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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy **Date:** March 2019

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					R-1 Program Element (Number/Name) PE 0604126N I (U) <i>Littoral Airborne MCM</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	0.000	11.314	14.625	17.248	-	17.248	18.901	18.639	17.761	18.116	Continuing	Continuing
2131: <i>Assault Breaching System</i>	0.000	11.314	14.625	17.248	-	17.248	18.901	18.639	17.761	18.116	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program provides a combination of U.S. Navy systems to counter the threat to amphibious forces from obstacles and anti-landing/sea mines in the Beach Zone and Surf Zone (0-10 ft water). The Assault Breaching Systems (ABS) consist of a system of systems approach that includes the following programs: Joint Direct Attack Munition (JDAM) Assault Breaching System (JABS); Coastal Battlefield Reconnaissance and Analysis (COBRA); Precision Navigation and Marking System (PNMS); Command, Control, Computers, Communications, and Intelligence (C4I). The Assault Breaching Systems enable the Navy-Marine Corps team to conduct Joint Forcible Entry Operations (JFEO), Ship-To-Objective Maneuver (STOM), and other combat operations to project power ashore.

JABS is a currently fielded system that neutralizes surface mines and obstacles in the Beach Zone and Surf Zone. The ABS Tactical Decision Aid optimizes the Desired Points of Impact (DPI) for JDAM munitions to effectively neutralize mines and obstacles while minimizing the required number of munitions and friendly aircraft sorties. Continued testing is required to optimize the ABS Tactical Decision Aid database for the most common enemy mines and obstacles.

COBRA conducts Intelligence Surveillance Reconnaissance and Targeting (ISR/T). This system which consists of two Airborne Payloads and one Post Mission Analysis station, provides Airborne Mine Countermeasures (AMCM) capability. Block I is a multispectral sensor capable of daytime detection of surface-laid minefields and obstacles in the Beach Zone and adds on-board near real-time processing. Block II capability adds a 3D Light Detection and Ranging (LIDAR) sensor that enables nighttime detection of mines and obstacles in the Beach Zone and the Surf Zone (0-10 ft of water). Block II also adds on-board real-time processing of multispectral imagery data. COBRA consists of a modular payload architecture that can be integrated onto the MQ-8B Fire Scout or USN manned helicopters like the MH-60. COBRA will serve in the "detect" mission module for the Surf Zone and Beach Zone in the Littoral Combat Ship (LCS) Mine Countermeasures (MCM) mission package.

PNMS provides navigational upgrades for the Landing Craft, Air Cushion (LCAC); Landing Craft, Utility (LCU); and Amphibious Assault Vehicle (AAV). A system of virtual lane marking improves the navigation ability of these three assault craft which enables them to navigate safely through the neutralized assault lanes provided by JABS. OPN funds the CRAFTALTS to upgrade the navigation systems. LCU Navigation Upgrade: Modernized the navigation system to enable safe transit through the breach lane. LCAC Autopilot Upgrade: An integrated improvement to the LCAC Service Life Extension Program (SLEP) navigation system for craft control that allows precise navigation and hovering within the breach lane. These software upgrades and backfits occur during scheduled LCAC SLEPs. AAV Navigation Upgrade : Modernize the navigation system to enable precise transit through the breach lane.

C4I system will tie all of the above systems together under an integrated ABS architecture that is compatible with the existing Mine Warfare architecture.

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Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy I BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 Program Element (Number/Name) PE 0604126N I (U)Littoral Airborne MCM			
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	17.622	20.348	-	20.348
Current President's Budget	11.314	14.625	17.248	-	17.248
Total Adjustments	11.314	-2.997	-3.100	-	-3.100
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.997			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.309	0.000			
• Program Adjustments	0.000	0.000	-3.100	-	-3.100
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Congressional Add Adjustments	11.623	-	-	-	-
Change Summary Explanation					
Program Changes:					
The FY 2020 funding request was reduced by \$3.100 million to account for the availability of prior year execution balances.					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0604126N / (U)Littoral Airborne MCM				Project (Number/Name) 2131 / Assault Breaching System			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
2131: Assault Breaching System	0.000	11.314	14.625	17.248	-	17.248	18.901	18.639	17.761	18.116	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development:	7.359	9.668	10.463	0.000	10.463
Articles:	-	-	-	-	-

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Appropriation/Budget Activity 1319 / 4		R-1 Program Element (Number/Name) PE 0604126N / (U)Littoral Airborne MCM		Project (Number/Name) 2131 / Assault Breaching System		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: COBRA - Continue design and development of COBRA hardware and continue integration test planning of additional surf zone capabilities. JABS - Continued design engineering of weapon effectiveness for beach and surf zones.						
FY 2020 Base Plans: COBRA - Continue design and development of COBRA hardware and integration test planning of additional surf zone capabilities. Conduct Block II Milestone B in 3Q FY20. JABS - Continue design and engineering of weapon effectiveness for beach and surf zones						
FY 2020 OCO Plans: N/A						
FY 2019 to FY 2020 Increase/Decrease Statement: FY2020 funding increase supports technical efforts necessary to achieve additional surf zone capabilities.						
Title: Technical Support:		0.942	1.447	1.307	0.000	1.307
Articles:		-	-	-	-	-
FY 2019 Plans: COBRA - Continue to provide management and shipping, contract and test/studies, C4I Data Fusion. Provide technical /acquisition support and documentation.						
FY 2020 Base Plans: COBRA - Continue to provide management and shipping, contract and test/studies, C4I Data Fusion. Provide technical /acquisition support and documentation (ILS, training, data, drawings).						
FY 2020 OCO Plans: N/A						
FY 2019 to FY 2020 Increase/Decrease Statement: No significant change.						
Title: Test and Evaluation:		2.209	2.382	4.336	0.000	4.336
Articles:		-	-	-	-	-
FY 2019 Plans: COBRA - Continue advance surf zone component/capability design and test.						

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
JABS - Surf Zone (SZ) and Beach Zone (BZ) characterization testing. FY 2020 Base Plans: COBRA - Continue advance surf zone component/capability design and test. Conduct Block I - 3A and 4 Flight Testing. JABS - Surf Zone (SZ) and Beach Zone (BZ) characterization testing. FY 2020 OCO Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: FY2020 funding increase supports technical efforts necessary to meet Block I requirements and JABS characterization testing.						
Title: Management: <div>Articles:</div> FY 2019 Plans: COBRA - Continue contract and financial management support. JABS - Continue to manage Mine magazine inventory management and shipping, contract management and tests/studies, C4I/Data fusion. FY 2020 Base Plans: COBRA - Continue contract and financial management support. JABS - Continue to manage Mine magazine inventory management and shipping, contract management and tests/studies, C4I/Data fusion. FY 2020 OCO Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: No significant change.		0.804 -	1.128 -	1.142 -	0.000 -	1.142 -
Accomplishments/Planned Programs Subtotals		11.314	14.625	17.248	0.000	17.248

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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604126N / (U)Littoral Airborne MCM	Project (Number/Name) 2131 / Assault Breaching System
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPN/2624: SHALLOW WATER Mine CM SHIP	8.796	8.616	8.730	-	8.730	5.595	5.703	5.811	5.927	0.000	106.526

Remarks

D. Acquisition Strategy

Countermine/Counter Obstacle (CM/CO) JDAM Assault Breaching System (JABS) and ABS Tactical Decision Aid testing is ongoing.
 Intelligence/Surveillance/Reconnaissance/Targeting (ISR/T) - COBRA Block I achieved MS C in 3rd QTR FY 2009.
 Precision Navigation & Marking System (PNMS) - The navigation upgrades for the Landing Craft, Air Cushion (LCAC) and Landing Craft, Utility (LCU) are complete.
 AAV enhancements will be achieved through an ECP (PMA AAV (Marine Corps)) in 1st QTR FY 2019.

E. Performance Metrics

Successful COBRA integration, flight tests: Operational Assessment (OA) and Development Testing (DT) into the MQ-8B Fire Scout. COBRA achieved IOC in FY 2017.
 The above systems continue to meet or exceed their Key Performance Parameters.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
Appropriation/Budget Activity 1319 / 4						R-1 Program Element (Number/Name) PE 0604126N / (U)Littoral Airborne MCM				Project (Number/Name) 2131 / Assault Breaching System					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Primary Hardware Dev, COBRA	C/CPAF	Arete : Tucson, AZ	0.000	5.038	Nov 2017	6.813	Jan 2019	8.438	Dec 2019	-		8.438	Continuing	Continuing	Continuing
Systems Engineering, COBRA	WR	NSWC, PC : PANAMA CITY, FL	0.000	0.781	Oct 2017	1.090	Nov 2018	1.688	Nov 2019	-		1.688	Continuing	Continuing	Continuing
JABS	WR	NSWC PC : NSWC IH	0.000	0.799	Oct 2017	0.927	Jan 2019	0.000	Nov 2019	-		0.000	Continuing	Continuing	Continuing
Training Dev, COBRA	WR	NSWC, PC : PANAMA CITY, FL	0.000	0.559	Oct 2017	0.659	Jan 2019	0.000	Dec 2019	-		0.000	Continuing	Continuing	Continuing
ABS IPT/Test Assets/Proj Eng	WR	NSWC, PC : PANAMA CITY, FL	0.000	0.182	Oct 2017	0.179	Dec 2018	0.337	Dec 2019	-		0.337	Continuing	Continuing	Continuing
Subtotal			0.000	7.359		9.668		10.463		-		10.463	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Development Support Equipment	WR	NSWC, PC : PANAMA CITY, FL	0.000	0.613	Nov 2017	0.942	Dec 2018	0.908	Dec 2019	-		0.908	Continuing	Continuing	Continuing
Integrated Logistics Support	WR	NSWC PC : PANAMA CITY, FL	0.000	0.072	Nov 2017	0.111	Nov 2018	0.060	Nov 2019	-		0.060	Continuing	Continuing	Continuing
Configuration Management	WR	NSWC, PC : PANAMA CITY, FL	0.000	0.072	Nov 2017	0.111	Nov 2018	0.061	Nov 2019	-		0.061	Continuing	Continuing	Continuing
Studies & Analysis	WR	NSWC IH : INDIAN HEAD, MD	0.000	0.185	Oct 2017	0.283	Dec 2018	0.278	Nov 2019	-		0.278	Continuing	Continuing	Continuing
Subtotal			0.000	0.942		1.447		1.307		-		1.307	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Development Test & Evaluation	WR	NSWC, IH : INDIAN HEAD, MD	0.000	1.126	Oct 2017	1.229	Nov 2018	3.201	Nov 2019	-		3.201	Continuing	Continuing	Continuing

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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Operational Test & Evaluation	WR	NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY	0.000	0.361	Nov 2017	0.405	Dec 2018	1.135	Nov 2019	-		1.135	Continuing	Continuing	Continuing
Development Test	WR	NSWC PC : Panama City, FL	0.000	0.722	Nov 2017	0.748	Nov 2018	0.000	Nov 2019	-		0.000	Continuing	Continuing	Continuing
Subtotal			0.000	2.209		2.382		4.336		-		4.336	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Contractor Engineering Support	C/CPFF	BAH, Northrop Grumman : DC, FL	0.000	0.090	Dec 2017	0.131	Dec 2018	0.140	Dec 2019	-		0.140	Continuing	Continuing	Continuing
Government Engineering Support	WR	NSWC, IH : INDIAN HEAD, MD	0.000	0.359	Nov 2017	0.501	Nov 2018	0.505	Nov 2019	-		0.505	Continuing	Continuing	Continuing
Program Management Support	WR	NSWC/ IH, PC : INDIAN HEAD, PANAMA CITY	0.000	0.318	Nov 2017	0.438	Oct 2018	0.440	Oct 2019	-		0.440	Continuing	Continuing	Continuing
Travel	WR	NAVSEA : WNY, DC	0.000	0.037	Oct 2017	0.058	Dec 2018	0.057	Dec 2019	-		0.057	Continuing	Continuing	Continuing
Subtotal			0.000	0.804		1.128		1.142		-		1.142	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	11.314		14.625		17.248		-		17.248	Continuing	Continuing	N/A
Remarks															

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PE 0604126N: (U)Littoral Airborne MCM
Navy

R-1 Line #80

Project (Number/Name)	Start Date	End Date	Duration (Days)	Start Time	End Time	Duration (Hours)	Start Date	End Date	Duration (Days)	Start Time	End Time	Duration (Hours)
1	2023-01-01	2023-01-05	5	08:00	18:00	10	2023-01-01	2023-01-05	5	08:00	18:00	10
2	2023-01-06	2023-01-10	5	08:00	18:00	10	2023-01-06	2023-01-10	5	08:00	18:00	10
3	2023-01-11	2023-01-15	5	08:00	18:00	10	2023-01-11	2023-01-15	5	08:00	18:00	10
4	2023-01-16	2023-01-20	5	08:00	18:00	10	2023-01-16	2023-01-20	5	08:00	18:00	10
5	2023-01-21	2023-01-25	5	08:00	18:00	10	2023-01-21	2023-01-25	5	08:00	18:00	10
6	2023-01-26	2023-01-30	5	08:00	18:00	10	2023-01-26	2023-01-30	5	08:00	18:00	10
7	2023-01-31	2023-02-04	5	08:00	18:00	10	2023-01-31	2023-02-04	5	08:00	18:00	10
8	2023-02-05	2023-02-09	5	08:00	18:00	10	2023-02-05	2023-02-09	5	08:00	18:00	10
9	2023-02-10	2023-02-14	5	08:00	18:00	10	2023-02-10	2023-02-14	5	08:00	18:00	10
10	2023-02-15	2023-02-19	5	08:00	18:00	10	2023-02-15	2023-02-19	5	08:00	18:00	10
11	2023-02-20	2023-02-24	5	08:00	18:00	10	2023-02-20	2023-02-24	5	08:00	18:00	10
12	2023-02-25	2023-02-29	5	08:00	18:00	10	2023-02-25	2023-02-29	5	08:00	18:00	10
13	2023-03-01	2023-03-05	5	08:00	18:00	10	2023-03-01	2023-03-05	5	08:00	18:00	10
14	2023-03-06	2023-03-10	5	08:00	18:00	10	2023-03-06	2023-03-10	5	08:00	18:00	10
15	2023-03-11	2023-03-15	5	08:00	18:00	10	2023-03-11	2023-03-15	5	08:00	18:00	10
16	2023-03-16	2023-03-20	5	08:00	18:00	10	2023-03-16	2023-03-20	5	08:00	18:00	10
17	2023-03-21	2023-03-25	5	08:00	18:00	10	2023-03-21	2023-03-25	5	08:00	18:00	10
18	2023-03-26	2023-03-30	5	08:00	18:00	10	2023-03-26	2023-03-30	5	08:00	18:00	10
19	2023-03-31	2023-04-04	5	08:00	18:00	10	2023-03-31	2023-04-04	5	08:00	18:00	10
20	2023-04-05	2023-04-09	5	08:00	18:00	10	2023-04-05	2023-04-09	5	08:00	18:00	10
21	2023-04-10	2023-04-14	5	08:00	18:00	10	2023-04-10	2023-04-14	5	08:00	18:00	10
22	2023-04-15	2023-04-19	5	08:00	18:00	10	2023-04-15	2023-04-19	5	08:00	18:00	10
23	2023-04-20	2023-04-24	5	08:00	18:00	10	2023-04-20	2023-04-24	5	08:00	18:00	10
24	2023-04-25	2023-04-29	5	08:00	18:00	10	2023-04-25	2023-04-29	5	08:00	18:00	10
25	2023-04-30	2023-05-04	5	08:00	18:00	10	2023-04-30	2023-05-04	5	08:00	18:00	10
26	2023-05-05	2023-05-09	5	08:00	18:00	10	2023-05-05	2023-05-09	5	08:00	18:00	10</

PE 0604126N I (U)Littoral Airborne MCM

2131 / Assault Breaching System

COBRA	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024										
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q							
	Realigned from PE 0603502N ▲																																		
Acquisition Milestones								Block I RFT ▲	Block I MSD ▲		Block II MSB ▲					Block II PDR ▲		Block II CDR ▲									Block II MS C ▲								
System Development				Block I -3A Surf Zone Algorithm Design and Implementation																															
				Block I -4 Daytime Surf Zone HW Development																															
													Block II E&MD																						
																											Block II LRIP								
																										Block II / MQ 8C Integration									
Test & Evaluation	Block I IOT&E								Block I -3A and -4 Flight Test																Block II CT		Block II DT								
																											Block II OA								
Deliveries	Block I LRIP																																		
				Block I Production & Sustainment																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604126N / (U)Littoral Airborne MCM	Project (Number/Name) 2131 / Assault Breaching System	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
COBRA				
Realigned from PE 0603502N	1	2018	1	2018
Acquisition Milestones: Block I Ready for Training	4	2019	4	2019
Acquisition Milestones: Block I Milestone Decision	1	2020	1	2020
Acquisition Milestones: Block II Milestone B	3	2020	3	2020
Acquisition Milestones: Block II Preliminary Design Review	4	2021	4	2021
Acquisition Milestones: Block II Critical Design Review	2	2022	2	2022
Acquisition Milestones: Block II Milestone C	2	2024	2	2024
System Development: Block I Algorithm Design & Implementation	4	2018	3	2021
System Development: Block I Hardware Development	4	2018	2	2022
System Development: Block II Engineering & Manufacturing Development	1	2021	2	2024
System Development: Block II Low Rate Production	2	2024	3	2024
System Development: Block II / MQ 8C Integration	1	2023	4	2024
Test & Evaluation: Block I IOT&E	1	2018	3	2018
Test & Evaluation: Block I -3A and -4 Flight Test	1	2020	4	2020
Test & Evaluation: Block II Contractor Testing	1	2023	1	2024
Test & Evaluation: Block II Development Test	2	2024	4	2024
Test & Evaluation: Block II Operational Assessment	2	2024	2	2024
Deliveries: Block I Low Rate Production	1	2018	1	2019
Deliveries: Block I Production and Sustainment	4	2018	4	2024