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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	172.825	14.764	18.735	18.754	-	18.754	15.010	14.499	14.783	15.073	Continuing	Continuing
0530: <i>Mine Hunt Systems</i>	9.484	7.127	6.961	8.430	-	8.430	5.203	4.532	4.619	4.705	Continuing	Continuing
1233: <i>Surface MCM Mid-life Upgrade</i>	160.299	0.000	1.011	1.032	-	1.032	1.054	1.073	1.094	1.116	Continuing	Continuing
1235: <i>Mine Warfare Planning and Analysis</i>	3.042	7.637	10.763	9.292	-	9.292	8.753	8.894	9.070	9.252	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Surface Mine Countermeasures (SMCM) Program Element (PE) provides resources in support of development of mine countermeasures systems to provide minehunting 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 neutralizing operations worldwide. Resources are for developing and deploying advanced minehunting and neutralization 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, Littoral Combat Ship (LCS) Class and other platforms.

1)The AN/AQS-20 is a minehunting and identification system with sensors housed in an underwater towed body. The sensors are designed 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.

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) 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.

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Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>
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4) SSQ-94 MCM Trainer upgrade will incorporate the AN/SQQ-32 (V)4 sonar, SSN2(V)5 PINS and Mine Neutralization System Team Trainer.

5) Mine Warfare and Environmental Decision Aids Library (MEDAL) is the U.S. Navy's single Mine Warfare (MIW) tactical decision support system for integrated mission planning, evaluation, and situational awareness. MEDAL provides mine warfare planning and evaluation tools and databases to the MCM Commander and to the individual MCM units.

6) MIW Integrated Synthetic Trainer (MIST) will be a synthetic trainer which will provide integrated phase training for MIW staffs in end-to-end MCM scenarios. This tool will provide the capability to train the U.S. Navy's four MIW staffs against near peer threats. 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 to control the training event. This effort begins in FY2020.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	15.527	18.735	18.700	-	18.700
Current President's Budget	14.764	18.735	18.754	-	18.754
Total Adjustments	-0.763	0.000	0.054	-	0.054
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.763	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.054	-	0.054

Change Summary Explanation

Program Changes:

FY19: -\$763K SBIR reduction

FY20: No change.

FY21: \$54K Miscellaneous increase

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 0530 / <i>Mine Hunt Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0530: <i>Mine Hunt Systems</i>	9.484	7.127	6.961	8.430	-	8.430	5.203	4.532	4.619	4.705	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Mine Hunt Systems project contains resources for systems, subsystems, and sensors integrated for use with the Mine Countermeasures Unmanned Surface Vehicle (MCM USV) for mine detection, classification, localization, identification, neutralization, and influence sweep 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 time for detection, classification, and identification.

The AN/AQS-20 is a minehunting and identification system with sensors housed in an underwater towed body. The sensors are designed 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 (MP) 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) underwent 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 replaced with a new High Frequency Wideband Forward Looking Sonar (WBFLS) design. The SLS is 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 FY 2024.

In FY 2019, the AN/AQS-20 Block 2 program completed DT, initiated MCM USV integration efforts and supported Net-Centric Sensor Analysis for Mine Warfare (NSAM) system initial integration. The AN/AQS-20A Block 2 P3I program SAS acoustic mine recognition development will continue to support the potential for automated in-situ mine identification. Additional P3I efforts included Automated Target Recognition, will continue beyond FY 2024. Efforts will include defining and developing necessary improvements for AN/AQS-20 Block 2 integration with the MCM USV.

In FY 2020, the AN/AQS-20 Block 2 program will continue integration with the MCM USV, conduct DT with the MCM USV, and support workups for the LCS Mission Package (MP) testing. AN/AQS-20 will continue improving data consolidation and cyber requirements, as well as sensor performance for localization.

In FY 2021, the AN/AQS-20 Block 2 program will conduct DT and commence TechEval with the LCS MCM MP, complete the MCM USV User Operational Evaluation System (UOES) efforts, and commence Automated Target Recognition (ATR) efforts.

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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 0530 / <i>Mine Hunt Systems</i>
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
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	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: AN/AQS-20 Product Development</p> <p align="right">Articles:</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue algorithm development for AN/AQS-20 Block 2 PMA Improvements including NSAM integration. - Correct deficiencies identified during MCM USV integration. - Continue SAS Acoustic mine recognition development. - Continue improvement of localization and re-acquisition. <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Continue AN/AQS-20 Block 2 PMA improvements and NSAM integration - Transition SBIR Sonar Data Fusion of AQS-20 multi-sensor data to improve single pass detection - Initiate Tech Refresh to improve iPMA performance, to include data fusion and contact management tool - Collect and Classify High Resolution Synthetic Aperture Sonar (SAS) images from test data to support machine learning of image processing - Initiate development of super classification of mines by leveraging machine learning - Improvement of Automated Target Recognition (ATR) by leveraging machine learning - Initiate development of a noise reduction algorithm to improve system performance by leveraging testing of the MCM USV - Initiate development of a Sound Velocity Profile (SVP) solution and integration of an active SVP profile update to improve system performance - Correct deficiencies identified during MCM USV developmental testing. <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase due to increased development efforts associated with Automated Target Recognition (ATR) and Sound Velocity Profile (SVP).</p>	2.999	2.100	3.251	0.000	3.251
<p>Title: AN/AQS-20 Support</p> <p align="right">Articles:</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Provide ongoing technical and management support to AN/AQS-20. - Continue to conduct test minefield maintenance. 	0.753	0.800	0.800	0.000	0.800

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
- Continue AN/AQS-20 Block 2 Mission Planning and Post Mission Analysis MCM USV Concept of Employment development.					
FY 2021 Base Plans:					
- Provide ongoing technical and management support to AN/AQS-20					
- Continue to conduct test minefield maintenance to support follow on system improvements					
- Continue AN/AQS-20 Block 2 Mission Planning and Post Mission Analysis MCM USV Concept of Employment development.					
FY 2021 OCO Plans:					
N/A					
Title: AN/AQS-20 Test and Evaluation					
Articles:					
	2.875	3.561	3.879	0.000	3.879
	-	-	-	-	-
FY 2020 Plans:					
- Continue SAS Acoustic recognition Testing.					
- Conduct contractor integration testing with the MCM USV.					
- Commence DT with the MCM USV.					
- Refine tactics post MCM USV DT.					
FY 2021 Base Plans:					
- Support Block 2 DT/TechEval					
- Support MCM MP DT/TechEval					
- Complete DT with the MCM USV.					
- Initiate testing to characterize deep mining capability of AQS-20					
- Initiate testing to characterize and model MCM USV Platform noise					
- Initiate testing and integration of Bi-Static EOID to transition the SBIR development program					
FY 2021 OCO Plans:					
N/A					
FY 2020 to FY 2021 Increase/Decrease Statement:					
Slight increase due to MCM Mission Package DT/TechEval test events and system characterization testing.					
Title: AN/AQS-20 Management Services					
	0.500	0.500	0.500	0.000	0.500
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p><i>FY 2020 Plans:</i></p> <ul style="list-style-type: none"> - Provide planning and management for the AN/AQS-20 program. - Complete update of acquisition documentation in support of Full Rate Production (FRP) Decision Review. - Continue to provide Program Office travel support. <p><i>FY 2021 Base Plans:</i></p> <ul style="list-style-type: none"> - Provide planning and management for the AN/AQS-20 program. - Continue to provide Program Office travel support. - Continue support for sonar and iPMA technical refresh efforts. - Continue risk reduction efforts. - Conduct competitive procurement source selection efforts. <p><i>FY 2021 OCO Plans:</i> N/A</p>					
Accomplishments/Planned Programs Subtotals	7.127	6.961	8.430	0.000	8.430

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPN/1601: <i>LCS MCM Mission Modules</i>	98.901	64.789	218.822	-	218.822	222.754	234.330	243.187	247.949	1,111.812	2,666.795

Remarks
OPN/1601 - The above funding line accounts for several programs, of which the Mine Hunt Systems program is only a portion.

D. Acquisition Strategy
AN/AQS-20 Low-Rate Initial Production (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. Conduct competitive procurement in FY 2021 and align resources with the MCM USV program.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 4				PE 0604127N / Surface Mine Countermeasures				0530 / Mine Hunt Systems							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
AN/AQS-20 Block 2 Integration	C/CPFF	Lockheed Martin : Not Specified	0.300	0.000		0.000		0.000		-		0.000	0.000	0.300	-
AN/AQS-20 P3I	C/CPFF	Raytheon : Portsmouth, RI	0.509	1.099	Nov 2018	1.800	Nov 2019	1.551	Nov 2020	-		1.551	Continuing	Continuing	Continuing
AN/AQS-20 P3I	C/CPFF	ARL/UT : Austin, TX	0.000	0.250	Nov 2018	0.100	Dec 2019	1.000	Nov 2020	-		1.000	Continuing	Continuing	Continuing
AN/AQS-20 Block 2 PMA	WR	NSWC, PC : Panama City FL	1.100	0.800	Oct 2018	0.100	Oct 2019	0.100	Oct 2020	-		0.100	Continuing	Continuing	Continuing
AN/AQS-20 Block 2 PMA	C/CPFF	ARL/UT : Austin, TX	1.128	0.850	Nov 2018	0.100	Dec 2019	0.100	Dec 2020	-		0.100	Continuing	Continuing	Continuing
AN/AQS-20 Risk Reduction	C/FFP	TBD : TBD	0.000	0.000		0.000		0.500	Dec 2020	-		0.500	0.000	0.500	-
Subtotal			3.037	2.999		2.100		3.251		-		3.251	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
AN/AQS-20 Engineering Services	WR	NUWC/NPT : Newport, RI	0.365	0.000		0.000		0.000		-		0.000	0.000	0.365	-
AN/AQS-20 Engineering Services	WR	NSWC, PC : Panama City, FL	0.135	0.086	Oct 2018	0.140	Oct 2019	0.140	Oct 2020	-		0.140	Continuing	Continuing	Continuing
AN/AQS-20 Engineering Services	C/CPFF	Raytheon : Portsmouth, RI	0.200	0.151	Nov 2018	0.200	Nov 2019	0.200	Nov 2020	-		0.200	Continuing	Continuing	Continuing
AN/AQS-20 ILS Function	WR	NSWC, PC : Panama City FL	0.200	0.516	Nov 2018	0.460	Nov 2019	0.460	Nov 2020	-		0.460	Continuing	Continuing	Continuing
Subtotal			0.900	0.753		0.800		0.800		-		0.800	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
AN/AQS-20 T&E Functions	WR	COTF : Norfolk, VA	0.200	0.175	Nov 2018	0.200	Nov 2019	0.200	Nov 2020	-		0.200	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 0530 / <i>Mine Hunt Systems</i>
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
AN/AQS-20 T&E Functions	WR	NSWC, PC : Panama City FL	4.247	2.300	Oct 2018	2.851	Oct 2019	3.169	Oct 2020	-		3.169	Continuing	Continuing	Continuing
AN/AQS-20 T&E Functions	C/CPFF	Raytheon : Portsmouth, RI	0.600	0.400	Nov 2018	0.510	Nov 2019	0.510	Nov 2020	-		0.510	Continuing	Continuing	Continuing
Subtotal			5.047	2.875		3.561		3.879		-		3.879	Continuing	Continuing	N/A

Remarks
COTF - Commander Operational Test and Evaluation Force

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
AN/AQS-20 Management Services	TBD	Various : Various	0.470	0.470	Dec 2018	0.470	Dec 2019	0.470	Dec 2020	-		0.470	Continuing	Continuing	Continuing
AN/AQS-20 Travel	TBD	Various : Various	0.030	0.030	Mar 2019	0.030	Mar 2020	0.030	Mar 2021	-		0.030	Continuing	Continuing	Continuing
Subtotal			0.500	0.500		0.500		0.500		-		0.500	Continuing	Continuing	N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		9.484	7.127	6.961	8.430	8.430	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 0530 / <i>Mine Hunt Systems</i>
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Proj 0530	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
AN/AQS-20 Program Milestones																												
AN/AQS-20 Development Phase																												
iPMA Development																												
Deploy and Retrieve (D&R) Development																												
AN/AQS-20 Test and Evaluation																												
MCM Mission Package Testing																												
AN/AQS-20 Risk Reduction																												
AN/AQS-20 Production																												
Production																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 0530				
AN/AQS-20 Program Milestones: AN/AQS-20 Full Rate Production (FRP) Decision Block 2	3	2021	3	2021
AN/AQS-20 Program Milestones: Initial Operational Capability (IOC)	4	2021	4	2021
AN/AQS-20 Development Phase: AN/AQS-20 Block 2 P3I	1	2019	4	2025
AN/AQS-20 Development Phase: AN/AQS-20 Materiel Reliability, Obsolesence, and Performance ECP Development (Block 2)	1	2019	4	2025
iPMA Development: iPMA Development	1	2019	1	2019
iPMA Development: iPMA/NSAM Integration and Test	2	2019	1	2021
iPMA Development: iPMA Tech Refresh	2	2021	4	2025
Deploy and Retrieve (D&R) Development: Raytheon D&R Fabrication	1	2019	1	2019
Deploy and Retrieve (D&R) Development: D&R Integration	2	2019	2	2019
Deploy and Retrieve (D&R) Development: System Integration and Test	3	2019	4	2019
AN/AQS-20 Test and Evaluation: AN/AQS-20 Block 2 DT	1	2019	2	2019
AN/AQS-20 Test and Evaluation: AN/AQS-20/MCM USV DT	4	2020	2	2021
MCM Mission Package Testing: MCM MP Developmental Testing	2	2021	3	2021
MCM Mission Package Testing: MCM MP Tech Eval	4	2021	1	2022
MCM Mission Package Testing: MCM MP IOT&E	1	2022	2	2022
AN/AQS-20 Risk Reduction: Retrofit Upgrade	4	2020	4	2020
AN/AQS-20 Risk Reduction: Risk Reduction Sonar (Volume Search)	2	2020	2	2021
AN/AQS-20 Risk Reduction: Risk Reduction Tow Body	2	2020	2	2021
AN/AQS-20 Risk Reduction: Retrofit Upgrade Option 1	3	2021	3	2021
AN/AQS-20 Production: Production: AN/AQS-20 Block 2 Basic Award	2	2021	2	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy **Date:** February 2020

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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AN/AQS-20 Production: Production: AN/AQS-20 Block 2 Option 1 Award	3	2022	3	2022
AN/AQS-20 Production: Production: AN/AQS-20 Block 2 Option 2 Award	3	2023	3	2023
AN/AQS-20 Production: Production: AN/AQS-20 Block 2 Option 3 Award	3	2024	3	2024
AN/AQS-20 Production: Production: AN/AQS-20 Block 2 Option 4 Award	3	2025	3	2025
AN/AQS-20 Production: Deliveries: AN/AQS-20 Block 2 Systems	1	2019	2	2019
AN/AQS-20 Production: Deliveries: AN/AQS-20 Block 2 Basic Award Systems	3	2023	3	2023
AN/AQS-20 Production: Deliveries: AN/AQS-20 Block 2 Option 1 Systems	3	2024	3	2024
AN/AQS-20 Production: Deliveries: AN/AQS-20 Block 2 Option 2 Systems	3	2025	3	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1233 / <i>Surface MCM Mid-life Upgrade</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
1233: <i>Surface MCM Mid-life Upgrade</i>	160.299	0.000	1.011	1.032	-	1.032	1.054	1.073	1.094	1.116	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Surface MCM Mid-life Upgrade project provides resources for development, improvement and integration of SSQ-94 MCM Trainer. Trainer upgrade will incorporate the AN/SQQ-32 (V)4 sonar, SSN2(V)5 PINS and Mine Neutralization System Team Trainer.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Product Development	0.000	1.011	1.032	0.000	1.032
Articles:	-	-	-	-	-
Description: SSQ-94 MCM Trainer Development					
FY 2020 Plans: Integration of MEDAL planning into the SSQ-94 MCM Trainer.					
FY 2021 Base Plans: Continue integration of MEDAL planning into the SSQ-94 MCM Trainer. Funding will be utilized to conduct analysis and feasibility testing of utilizing legacy combat systems on future platforms. This will include the potential reuse of the AN/SQQ-32(V)4 sonar on unmanned ships, the reuse of the AN/SLQ-37 and SLQ-38 on the unmanned surface vehicle, and the reuse of the AN/SLQ-60 onboard Vessels of Opportunity (VOO).					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding level remains consistent for SSQ-94 MCM Trainer development efforts.					
Accomplishments/Planned Programs Subtotals	0.000	1.011	1.032	0.000	1.032

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

N/A

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1233 / <i>Surface MCM Mid-life Upgrade</i>

D. Acquisition Strategy

SSQ-94 - Naval Surface Warfare Center, Panama City (NSWC, PC) and ARL UT designed and developed the SSQ-94 MCM Trainer.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1233 / <i>Surface MCM Mid-life Upgrade</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
MNS Development	Various	TBD : TBD	22.455	0.000		0.000		0.000		-		0.000	0.000	22.455	-
SSQ-94 Trainer	WR	NSWC, PC : NSWC, PC	16.344	0.000		1.011	Dec 2019	1.032	Dec 2020	-		1.032	0.000	18.387	-
BSP: Develop Bottom Sediment Classifier	WR	NRL : WASHINGTON, DC	0.258	0.000		0.000		0.000		-		0.000	0.000	0.258	-
Systems Engineering and Integration	WR	NSWC, PC : PANAMA CITY, FL	0.306	0.000		0.000		0.000		-		0.000	0.000	0.306	-
System Development 1	WR	NSWC, PC : SAN DIEGO, CA	0.373	0.000		0.000		0.000		-		0.000	0.000	0.373	-
Systems Engineering 2	WR	NSWC, PC : PANAMA CITY, FL	2.915	0.000		0.000		0.000		-		0.000	0.000	2.915	-
Systems Engineering 3 MCM CES	WR	NSWC, PC : PANAMA CITY, FL	1.633	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
HFWB: Primary Hardware Development 1	C/CPAF	ARL UT : TEXAS	15.511	0.000		0.000		0.000		-		0.000	0.000	15.511	-
Primary Hardware Development 2	WR	ARL-UT : AUSTIN, TX	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
HFWB: Tow Cable Development	C/CPAF	ARL UT : TEXAS	1.399	0.000		0.000		0.000		-		0.000	0.000	1.399	-
HFWB: Ship Integration	WR	NSWC, PC : PANAMA CITY, FL	1.697	0.000		0.000		0.000		-		0.000	0.000	1.697	-
HFWB: SYSTEM ENGINEER	C/CPAF	ARL UT : TEXAS	9.065	0.000		0.000		0.000		-		0.000	0.000	9.065	-
Software Development MEDAL EA	C/CPFF	SAIC : McLean, VA	41.180	0.000		0.000		0.000		-		0.000	0.000	41.180	-
Subtotal			113.136	0.000		1.011		1.032		-		1.032	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 4				PE 0604127N / Surface Mine Countermeasures				1233 / Surface MCM Mid-life Upgrade							
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
Develop Logistics Products	WR	NSWC, PC : PANAMA CITY, FL	0.243	0.000		0.000		0.000		-		0.000	0.000	0.243	-
Software Development 1	C/CPFF	SAIC : McLean, VA	0.350	0.000		0.000		0.000		-		0.000	0.000	0.350	-
Software Development 2	C/CPFF	SAIC : McLean, Va	0.914	0.000		0.000		0.000		-		0.000	0.000	0.914	-
HFVB Software Development	C/CPAF	ARL-UT : TEXAS	8.450	0.000		0.000		0.000		-		0.000	0.000	8.450	-
HFVB Integrated Logistics Support	WR	NSWC, PC : PANAMA CITY, FL	2.765	0.000		0.000		0.000		-		0.000	0.000	2.765	-
Software Engineering 1 MCM CES	WR	NSWC, PC : PANAMA CITY, FL	1.517	0.000		0.000		0.000		-		0.000	0.000	1.517	-
Software Engineering 2 MEDAL	WR	NSWC, PC : PANAMA CITY, FL	2.458	0.000		0.000		0.000		-		0.000	0.000	2.458	-
Subtotal			16.697	0.000		0.000		0.000		-		0.000	0.000	16.697	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
MEDAL Test and Evaluation	C/FP	SAIC : McLean, VA	7.636	0.000		0.000		0.000		-		0.000	0.000	7.636	-
MCM CES Test and Evaluation 1	C/CPAF	VARIOUS : VARIOUS	1.782	0.000		0.000		0.000		-		0.000	0.000	1.782	-
HFVB: Developmental Test and Evaluation	C/CPAF	ARL-UT : TEXAS	5.925	0.000		0.000		0.000		-		0.000	0.000	5.925	-
Test and Evaluation 2	C/CPAF	VARIOUS : VARIOUS	5.204	0.000		0.000		0.000		-		0.000	0.000	5.204	-
Subtotal			20.547	0.000		0.000		0.000		-		0.000	0.000	20.547	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1233 / <i>Surface MCM Mid-life Upgrade</i>
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Program Management Support 1	C/CPFF	CACI : WASHINGTON, DC	0.263	0.000		0.000		0.000		-		0.000	0.000	0.263	-
Travel 1	WR	NAVSEA : WNY, DC	0.084	0.000		0.000		0.000		-		0.000	0.000	0.084	-
Government Engineering Support1	WR	NSWC, PC : PANAMA CITY, FL	0.325	0.000		0.000		0.000		-		0.000	0.000	0.325	-
MEDAL Program Management Support 2	Various	VARIOUS : VARIOUS	2.827	0.000		0.000		0.000		-		0.000	0.000	2.827	-
SBIR Assessment 2	Various	VARIOUS : VARIOUS	0.019	0.000		0.000		0.000		-		0.000	0.000	0.019	-
Program Management Support 3	C/CPFF	CACI : WASHINGTON, DC	1.341	0.000		0.000		0.000		-		0.000	0.000	1.341	-
Program Management Support 4	C/CPFF	CACI : WASHINGTON, DC	0.080	0.000		0.000		0.000		-		0.000	0.000	0.080	-
Government Engineering Support3	WR	NSWC, PC : PANAMA CITY, FL	0.090	0.000		0.000		0.000		-		0.000	0.000	0.090	-
Travel 3	C/CPAF	NAVSEA : WNY, DC	0.256	0.000		0.000		0.000		-		0.000	0.000	0.256	-
Program Management Support 5	C/CPFF	CACI : WASHINGTON, DC	0.167	0.000		0.000		0.000		-		0.000	0.000	0.167	-
Government Engineering Support4	WR	NSWC, PC : PANAMA CITY, FL	0.010	0.000		0.000		0.000		-		0.000	0.000	0.010	-
Travel4	C/CPAF	NSWC, PC : PANAMA CITY, FL	0.069	0.000		0.000		0.000		-		0.000	0.000	0.069	-
HFWB: Program Management Support 6	C/CPAF	VARIOUS : VARIOUS	1.442	0.000		0.000		0.000		-		0.000	0.000	1.442	-
HFWB: Government Engineering Support5	WR	NSWC, PC : PANAMA CITY, FL	0.750	0.000		0.000		0.000		-		0.000	0.000	0.750	-
HFWB: Travel 5	C/CPAF	NAVSEA : WNY, DC	0.080	0.000		0.000		0.000		-		0.000	0.000	0.080	-
Government Engineering Support6	WR	NSWC, PC : PANAMA CITY, FL	1.352	0.000		0.000		0.000		-		0.000	0.000	1.352	-
Travel 6	C/CPAF	NAVSEA : WNY, DC	0.238	0.000		0.000		0.000		-		0.000	0.000	0.238	-
SBIR Assessment 6	Various	VARIOUS : VARIOUS	0.054	0.000		0.000		0.000		-		0.000	0.000	0.054	-

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1233 / <i>Surface MCM Mid-life Upgrade</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
SSQ-94 Trainer				
System Development: SSQ-94 MCS Trainer: SSQ-94 MCS Trainer Development	1	2020	4	2022
System Development: SSQ-94 MCS Trainer: SSQ-94 MCS Integration and Testing	1	2023	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy										Date: February 2020		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>				Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
1235: <i>Mine Warfare Planning and Analysis</i>	3.042	7.637	10.763	9.292	-	9.292	8.753	8.894	9.070	9.252	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Mine Warfare Planning and Analysis project consists of two separate projects, the Mine Warfare and Environmental Decision Aids Library (MEDAL) and the MIW Synthetic Trainer (MIST). MEDAL is a software-intensive software program and is U.S. Navy's single Mine Warfare (MIW) tactical decision support system for integrated mission planning, evaluation, and situational awareness. MEDAL provides mine warfare planning and evaluation tools and databases to mine countermeasures (MCM) Commanders and is employed at the unit level to perform MCM sortie planning and evaluation. The most recent MEDAL increment, known as MEDAL Enterprise Architecture (EA), is no longer dependent on Global Command and Control System - Maritime (GCCS-M) for fielding to MIW fleet users. MEDAL EA is a family of systems, comprised of the following three components: MINEnet Global, MINEnet Tactical, and Minefield Planning.

MINEnet Global is a shore-based website that provides MIW waterspace awareness functionality to support Navy non-MIW forces. MINEnet Global also supports dedicated MIW forces by providing downloadable reference databases, MIW reference publications and links to MIW information. The MINEnet Tactical component is a software application which provides MCM tactical planning, situational awareness and post mission evaluation capabilities. It has been developed to be fielded to standard Navy networks including, Consolidated Afloat Networks and Enterprise Services (CANES), Integrated Shipboard Network System (ISNS), and Navy Marine Corps Intranet (NMCI) servers and uses common web browser as the user interface. Minefield Planning is also a tactical software application which provides the capability to plan mining operations.

MIST will be a synthetic trainer which will provide integrated phase training for MIW staffs in end-to-end MCM scenarios. This tool will provide the capability to train the U.S. Navy's four MIW staffs against near peer threats. 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 to control the training event. This effort begins in FY20.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Product Development	3.934	4.818	4.593	0.000	4.593
Articles:	-	-	-	-	-
FY 2020 Plans: In FY20, MINEnet Tactical v1.3.1 will complete and MINEnet Tactical (MNT) v1.4 development begins. MNT v1.3.1 addresses previously identified enhancements and fixed critical software bugs found in MNT v1.3.0. MNT v1.3.1 will be fielded in lieu of MNT v1.3.0. MNT v1.4 is a multi-year effort to replace commercial-off-the-shelf (COTS) components, which are either near end-of-life or no longer approved in Department of the Navy (DoN)					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Application and Database Management System (DADMS), with new, approved components in order to maintain cybersecurity compliance. Additionally, FY20 effort includes incorporating initial performance values for UISS, Knifefish and AN/AQS-20C systems into the MEDAL Tactical Performance Database (TPDB), then analyzing the performance values, and validating effectiveness outputs. FY20 funding will initiate development of MIST. MIST will be a synthetic trainer which provides integrated phase training for MIW staffs in end-to-end MCM scenarios. FY20 work will initially focus on defining user requirements, software design, and software development processes. Initiation of MIST was delayed from FY19 to FY20 due to excess growth budget reduction.</p> <p>FY 2021 Base Plans: In FY21, MINEnet Tactical v1.4 development continues and final performance values for AN/AQS-24C will be incorporated into the Tactical Performance Database, tested, and validated for fleet release. The effort will include updates to the MINEnet Global application as required. Additionally, complete Minefield Planning v1.1 software development. In FY21, the MIST project will develop a prototype for testing and feedback.</p> <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding level decreased due to overall reduction in program funding.</p>					
<p>Title: Engineering Support</p> <p align="right">Articles:</p> <p>FY 2020 Plans: Provide system engineering technical management and execute necessary integrated logistics support and training tasks across the MEDAL EA family of systems, to support the lifecycle of the project. FY20 systems engineering tasks include analysis of requirements and design for MNT v1.4 updates to replace end-of-life COTS products, allocation of requirements to baseline, preparation of engineering change proposals to initiate development of MINEnet Tactical v1.4 capability, and configuration management to document changes to the baseline. Additionally, finalize MEDAL EA software performance specification and prepare for software functional review in FY21. Continue maintenance of integrated logistics and training documents and processes (e.g. LCSP, NTSP, DEMIL, Maintenance. and Obsolescence plans) to support ILS certification and to ensure fielded systems are supported. Execute system upgrades to fielded systems to ensure cybersecurity compliance. Perform MIW Integrated Synthetic Trainer (MIST) requirements analysis, draft software function</p>	2.395	4.128	2.789	0.000	2.789
	-	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy				Date: February 2020	
Appropriation/Budget Activity 1319 / 4		R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>		Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>	
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
and software requirements specification with sufficient detail to inform System Functional Review/System Requirements Review (SFR/SRR) and begin agile software development.					
FY 2021 Base Plans: Continue systems engineering technical management for MEDAL EA MINEnet Tactical v1.4 development, assess critical issues and manage process to incorporate fixes. Conduct requirements analysis, prepare engineering change proposals and conduct configuration management for Minefield Planning v1.1 software update. Perform system functional review for MEDAL EA. Conduct requirements analysis of overall MEDAL backlog, allocate requirements to future builds. Provide technical integration of developed algorithms and models that have demonstrated the required level of maturity for transition.					
In FY21, MIW Integrated Synthetic Trainer (MIST) systems engineering will support development and assessment of prototype capabilities.					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement: Funding level decreased due to overall reduction in program funding.					
Title: Test and Evaluation					
Articles:					
	0.620	1.041	0.930	0.000	0.930
	-	-	-	-	-
FY 2020 Plans: Continue system release candidate testing activities for each MEDAL version, continue integration and certification with host networks with multiple platforms including LCS MCM MPAS, ISNS, CANES, ONENET, NMCI. Continue Cybersecurity patching and assessments.					
FY 2021 Base Plans: Continue annual integration testing activities multiple platforms including LCS MCM MPAS, ISNS, CANES, ONENET, NMCI integration tests. Continue Cybersecurity patching and assessments.					
FY 2021 OCO Plans: N/A					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020			
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>				
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)						
		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Funding level remains consistent for MEDAL test and evaluation efforts.						
Title: Management Services		0.688	0.776	0.980	0.000	0.980
Articles:		-	-	-	-	-
FY 2020 Plans: Continue to provide program management support and travel oversight for MEDAL program. Program management shall include overall technical guidance and leadership for the program. Oversight of financial and logistics efforts. Coordination with Navy and other DoD organizations as required to ensure successful execution of the program. Communicate and coordinate with other program office tasking to include briefings, demonstrations, project planning, and project status as required.						
MIST project manager will provide program management leadership for the MIST project. develop project planning Program management shall include overall technical guidance and leadership for the program. Oversight of financial and logistics efforts. Coordination with Navy and other DoD organizations as required to ensure successful execution of the program. Communicate and coordinate with other program office tasking to include briefings, demonstrations, project planning, and project status as required.						
FY 2021 Base Plans: Continue to provide program management support and travel oversight for MEDAL program. Program management shall include overall technical guidance and leadership for the program. Oversight of financial and logistics efforts. Coordination with Navy and other DoD organizations as required to ensure successful execution of the program. Communicate and coordinate with other program office tasking to include briefings, demonstrations, project planning, and project status as required.						
MIST project manager will provide program management leadership for the MIST project. Program management shall include overall technical guidance and leadership for the program. Oversight of financial and logistics efforts. Coordination with Navy and other DoD organizations as required to ensure successful execution of the program. Communicate and coordinate with other program office tasking to include briefings, demonstrations, project planning, and project status as required.						
FY 2021 OCO Plans: N/A						
FY 2020 to FY 2021 Increase/Decrease Statement:						

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Increased funding in FY21 will support required management support to successfully field MEDAL EA.					
Accomplishments/Planned Programs Subtotals	7.637	10.763	9.292	0.000	9.292

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• 2622/LV075: <i>Mine Sweeping Replacement (MEDAL).</i>	1.021	0.000	0.000	-	0.000	0.362	0.611	0.623	0.000	0.000	14.383

Remarks

D. Acquisition Strategy

Mine Warfare and Environmental Decision Aids Library (MEDAL) is U.S. Navy's single Mine Warfare (MIW) tactical decision support system for integrated mission planning, evaluation, and situational awareness. FY19 was the last year of the prime contract and the systems engineering and software development efforts will transition to government teams at the Naval Surface Warfare Center, Panama City Division (NSWC PCD), Panama City, FL. MEDAL is currently a pre-acquisition category IV-monitor program and plans to enter the acquisition process at Milestone B. MEDAL will follow the DoD acquisition model for incrementally deployed software-intensive systems.

The sole source prime contract completed on 30 Sept 2019. Software development will be accomplished by the Naval Surface Warfare Center Panama City Division, Panama City, FL from this point forward.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
MEDAL EA	C/CPAF	SAIC : McLean, VA	1.336	1.574	Oct 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MEDAL EA & MIW Integrated Synthetic Training (MIST)	SS/IDIQ	Various : Various	0.000	0.000		0.700	Nov 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Medal EA & MIW Integrated Synthetic Training (MIST)	WR	NSWC PCD : Panama City FL	0.000	2.360	Oct 2018	4.118	Oct 2019	4.593	Oct 2020	-		4.593	Continuing	Continuing	Continuing
Subtotal			1.336	3.934		4.818		4.593		-		4.593	Continuing	Continuing	N/A

Remarks
FY 2017 and prior funding in Program Element (PE) 0603502N.

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
MEDAL EA & MIW Integrated Synthetic Training (MIST)	WR	NSWC PC : Panama City FL	0.423	2.395	Oct 2018	3.278	Oct 2019	2.789	Oct 2020	-		2.789	Continuing	Continuing	Continuing
MEDAL EA & MIW Integrated Synthetic Training (MIST)	C/IDDQ	TBD : TBD	0.000	0.000		0.850	Jun 2020	0.000		-		0.000	Continuing	Continuing	Continuing
Subtotal			0.423	2.395		4.128		2.789		-		2.789	Continuing	Continuing	N/A

Remarks
FY 2017 and prior funding in Program Element (PE) 0603502N.

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
MEDAL EA	C/CPAF	SAIC : McLean, VA	0.675	0.124	Oct 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
MEDAL EA & MIW Integrated Synthetic Training (MIST)	WR	NSWC PCD : Panama City, FL	0.000	0.496	Oct 2018	1.041	Oct 2019	0.930	Oct 2020	-		0.930	Continuing	Continuing	Continuing
Subtotal			0.675	0.620		1.041		0.930		-		0.930	Continuing	Continuing	N/A

Remarks
FY 2017 and prior funding in Program Element (PE) 0603502N.

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
MEDAL	WR	NSWC PC : Panama City FI	0.608	0.688	Oct 2018	0.776	Oct 2019	0.980	Oct 2020	-		0.980	Continuing	Continuing	Continuing
Subtotal			0.608	0.688		0.776		0.980		-		0.980	Continuing	Continuing	N/A

Remarks
FY 2017 and prior funding in Program Element (PE) 0603502N.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.042	7.637	10.763	9.292	-	9.292	Continuing	Continuing	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MEDAL				
Acquisition Milestones: Milestone B	2	2021	2	2021
System Development: MEDAL EA Development: MEDAL EA Minefield Planning (MP) Development	1	2019	2	2019
System Development: MEDAL EA Development: MEDAL EA Development MINENet Tactical V1.3	1	2019	1	2020
System Development: MEDAL EA Development: MEDAL EA Development MINENet Tactical V1.4	2	2020	4	2022
System Development: MEDAL EA Development: MEDAL EA Development MINENet Tactical V1.5	1	2023	4	2023
System Development: MEDAL EA Development: MEDAL EA Development MINENet Tactical V1.6	2	2024	2	2025
System Development: MEDAL EA Development: MEDAL EA Minefield Planning v1.1 (MFP) Development	1	2021	4	2021
System Development: MEDAL EA Development: MEDAL EA Minefield Planning v1.2 (MFP) Development	1	2024	2	2024
System Development: MEDAL EA Development: MEDAL EA MINENet Tactical v1.2 Training Development	2	2019	2	2020
System Development: MEDAL EA Development: MEDAL EA MINENet Tactical v1.3 Training Development	3	2020	2	2021
System Development: MEDAL EA Development: MEDAL EA MINENet Tactical v1.5 Training Development	2	2024	2	2025
System Development: MEDAL EA Development: MEDAL Tactical Performance Database update 1	3	2020	3	2020

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy			Date: February 2020	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)		
1319 / 4	PE 0604127N / <i>Surface Mine Countermeasures</i>	1235 / <i>Mine Warfare Planning and Analysis</i>		
Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
System Development: MEDAL EA Development: MEDAL Tactical Performance Database update 2	1	2021	1	2021
System Development: MEDAL EA Development: MEDAL Tactical Performance Database update 3	1	2022	1	2022
System Development: MEDAL EA Development: MEDAL Tactical Performance Database update 4	3	2022	3	2022
System Development: MEDAL EA Development: MEDAL Tactical Performance Database update 5	2	2023	2	2023
System Development: MEDAL EA Development: MEDAL EA Logistics: ILS Cert for ships 1	4	2019	4	2019
System Development: MEDAL EA Development: MEDAL EA Logistics: ILS Cert for ships 2	4	2020	4	2020
System Development: MIW Integrated Synthetic Training (MIST) Development: MIW Integrated Synthetic Training (MIST) Development V1.0	2	2020	1	2022
System Development: MIW Integrated Synthetic Training (MIST) Development: MIW Integrated Synthetic Training (MIST) Development V1.1	4	2022	1	2024
Test and Evaluation: MEDAL EA T&E: MEDAL EA MFP Test & Evaluation	3	2019	4	2019
Test and Evaluation: MEDAL EA T&E: MEDAL EA Test & Evaluation MINENet Tactical V1.3.0	3	2019	3	2019
Test and Evaluation: MEDAL EA T&E: MEDAL EA Test & Evaluation MINENet Tactical V1.3.1	2	2020	2	2020
Test and Evaluation: MEDAL EA T&E: MEDAL EA Test & Evaluation MINENet Tactical V1.4	1	2023	1	2023
Test and Evaluation: MEDAL EA T&E: MEDAL EA Test & Evaluation MINENet Tactical V1.5	1	2024	1	2024
Test and Evaluation: MEDAL EA T&E: MEDAL EA Test & Evaluation MINENet Tactical V1.6	2	2025	2	2025
Test and Evaluation: MEDAL EA T&E: MEDAL EA Test & Evaluation MINENet Tactical V1.7	2	2024	2	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Test and Evaluation: MEDAL EA T&E: MEDAL EA Test & Evaluation MINENet Tactical V1.8	2	2025	2	2025
Test and Evaluation: MEDAL EA T&E: MEDAL EA MFP v1.1 Test & Evaluation	1	2022	1	2022
Test and Evaluation: MEDAL EA T&E: MEDAL EA MFP v1.2 Test & Evaluation	2	2024	2	2024
Test and Evaluation: MEDAL EA T&E: MINEnet Tactical and CANES Integration Testing 1	3	2019	3	2019
Test and Evaluation: MEDAL EA T&E: MINEnet Tactical and NETC2 Integration Testing	4	2019	1	2020
Test and Evaluation: MEDAL EA T&E: MINEnet Tactical and ISNS Integration Testing	1	2020	2	2020
Test and Evaluation: MEDAL EA T&E: MINEnet Tactical and CANES Integration Testing 2	3	2020	3	2020
Test and Evaluation: MIW Integrated Synthetic Training (MIST) T&E: MIST Fleet Prototype Assessment Test and Evaluation	3	2021	3	2021
Test and Evaluation: MIW Integrated Synthetic Training (MIST) T&E: MIST Shore-Based Test Event 1	4	2022	4	2022
Test and Evaluation: MIW Integrated Synthetic Training (MIST) T&E: MIST Shore-based Test Event 2	3	2024	3	2024
Delivery Milestones: MEDAL EA Fielding: MEDAL EA MINENet Tactical V1.2.x Fielding	1	2019	2	2020
Delivery Milestones: MEDAL EA Fielding: MEDAL EA MFP V1.0 Fielding	4	2020	4	2020
Delivery Milestones: MEDAL EA Fielding: MEDAL EA Fielding MINENet Tactical V1.3	3	2020	2	2021
Delivery Milestones: MEDAL EA Fielding: MEDAL EA Fielding MINENet Tactical V1.4	2	2023	2	2024
Delivery Milestones: MEDAL EA Fielding: MEDAL EA Fielding MINENet Tactical V1.5	2	2024	2	2025
Delivery Milestones: MEDAL EA Fielding: MEDAL EA Fielding MINENet Tactical V1.6	4	2025	4	2025
Delivery Milestones: MEDAL EA Fielding: MEDAL EA MFP V1.1 Fielding	2	2022	2	2022
Delivery Milestones: MEDAL EA Fielding: MEDAL EA MFP V1.2.x Fielding	3	2024	3	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0604127N / <i>Surface Mine Countermeasures</i>	Project (Number/Name) 1235 / <i>Mine Warfare Planning and Analysis</i>

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Delivery Milestones: MIW Integrated Synthetic Training (MIST) Fielding: MIST V1.0 Fielding	1	2023	3	2023
Delivery Milestones: MIW Integrated Synthetic Training (MIST) Fielding: MIST V1.1 Fielding	4	2024	1	2025