Recover</i>	1,100.616	8.889	11.759	10.442	-	10.442	14.577	12.295	16.556	16.841	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**Note**

AAG funding included under 0604512N in FY 2018 and prior. All AAG costs FY 2019 and later are captured under PE: 0604530N, PU: 2367. PY article includes Advanced Arresting Gear (AAG) Jet Car Track Site and two Improved Manually Operated Visual Landing Aid System (IMOVLAS) production representative models. Service Life Management Program (SLMP) test articles refer to actual units (two units per ship set).

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

This Navy unique project addresses the System Development and Demonstration (SDD) of systems required to recover and launch Navy/Marine Corps Aircraft (Fixed/Rotary Wing and Vertical/Short Take-Off and Landing) operating aboard aircraft carriers (CVN), amphibious assault ships and air capable ships. This program includes the following systems under Project 2232, including the funding of production representative models for:

(1) Aircraft Launch & Recovery Equipment (ALRE) Modernization: ALRE Modernization encompasses efforts required to ensure continued functional performance, operational relevance, and cybersecurity accreditation for all product lines across the ALRE program. This includes efforts required to resolve emerging obsolescence issues (both hardware and software), implement fleet driven operational capability upgrades, and comply with cybersecurity requirements and computer task order requirements for security threat mitigation. Major categories include Visual Landing Aids (VLA), Information Systems, Launcher, Recovery and Aviation Data Management and Control System (ADMACS). There are 48 fielded subsystems that are included in the major categories. The ALRE Gold Disk program provides diagnostic test routines for fleet technician troubleshooting capability on faulty circuit cards to identify the problem and perform the repair.

(2) Aircraft Launch & Recovery Equipment (ALRE) Service Life Management Program (SLMP): The ALRE SLMP for Launcher and Recovery is required to sustain carrier aviation operations of higher energy aircraft launch and recoveries that are increasing loads on the ALRE systems, and that are affecting availability, maintainability and cost. This program will consist of service life assessment and extension initiatives and will establish the design foundation (structural, reliability, and maintainability analyses), permit appropriate assessment, track and focus design changes where most needed. Two SLMP prototypes were procured in FY 2018. The Nimitz class aircraft carriers operate Mark 7 arresting gear systems to capture and arrest Navy aircraft. The Mark 7 systems use a classic linear-piston cylinder setup to convert the kinetic energy of the aircraft into storage energy. Specifically a control system is used to apply correct logic to piston-cylinder closing parameters depending upon the aircraft type that is being arrested. This is called Advanced Recovery Control (ARC). The current ARC system was designed with early 2000's technology and components that have reached their end-of-life and are not compliant with current cybersecurity protocols. To support continued operations through 2060, a series of developmental engineering changes are required for modernized control components, technology and cybersecurity. This is the ARC Block Upgrade.

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

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
<b>Title:</b> Aircraft Launch & Recovery Equipment Modernization	0.000	0.099	0.350	0.000	0.350

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2024 Navy	<b>Date:</b> March 2023
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<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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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
<b>Articles:</b>	-	-	-	-	-
<p><b>Description:</b> ALRE Modernization encompasses efforts required to ensure continued functional performance, operational relevance, and cybersecurity accreditation for all product lines across the ALRE program. This includes efforts required to resolve emerging obsolescence issues (both hardware and software), implement fleet driven operational capability upgrades, and comply with cybersecurity requirements and computer task order requirements for security threat mitigation. Major categories include Visual Landing Aids (VLA), Information Systems, Launcher, Recovery and Aviation Data Management and Control System (ADMACS). There are 48 fielded subsystems that are included in the major categories.</p> <p><b>FY 2023 Plans:</b> Continues the developmental enhancements to resolve known and emerging capability shortfalls within the major categories of ALRE to include: VLA, Information Systems, Launcher, Recovery and ADMACS. These major subsystems include 48 fielded Aircraft Launch and Recovery Systems. These efforts support various Air Capable Ships, Amphibious Assault Ships, and Aircraft Carrier Fleet.</p> <p><b>FY 2024 Base Plans:</b> Continues the developmental enhancements to resolve known and emerging capability shortfalls within the major categories of ALRE to include: VLA, Information Systems, Launcher, Recovery and ADMACS. These major subsystems include 48 fielded Aircraft Launch and Recovery Systems. These efforts support various Air Capable Ships, Amphibious Assault Ships, and Aircraft Carrier Fleet. Begin development of Gold Disk circuit card test routine software.</p> <p><b>FY 2024 OCO Plans:</b> N/A</p> <p><b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> The increase from FY 2023 to FY 2024 is due to the Program Increase to support the ALRE Gold Disk effort.</p>					
<p><b>Title:</b> Aircraft Launch &amp; Recovery Equipment (ALRE) Service Life Management Program (SLMP)</p> <p style="text-align: right;"><b>Articles:</b></p>	8.889 1	11.660 1	10.092 2	0.000 -	10.092 2
<p><b>FY 2023 Plans:</b> Continue ARC Block Upgrade prototype manufacturing. Continue analyses and service life assessments on various ALRE systems.</p> <p><b>FY 2024 Base Plans:</b></p>					

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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 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024 Base</b>	<b>FY 2024 OCO</b>	<b>FY 2024 Total</b>
Complete ARC Block Upgrade prototypes for regression and environmental qualification efforts. Conduct the following environmental qualification efforts on the ARC Block Upgrade prototypes: Cyber security, Regression, humidity, shock, temperature, vibration and electromagnetic interference EMI testing.  <b>FY 2024 OCO Plans:</b> N/A  <b>FY 2023 to FY 2024 Increase/Decrease Statement:</b> The decrease from FY 2023 to FY 2024 is due to the ramp down of ARC Block Upgrade Development Non Recurring Engineering (NRE) efforts and an overall unit cost decrease for ordering multiple quantities for ARC prototypes.					
<b>Accomplishments/Planned Programs Subtotals</b>	8.889	11.759	10.442	0.000	10.442

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024 Base</u>	<u>FY 2024 OCO</u>	<u>FY 2024 Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPN/4213: <i>Aircraft Launch &amp; Recovery Equipment-Aircraft Launch &amp; Recovery Equipment</i>	176.387	272.044	162.273	-	162.273	117.925	97.652	97.973	98.420	Continuing	Continuing

**Remarks**  
OPN 4213 includes a portion of line item funding for ALRE.

**D. Acquisition Strategy**  
Aircraft Launch & Recovery Equipment Modernization: This program ensure continued functional performance, operational relevance, and cybersecurity accreditation for all product lines across the ALRE program. Programs include Visual Landing Aids (VLA), Information Systems, Launcher, Recovery and Aviation Data Management and Control System (ADMACS). There are 48 fielded subsystems that are included in the major categories.  
  
Aircraft Launch & Recovery Equipment Service Life Management Program (SLMP): This program will consist of Service Life Assessment and Extension initiatives and will establish the design foundation (structural, reliability and maintainability analyses), permit appropriate assessment, track and focus design changes where most needed.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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<b>Product Development (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Primary SW Dev - ALRE Mod	WR	NAWCAD : Lakehurst, NJ	0.000	0.000		0.099	Nov 2022	0.350	Nov 2023	-		0.350	Continuing	Continuing	Continuing
Primary HW Dev-SLMP	C/CPFF	NGC : Sykesville, MD	0.000	8.792	Jan 2022	8.263	Feb 2023	5.258	Nov 2023	-		5.258	3.490	25.803	-
Prior Year Cost No Longer Funded in FYDP	Various	Various : Various	929.811	0.000		0.000		0.000		-		0.000	0.000	929.811	-
<b>Subtotal</b>			929.811	8.792		8.362		5.608		-		5.608	Continuing	Continuing	N/A

**Remarks**  
 Primary HW Dev-SLMP: Includes ARC Block Upgrade Development NRE and hardware procurement for ARC prototypes. FY 2022 was updated to reflect actual execution in support of ARC Block Upgrade Development and hardware procurement for ARC prototypes. FY 2023 was updated to reflect more accurate cost for ARC prototype. The decrease from FY 2023 to FY 2024 is due to the ramp down of NRE efforts and an overall unit cost decrease for ordering multiple quantities. FY 2023 award date was updated.

<b>Support (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Government Engineering Support	WR	NAWCAD : Lakehurst, NJ	0.000	0.097	Nov 2021	0.099	Nov 2022	0.133	Nov 2023	-		0.133	Continuing	Continuing	Continuing
Prior Year Cost No Longer Funded in FYDP	Various	Various : Various	54.675	0.000		0.000		0.000		-		0.000	0.000	54.675	-
<b>Subtotal</b>			54.675	0.097		0.099		0.133		-		0.133	Continuing	Continuing	N/A

<b>Test and Evaluation (\$ 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>			
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Prior Year Operational Test & Evaluation Not Funded FYDP (PYOT&E)	WR	NAWCAD : Lakehurst, NJ	23.901	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Prior Year Developmental Test & Evaluation Not Funded FYDP (PYDT&E)	Various	Various : Various	88.996	0.000		0.000		0.000		-		0.000	0.000	88.996	-

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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<b>Test and Evaluation (\$ 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>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Developmental Test & Evaluation (DT&E)	C/CPFF	NGC : Sykesville, MD	0.000	0.000		3.298	Feb 2023	4.701	Nov 2023	-		4.701	3.005	11.004	-
<b>Subtotal</b>			112.897	0.000		3.298		4.701		-		4.701	Continuing	Continuing	N/A

**Remarks**  
FY 2023 was updated to reflect the Non Recurring Engineering Testing at NGC to support the ARC Block Upgrade and update the award date.

<b>Management Services (\$ 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>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Prior Year Cost No Longer Funded in FYDP	Various	Various : Various	3.233	0.000		0.000		0.000		-		0.000	0.000	3.233	-
<b>Subtotal</b>			3.233	0.000		0.000		0.000		-		0.000	0.000	3.233	N/A

<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>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>	
<b>Project Cost Totals</b>	1,100.616	8.889	11.759	10.442	-	10.442	Continuing	Continuing	N/A

**Remarks**

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**Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy** **Date:** March 2023

<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>
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	2022				2023				2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
ALRE Modernization	Obsolescence, Redesign Development and Testing																											
ALRE Service Life Management Program (SLMP)	Hardware/Software Development																											
	System Development																											
	Test/Evaluation																											
AAP Milestones	◆ Milestone B Decision Review Milestone C Decision Review ◆																											
System Engineer Technical Review (SETR)	◆ CDR TRR ◆ PRR ◆																											
Development	ARC Development																											
Prototype	◆ Prototype Contract Award Prototype Production																											
Logistics	Logistics Products																											
Testing	DVT/Environmental Testing JCTS Testing RALS Testing																											
Production	Production Contract Award ◆ Production																											
Install																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2024 Navy</b>		<b>Date:</b> March 2023
<b>Appropriation/Budget Activity</b> 1319 / 5	<b>R-1 Program Element (Number/Name)</b> PE 0604512N / <i>Shipboard Aviation Systems</i>	<b>Project (Number/Name)</b> 2232 / <i>CV/CVN Launch and Recover</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>ALRE MODERNIZATION</b>				
Obsolescence, Redesign Development and Testing	1	2022	4	2028
<b>ALRE SERVICE LIFE MANAGEMENT PROGRAM (SLMP)</b>				
SLMP Systems Development: HW/SW Development	1	2022	4	2028
SLMP Systems Development: System Development	1	2022	4	2028
SLMP Systems Development: Test & Evaluation	1	2022	4	2028
ARC Systems Development: ARC CDR	3	2023	3	2023
ARC Systems Development: ARC TRR	3	2026	3	2026
ARC Systems Development: ARC PRR	4	2026	4	2026
ARC Systems Development: ARC Milestone B Decision Review	2	2023	2	2023
ARC Systems Development: ARC Milestone C Decision Review	4	2026	4	2026
ARC Systems Development: ARC Block Upgrade Development	1	2022	4	2026
ARC Block Upgrade Prototype: Prototype Contract Award	2	2023	2	2023
ARC Block Upgrade Prototype: Prototype Production	2	2023	2	2026
ARC Test & Evaluation: Technical Evaluation: ARC Block Upgrade Testing	3	2025	4	2028