Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy											Date: February 2018	
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 0604127N *I Surface Mine Countermeasures*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	0.000	0.000	0.000	18.154	-	18.154	20.635	17.560	14.260	14.530	Continuing	Continuing
0530: *Mine Hunt Systems*	0.000	0.000	0.000	7.579	-	7.579	8.861	7.234	4.447	4.548	Continuing	Continuing
1233: *Surface MCM Mid-life Upgrade*	0.000	0.000	0.000	0.000	-	0.000	1.011	1.031	1.054	1.075	Continuing	Continuing
1235: *Mine Warfare Planning and Analysis*	0.000	0.000	0.000	10.575	-	10.575	10.763	9.295	8.759	8.907	Continuing	Continuing

Note

FY 2018 and prior funding in Program Element (PE) 0603502N. Projects realigned from PE 0603502N starting in FY 2019.

The FY 2019 funding request was reduced by $1.192 million to account for the availability of prior year execution balances.

A. Mission Description and Budget Item Justification

This program element provides resources in support of development of mine countermeasure systems to provide minehunting, minesweeping, and neutralization to counter known and projected mine threats. The mine countermeasures systems provide mobile, quick reaction forces capable of land or sea-based minehunting and minesweeping operations worldwide. Resources are for developing and deploying advanced mine-hunting and minesweeping systems and the intelligence and oceanographic capabilities that will enable mine warfare superiority. Tactics and techniques used vary across a diversity of environments and a diversity of threats, including both asymmetric and emerging. Resources provide for systems and support of mine warfare systems, maritime systems, and expeditionary systems to allow for continuous operations of the Navy's warships and support vessels, other military vessels, and commercial vessels. Increased capability includes conducting minefield reconnaissance (mine density and location) at high area search rates, improving detection capability, decreasing sensor false alarm rates, reducing or eliminating post-mission analysis detect, classify, identify, decide time, improving neutralization time, improving network communications, automatic target recognition, and achieving in-stride detect-to-engage capability. The Surface Mine Countermeasures programs are in general platform independent and will provide detection, classification, localization, identification, neutralization, and influence clearance capabilities. Programs develop: (1) Unmanned minehunting capability for surface platforms; (2) the integration and improvement of new and existing systems (3) support for systems which detect, localize, classify, identify, and neutralize all mine types across MCM Avenger Class and other platforms.

1)The AN/AQS-20 is a mine hunting and identification system with sensors housed in an underwater towed body. The sensors are designated for the detection, classification and localization of bottom, close-tethered, and volume targets, and also for the identification of bottom targets. The system will be deployed from the Littoral Combat Ship (LCS) as part of the MCM Mission Package or can be deployed from other Vessels of Opportunity (VOO). The MCM USV is the tow platform for the AN/AQS-20.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy	Date: February 2018
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 0604127N *I Surface Mine Countermeasures*

2) AN/SQQ-32(V)4 High-Frequency, Wide Band (HFWB) is a technology upgrade to the AN/SQQ-32 Towed Body which will incorporate HFWB technology into the detection sonar to address performance deficiencies against new mine threats in the littorals. This upgrade will be installed on MCM-1 Class ships with the AN/SQQ-32(V)3 and will develop new transducer modules, fiber optic cable and modify topside processing and display software.
3) Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System - Maritime (GCCS-M). MEDAL provides mine and mine warfare planning and evaluation tools and databases to the MCM Commander. 3) Develop and implement Mine Countermeasures Commander's Estimate of the Situation (MCM CES).
4) AN/SLQ-60 Mine Neutralization System (MNS) Seafox on the MCM Class ships. MNS is the replacement to the existing AN/SLQ-48 Mine Neutralization System.
5) SSQ-94 MCM Trainer upgrade will incorporate the AN/SQQ-32 (V)4 sonar, SSN2(V)5 PINS and Mine Neutralization System Team Trainer.

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	18.154	-	18.154
Total Adjustments	0.000	0.000	18.154	-	18.154
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Rate/Misc Adjustments	0.000	0.000	18.154	-	18.154

Change Summary Explanation

Program Changes:
FY19 +$18,154K realigned from PE 0603502N in FY 2019.

Technical: Not applicable.
Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / *Surface Mine Countermeasures*	Project (Number/Name) 0530 / *Mine Hunt Systems*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
0530: *Mine Hunt Systems*	0.000	0.000	0.000	7.579	-	7.579	8.861	7.234	4.447	4.548	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

FY 2018 and prior funding in Program Element (PE) 0603502N. Projects moved from PE 0603502N starting in FY 2019.

The FY 2019 funding request was reduced by $1.192 million to account for the availability of prior year execution balances.

A. Mission Description and Budget Item Justification

This project contains resources for systems, subsystems, and sensors integrated for use with the new program MCM Unmanned Surface Vehicle (MCM USV) for mine detection, classification, localization, and identification in support of mine neutralization, and influence clearance capabilities. Research, development, test, and evaluation efforts are for increasing capability by decreasing time required to conduct Mine Countermeasures (MCM) operations, ensuring low risk to naval and commercial vessels, and removing the man from the minefield. Increased capability includes conducting minefield reconnaissance (mine density and location) at high area search rates, improving detection capability, decreasing sensor false alarm rates, and reducing post-mission analysis for detection, classification, and identification.

The AN/AQS-20 is a mine hunting and identification system with sensors housed in an underwater towed body. The sensors are designated for the detection, classification and localization of bottom, close-tethered, and volume targets, and also for the identification of bottom targets. The system will be deployed from the Littoral Combat Ship (LCS) as part of the MCM Mission Package or can be deployed from other Vessels of Opportunity (VOO). The MCM USV is the tow platform for the AN/AQS-20. The AN/AQS-20 Block 1 (the AQS-20A) is undergoing a Pre-Planned Product Improvement (P3I) program to upgrade the Forward Looking Sonar (FLS) and Side-Looking Sonars (SLS) to improve Probability of Classifying a Mine-like object as a Mine, reduce False Classification, and improve Depth Localization performance to meet Block 2 (the AQS-20C) performance. The Forward Looking Sonar is being replaced with a new High Frequency Wideband Forward Looking Sonar (WBFLS) design. The SLS is being replaced with a new Multifunction SLS with Synthetic Aperture Sonar (SAS) capability, as well as, improved signal processing and Signal to Noise Ratio. The Block 1 P3I program began in FY 2012 and completed in FY 2017. Award and management for Block 2 production units began in FY 2014 (the AQS-20C). Materiel Reliability, obsolescence, and performance Engineering Change Proposal (ECP) efforts continue beyond FY2023.

In FY 2018, the AN/AQS-20 Block 2 program (AQS-20C) is scheduled to conduct Developmental Testing (originally scheduled to start at end of FY17), initiate MCM USV integration, and initiation of MCM improvements for post mission analysis tools in support of Net-centric Sensor Analysis for Mine Warfare (NSAM) integration for the Fleet Operators. The net effect of these tools combined with the more powerful AN/AQS-20 Block 2 sensors will be improved classification of mines, more accurate vertical localization, reduced false calls, and improved area clearance rate sustained. Improvements also include the collection and ingestion of in-situ environmental data used for mission planning to configure the sensor which optimizes sensor performance during missions. Development of these tools begins in FY 2018 and will continue through FY 2021.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604127N / *Surface Mine Countermeasures*	**Project (Number/Name)** 0530 / *Mine Hunt Systems*

In FY 2019, the AN/AQS-20 Block 2 program will support the MCM USV User Operational Evaluation System (UOES), MCM USV Development Testing, and workups for the LCS MP Testing. NSAM initial integration efforts will continue. SAS acoustic mine recognition development will continue to support the potential for automated in-situ mine identification. Also efforts will include defining and developing necessary improvements for AN/AQS-20 Block 2 integration with the MCM USV.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: AN/AQS-20 Product Development	0.000	0.000	3.000	0.000	3.000
Articles:	-	-	-	-	-
FY 2018 Plans: FY 2018 funding in Program Element (PE) 0603502N.					
FY 2019 Base Plans: - Continue SAS Acoustic mine recognition development. - Continue SAS Acoustic mine recognition ECP. - Continue algorithm development for AN/AQS-20 Block 2 PMA Improvements including NSAM integration. - Continue AN/AQS-20 Block 2 improvements in support of MCM USV integration. - Correct deficiencies identified during testing.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: FY 2018 funding in Program Element (PE) 0603502N. FY 2019 slight decrease due to completion of PMA Software efforts.					
Title: AN/AQS-20 Support	0.000	0.000	0.900	0.000	0.900
Articles:	-	-	-	-	-
FY 2018 Plans: FY 2018 funding in Program Element (PE) 0603502N.					
FY 2019 Base Plans: - Provide ongoing technical and management support to AN/AQS-20. - Continue to conduct test minefield maintenance. - Continue AN/AQS-20 Block 2 Mission Planning and Post Mission Analysis Concept of Employment development.					
FY 2019 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604127N / *Surface Mine Countermeasures*	**Project (Number/Name)** 0530 / *Mine Hunt Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2018 funding in Program Element (PE) 0603502N. No significant change from FY 2018 to FY 2019.					
Title: AN/AQS-20 Test and Evaluation	0.000	0.000	3.179	0.000	3.179
Articles:	-	-	-	-	-
FY 2018 Plans: FY 2018 funding in Program Element (PE) 0603502N. ***FY 2019 Base Plans:*** - Continue SAS Acoustic recognition Testing. - Update Test and Evaluation Master Plan. - Support MCM USV User Operational Evaluation System. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY 2018 funding in Program Element (PE) 0603502N. FY 2019 decrease due to completion of Developmental Testing (DT) in FY 2018.					
Title: AN/AQS-20 Management Services	0.000	0.000	0.500	0.000	0.500
Articles:	-	-	-	-	-
FY 2018 Plans: FY 2018 funding in Program Element (PE) 0603502N. ***FY 2019 Base Plans:*** - Provide planning and management for the AN/AQS-20 program. - Begin update of acquisition documentation in support of Full Rate Production (FRP) Decision Review. - Continue to provide Program Office travel support. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604127N / *Surface Mine Countermeasures*	**Project (Number/Name)** 0530 / *Mine Hunt Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
FY 2018 funding in Program Element (PE) 0603502N. No significant change from FY 2018 to FY 2019.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	7.579	0.000	7.579

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• OPN/1601: *LCS MCM Mission Modules*	29.724	55.870	124.147	-	124.147	204.324	245.108	227.068	234.109	1,501.531	2,771.262
• RDTEN/0603502N/0530: *Mine Hunt Systems*	9.469	9.761	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	299.669

Remarks

OPN/1601 funding line accounts for several programs, of which the AN/AQS-20 program is only a portion.

D. Acquisition Strategy

AN/AQS-20 LRIP procurement continued following Block 2 (AQS-20C units) competitive contract award in FY 2014. Continue to meet MCM MP requirements to support production of Block 2 units.

E. Performance Metrics

AN/AQS-20 - Successfully complete Block 2 DT in FY 2018.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604127N / *Surface Mine Countermeasures*	**Project (Number/Name)** 0530 / *Mine Hunt Systems*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/AQS-20 P3I	C/CPFF	Raytheon : Portsmouth, RI	0.000	0.000		0.000		1.100	Nov 2018	-		1.100	Continuing	Continuing	Continuing
AN/AQS-20 P3I	C/CPFF	ARL/UT : Austin, TX	0.000	0.000		0.000		0.250	Nov 2018	-		0.250	Continuing	Continuing	Continuing
AN/AQS-20 Block 2 PMA	WR	NSWC, PC : Panama City FL	0.000	0.000		0.000		0.800	Oct 2018	-		0.800	Continuing	Continuing	Continuing
AN/AQS-20 Block 2 PMA	C/CPFF	ARL/UT : Austin, TX	0.000	0.000		0.000		0.850	Nov 2018	-		0.850	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		3.000		-		3.000	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/AQS-20 Engineering Services	WR	NSWC, PC : Panama City, FL	0.000	0.000		0.000		0.135	Oct 2018	-		0.135	Continuing	Continuing	Continuing
AN/AQS-20 Engineering Services	C/CPFF	Raytheon : Portsmouth, RI	0.000	0.000		0.000		0.200	Nov 2018	-		0.200	Continuing	Continuing	Continuing
AN/AQS-20 ILS Function	WR	NSWC, PC : Panama City FL	0.000	0.000		0.000		0.565	Nov 2018	-		0.565	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.900		-		0.900	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/AQS-20 T&E Functions	WR	COTF : Norfolk, VA	0.000	0.000		0.000		0.200	Nov 2018	-		0.200	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604127N / *Surface Mine Countermeasures*	**Project (Number/Name)** 0530 / *Mine Hunt Systems*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/AQS-20 T&E Functions	WR	NSWC, PC : Panama City FL	0.000	0.000		0.000		2.479	Oct 2018	-		2.479	Continuing	Continuing	Continuing
AN/AQS-20 T&E Functions	C/CPFF	Raytheon : Portsmouth, RI	0.000	0.000		0.000		0.500	Nov 2018	-		0.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		3.179		-		3.179	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

COTF - Naval Command Operational Test and Evaluation Force

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/AQS-20 Management Services	TBD	Various : Various	0.000	0.000		0.000		0.470	Dec 2018	-		0.470	Continuing	Continuing	Continuing
AN/AQS-20 Travel	TBD	Various : Various	0.000	0.000		0.000		0.030	Mar 2019	-		0.030	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.500		-		0.500	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		7.579		-		7.579	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604127N / *Surface Mine Countermeasures*	**Project (Number/Name)** 0530 / *Mine Hunt Systems*

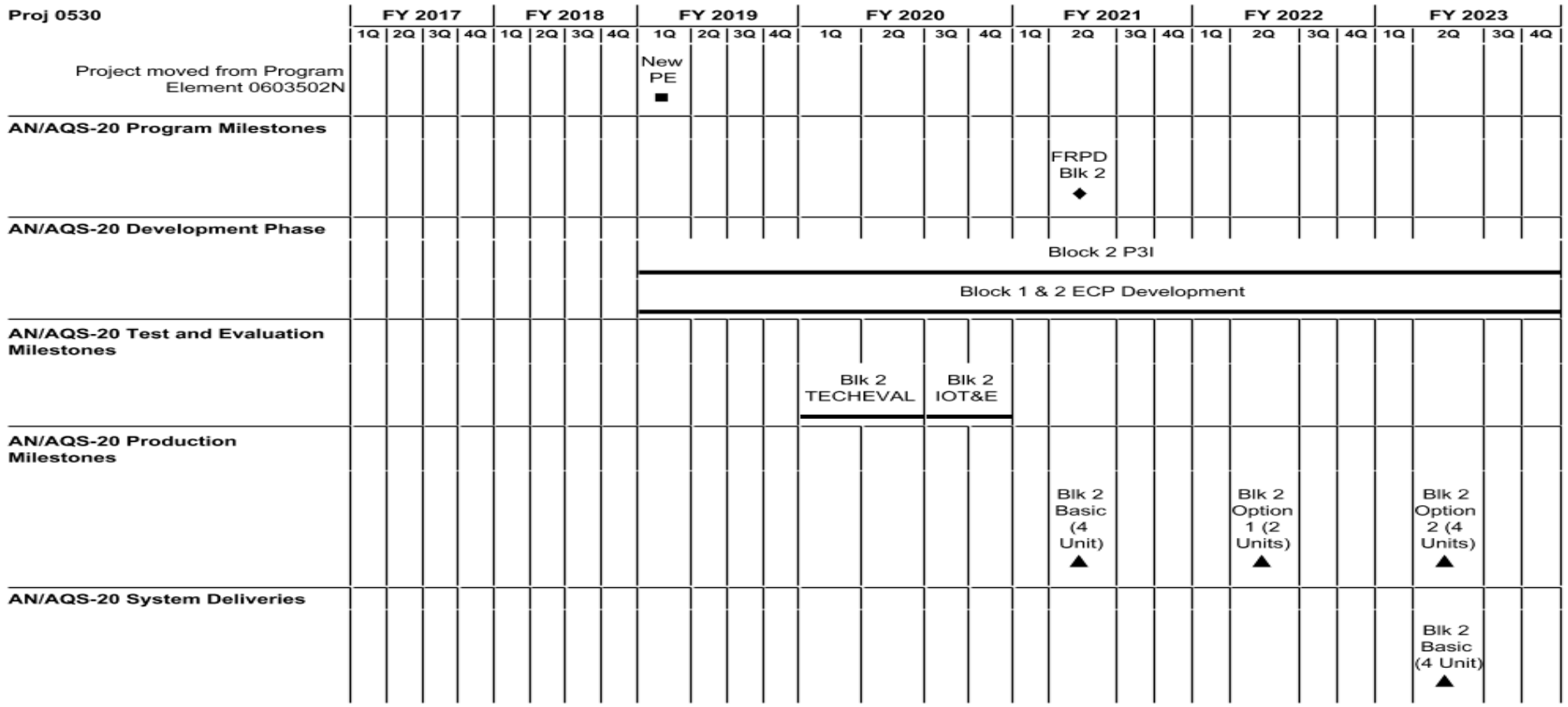

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604127N / *Surface Mine Countermeasures*	**Project (Number/Name)** 0530 / *Mine Hunt Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0530				
Project moved from Program Element 0603502N: New PE	1	2019	1	2019
AN/AQS-20 Program Milestones: AN/AQS-20 Full Rate Production (FRP) Decision Block 2	2	2021	2	2021
AN/AQS-20 Development Phase: AN/AQS-20 Block 2 P3I	1	2019	4	2023
AN/AQS-20 Development Phase: AN/AQS-20 Materiel Reliability, Obsolesence, and Performance ECP Development (Block 1 & 2)	1	2019	4	2023
AN/AQS-20 Test and Evaluation Milestones: AN/AQS-20 Test Events Block 2 IOT&E	3	2020	4	2020
AN/AQS-20 Test and Evaluation Milestones: AN/AQS-20 Test Events Block 2 TECHEVAL	1	2020	2	2020
AN/AQS-20 Production Milestones: AN/AQS-20 Block 2 New Basic Award (4 Unit)	2	2021	2	2021
AN/AQS-20 Production Milestones: AN/AQS-20 Block 2 Option 1 Award (2 Units)	2	2022	2	2022
AN/AQS-20 Production Milestones: AN/AQS-20 Block 2 Option 2 Award (4 Units)	2	2023	2	2023
AN/AQS-20 System Deliveries: AN/AQS-20 Block 2 New Basic Award Systems (4 Unit)	2	2023	2	2023

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / *Surface Mine Countermeasures*	Project (Number/Name) 1233 / *Surface MCM Mid-life Upgrade*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
1233: *Surface MCM Mid-life Upgrade*	0.000	0.000	0.000	0.000	-	0.000	1.011	1.031	1.054	1.075	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides resources for development, improvement and integration of MCM systems. A description of the major planned programs include the following:

1) AN/SQQ-32(V)4 High-Frequency, Wide Band (HFWB) is a technology upgrade to the AN/SQQ-32 Towed Body which will incorporate HFWB technology into the detection sonar to address performance deficiencies against new mine threats in the littorals. This upgrade will be installed on MCM-1 Class ships with the AN/SQQ-32(V)3 and will develop new transducer modules, fiber optic cable and modify topside processing and display software. 2) Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System - Maritime (GCCS-M). MEDAL provides mine and mine warfare planning and evaluation tools and databases to the MCM Commander. 3) Develop and implement Mine Countermeasures Commander's Estimate of the Situation (MCM CES). 4) The Unmanned Influence Sweep System (UISS) utilizes an Unmanned Surface Vehicle (USV) integrated with an Unmanned Surface Sweep System (US3), a magnetic/acoustic sweep system developed to sweep acoustic/magnetic influence mines, which can be deployed from the Littoral Combat Ship (LCS) or a ship of opportunity; 5) The Multi-Function USV replaces the sweep system with a minehunting sensor. The capability leverages off a common USV to conduct minehunting missions. 6) AN/SLQ-60 Mine Neutralization System (MNS) Seafox on the MCM Class ships. MNS is the replacement to the existing AN/SLQ-48 Mine Neutralization System. 7) SSQ-94 MCM Trainer upgrade will incorporate the AN/SQQ-32 (V)4 sonar, SSN2(V)5 PINS and Mine Neutralization System Team Trainer.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy			Date: February 2018
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / *Surface Mine Countermeasures*	Project (Number/Name) 1235 / *Mine Warfare Planning and Analysis*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
1235: *Mine Warfare Planning and Analysis*	0.000	0.000	0.000	10.575	-	10.575	10.763	9.295	8.759	8.907	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

FY 2018 and prior funding in Program Element (PE) 0603502N. Projects realigned from PE 0603502N starting in FY 2019.

A. Mission Description and Budget Item Justification

Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System - Maritime (GCCS-M). MEDAL provides mine and mine warfare planning and evaluation tools and databases to the MCM Commander.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: MEDAL Product Development	0.000	0.000	5.648	0.000	5.648
Articles:	-	-	-	-	-
FY 2018 Plans: FY 2018 funding for this program was funded in PE 0603502N, Project 1235.					
FY 2019 Base Plans: FY19 funding will initiate development of the MIW IST. This MIW Integrated Synthetic Trainer is the means in which to conduct Integrated Phase training for MIW forces similar to a Fleet Synthetic Training (FST) event for a CSG/ESG. This tool will provide the capability to train the U.S. Navy's four MIW staffs that include one Theater MIWC and three MCMCs against near peer threats. MIW IST will be a separate tool that executes in conjunction with the MEDAL mission planning and evaluation system used by MIW staffs and units. It will incorporate the laydown of simulated threat minefields expected to be used to blockade ports, defend against landing assaults, or deny access to sea lines of communication and to control the training event. It will use MIW staff created MEDAL MCM plans, underlying MIW databases, and real world environmental databases to generate simulated mission sorties and interactions with the defined minefields. These generated mission files will allow staffs to use MEDAL to evaluate each days progress determining achieved clearance and remaining risk to ship traffic. MIW IST will have an adjustable "Game Clock" allowing staffs in faster than real time to conduct multi-week long MCM operations in a classroom environment. FY19 work will initially focus on defining user requirements, software design, and transition to an Agile Software development process.					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0604127N / *Surface Mine Countermeasures*	**Project (Number/Name)** 1235 / *Mine Warfare Planning and Analysis*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
FY19 funding will also support the MINEnet Tactical development to enhance the Minefield Planning capabilities, support interface changes, and provide updates to sortie planning and databases for the transition of AQS-20A to the AQS-20C configuration. The MEDAL EA course curriculum for MINEnet Tactical 1.3 will be updated and updated software will be fielded to the Mine Warfare Training Center. Work will also begin on MINEnet Tactical v1.4, which will provide the replacement of all commercial-off-the-shelf (COTS) components, which are either near end-of-life or no longer approved in Department of the Navy (DoN) Application and Database Management System (DADMS). Update application as required to support new and approved COTS components. FY19 work will also complete cybersecurity transition from DIACAP to Risk Management Framework (RMF). ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding was realigned from PE 0603502N, Project 1235. Increase in FY 2019 funding supports the development of the Mine Warfare (MIW) Integrated Synthetic Trainer (IST) and MINEnet Tactical v1.4.					
Title: MEDAL Support	0.000	0.000	3.187	0.000	3.187
Articles:	-	-	-	-	-
FY 2018 Plans: FY 2018 funding for this program was funded in PE 0603502N, Project 1235. ***FY 2019 Base Plans:*** Complete the development of MEDAL EA MINEnet Tactical v1.3 capability and Planning on Risk (PoR). Provide technical integration of developed algorithms and models that have demonstrated effectiveness with respect to objective requirements. Additionally, fielding work will increase and the initial roll out of MINEnet Tactical to the fleet will continue; ramping up the fielding efforts will allow retirement of older MEDAL Build 11 by end of FY19. The support will address fixing software defects and high-priority fleet change requests reported in MINEnet Tactical v1.2.2 and release the upgrades in the MINEnet Tactical v1.3 development baseline. Finally, the support effort will include communication with activities such as applied labs, government activities, and designated contractors. Assist in providing the speed, agility, adaptability, and flexibility required for modern MCM operations. ***FY 2019 OCO Plans:*** N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:***					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Funding was realigned from PE 0603502N, Project 1235. Increase in FY 2019 funding supports completing the development of MINEnet Tactical and the ramp up of fielding to the Fleet.					
Title: MEDAL Test and Evaluation	0.000	0.000	0.825	0.000	0.825
Articles:	-	-	-	-	-
FY 2018 Plans: FY 2018 funding for this program was funded in PE 0603502N, Project 1235.					
FY 2019 Base Plans: Continue System Development testing activities with multiple platforms including LCS MCM MPAS, ISNS, CANES and ONENET integration tests. Continue Cybersecurity patching and assessments. Deliver to Fleet in accordance with the MEDAL EA Fielding Plan.					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: Funding was realigned from PE 0603502N, Project 1235. Increase in FY 2019 funding supports required testing.					
Title: MEDAL Management	0.000	0.000	0.915	0.000	0.915
Articles:	-	-	-	-	-
FY 2018 Plans: FY 2018 funding for this program was funded in PE 0603502N, Project 1235.					
FY 2019 Base Plans: Continue to provide program management support and travel for MEDAL program. Program management shall include overall technical guidance and leadership for the program. Oversight of financial and logistics efforts and coordination with Navy and other DoD organizations and contractors as required to ensure successful execution of the program. As part of the systems engineering element of PM, communicate and coordinate with MIW C4ISR, ICWS, Organic MCM, Mainstreaming MIEW, Expeditionary Warfare C4ISR, tactics development, long term planning, Naval Special Clearance Team (NSCT-1) Assault Breaching System (ABS), LCS, and other programs as they relate to MEDAL and MIW Mission Planning, Evaluation, and C4ISR. Other PM tasking to include briefings, demonstrations, and project planning as required.					
FY 2019 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
N/A ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding was realigned from PE 0603502N, Project 1235. Increase in FY 2019 funding supports required management support.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	10.575	0.000	10.575

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• 2622/LV075: *Mine Sweeping Replacement (MEDAL).*	2.358	3.585	1.111	-	1.111	0.799	0.889	0.891	0.900	0.000	16.356

Remarks

D. Acquisition Strategy

Mine Warfare and Environmental Decision Aids Library (MEDAL) - requirements for MEDAL Builds are generated through a formal requirements process. Requirements conferences gather a list of candidate functions based on a logical sequence to fully implement the overall software architecture. The fleet is presented with a recommended list of candidate capabilities based on this program plan, doctrine, fleet comments, and technology. These capability items are then prioritized by the fleet representatives (coordinated by Naval Surface and Mine War-fighting Development Center (SMWDC). The fleet inputs are then consolidated by COMINEWARCOM into an overall list which is then presented to Navy leadership for pricing and final selection. The selection is based on price, risk, available funding, and possibly by other program factors (e.g., ensure that MEDAL supports other program delivery schedules). Selection balances immediate needs, long term objectives, technical maturity and other programmatic factors. A verification and validation process is applied to any algorithms, tactics, or models to be incorporated in the software.

E. Performance Metrics

Mine Warfare and Environmental Decision Aids Library (MEDAL) development to include integration of data fusion techniques and incorporation of Data Access Layer (DAL) architecture to meet FORCEnet requirements.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MEDAL EA	C/CPAF	SAIC : McLean, VA	0.000	0.000		0.000		5.648	Oct 2018	-		5.648	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		5.648		-		5.648	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MEDAL EA	WR	NSWC PC : Panama City FL	0.000	0.000		0.000		3.187	Nov 2018	-		3.187	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		3.187		-		3.187	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MEDAL EA	C/CPAF	SAIC : McLean, VA	0.000	0.000		0.000		0.825	Oct 2018	-		0.825	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.825		-		0.825	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy		Date: February 2018
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MEDAL EA	WR	NSWC PC : Panama City Fl	0.000	0.000		0.000		0.915	Nov 2018	-		0.915	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		0.915		-		0.915	Continuing	Continuing	N/A

Remarks

FY 2018 and prior funding in Program Element (PE) 0603502N.

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		0.000		10.575		-		10.575	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
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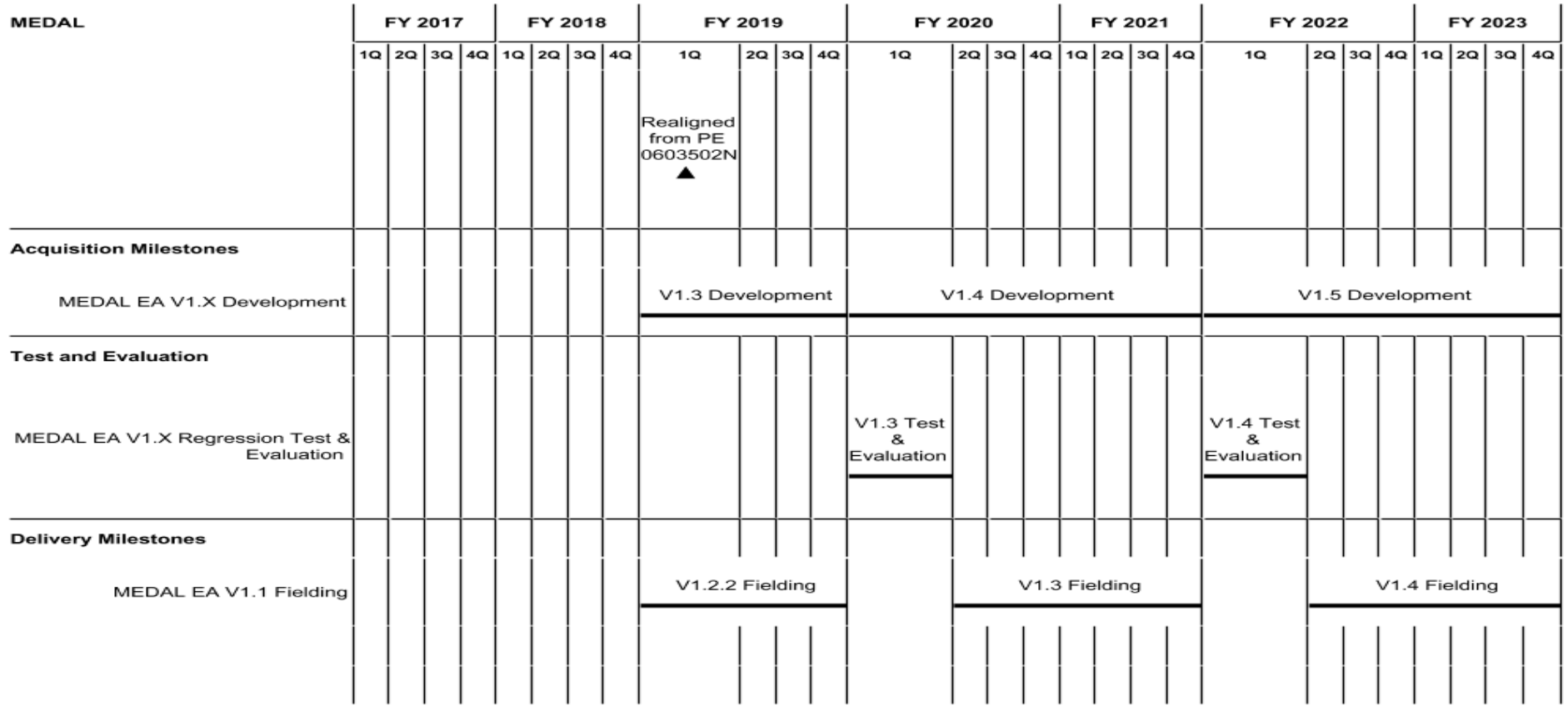

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
MEDAL				
Schedule Detail	1	2019	1	2019
Acquisition Milestones: MEDAL EA V1.X Development: MEDAL EA V1.3X Development	1	2019	4	2019
Acquisition Milestones: MEDAL EA V1.X Development: MEDAL EA V1.4X Development	1	2020	4	2021
Acquisition Milestones: MEDAL EA V1.X Development: MEDAL EA V1.5X Development	1	2022	4	2023
Test and Evaluation: MEDAL EA V1.X Regression Test & Evaluation: MEDAL EA V1.3X Test & Evaluation	1	2020	1	2020
Test and Evaluation: MEDAL EA V1.X Regression Test & Evaluation: MEDAL EA V1.34 Test & Evaluation	1	2022	1	2022
Delivery Milestones: MEDAL EA V1.1 Fielding: MEDAL EA V1.2 Fielding	1	2019	4	2019
Delivery Milestones: MEDAL EA V1.1 Fielding: MEDAL EA V1.3 Fielding	2	2020	4	2021
Delivery Milestones: MEDAL EA V1.1 Fielding: MEDAL EA V1.4 Fielding	2	2022	4	2023