Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0101226N *I Submarine Acoustic War Dev*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	60.250	6.548	37.693	64.752	-	64.752	-	-	-	-	-	-
1265: *Sub Defensive Warfare*	60.250	6.548	11.505	16.887	-	16.887	-	-	-	-	-	-
1267: *Compact Rapid Attack Weapon (CRAW)*	0.000	0.000	13.363	44.854	-	44.854	-	-	-	-	-	-
1268: *Non-Traditional Acoustic Communications (NTAC)*	0.000	0.000	3.325	3.011	-	3.011	-	-	-	-	-	-
9999: *Congressional Adds*	0.000	0.000	9.500	0.000	-	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Submarine Acoustic Warfare (SAWS) Development Program includes Submarine Torpedo Defense System (SubTDS), Compact Rapid Attack Weapon (CRAW) and Non-Traditional Acoustic Communications (NTAC). The SAWS Development Programs improve the survivability of all U.S. Submarines. The SubTDS efforts include acoustic countermeasures, submarine defense capabilities, external launch systems, all acoustic augmentation systems for the U.S. Navy submarines and Undersea Defense Working Group (UDWG). The Compact Rapid Attack Weapon (CRAW) and Non-Traditional Acoustic Communications (NTAC) efforts begin in FY21.

Project 1265 SubTDS

The ADC MK 5 acoustic countermeasure (ACAT III) developmental contract awarded in Sep 2018 and is currently in the Engineering and Manufacturing Development (E&MD) phase. The first development (Increment 1) effort of the overall SubTDS program is focused on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the fleet. The ADC MK5 development will result in delivering fully functional test units and Engineering Development Model (EDM) variants. The ADC MK5 will bring new technologies including adaptability packaged in a three-inch diameter body. The ADC MK5 efforts support on-going development including component and subsystem design, in support of the Preliminary Design Review (PDR). Completion of the Critical Design Review (CDR) and contract award for procurement of multiple ADC MK5 EDM countermeasure variants will occur in 3Q FY22.

FY22 funding will build and deliver four (4) Countermeasure Control Tools (CCT), and will begin the production for eight (8) Special Test Units ((4) STU-E's (4) STU's), and seventeen (17) EDM-1.Completion of the Critical Design Review (CDR) will occur in FY22. EDM-2 development and prototyping will continue in preparation to begin production and deliveries in FY23.

EDM-2 development and prototyping will continue in preparation for FY23 deliveries. The next development (Increment 2) effort focuses on the development of the External Countermeasure Launcher (ECL) 6-inch acoustic countermeasure, Tactical Decision Aid, and integration of communication interfaces with ship systems for enabling improved adaptive capabilities leading up to a contract award in FY26.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
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The Undersea Defense Working Group (UDWG) is a working group comprised of fleet, resource sponsor, (testing community) and acquisition community representatives to assess fleet threats and the effectiveness of our countermeasure and systems against these threats, both known and projected. This includes associated studies, demonstrations, models, and simulations. The Technical Direction Agent (TDA) and In-Service Engineering Agent (ISEA) will provide hardware and software development support for Acoustic Devices Countermeasure (ADC) as well as Countermeasures Set, Acoustic (CSA) systems, future variants, and Acoustic Augmentation Support Systems (AASS) in the Acoustic Augmentation Support Program (AASP), and advanced communication systems improvements in support of the AASP, including component level technical insertion.

Project 1267 Compact Rapid Attack Weapon (CRAW)

1. Compact Rapid Attack Weapon (CRAW) Development Design
CRAW is a very lightweight torpedo that can double as a submarine hard kill countermeasure. The Office of Naval Research (ONR) developed the initial CRAW design to be a multi- platform and multi-mission weapon. This program will finish design gaps in the CRAW hardware and transition the technology into a production ready design. In addition, it will mature the software currently in development under an ONR Future Naval Capability (FNC) program and transition it into CRAW baseline system. The program will establish a baseline production design, incrementally improve software through Advanced Processor Build (APB) software upgrades, test and qualify the system for safe operations, and stand-up a production line to achieve full rate production.

In FY2022 the program will complete the TI-2 design and stand-up an initial production line by procuring special test equipment, material, tooling, and begin assembly of 20 TI-2 prototypes. In addition, the program will finish the warhead design, test APB-1 software build, and begin development work for the APB-2 software build.

2. Compact Rapid Attack Weapon (CRAW) Submarine Integration
Integration of CRAW into the external countermeasure launcher (ECL) assembly and the upgrades to the combat systems supports pre-planning and launch control of the CRAW. This effort requires upgrades to the submarine combat system as a part of the Submarine Federated and Warfare Tactical Systems (SWFTS) modernization cycle. The major components requiring hardware and software upgrades to support CRAW include the ECL assembly, Countermeasure Set Acoustic (CSA) launcher, BYG-1 combat system, and Common Weapon Launcher (CWL). The upgrades will come in two initial phases with a Tactical Temporary Alteration (TEMPALT) to Technical Insertion 20 (TI-20) for installation of capability on Virginia (VA) Block (BLK) III/IV ships in FY24, and then a permanent Ship Alteration (SHIPALT) in TI-24 for all VA class hulls. In addition, the necessary TEMPALT and SHIPALT documentation (e.g. design changes, safety reports, test reports, etc.) required for installation aboard a submarine will be developed. An integrated test program and operational testing with the Navy's Command Operational Test and Evaluation Force will be conducted post installation.

In FY2022 the program will complete the Study TEMPALT data package and demonstrate the launch of a CRAW from an ECL on a submarine. This test will inform the final Tactical Mission TEMPALT needed for early integration and install of CRAW on a submarine in FY24-FY25. The program will also continue development of upgrades necessary to support CRAW launch and control from the BYG-1 combat system.

Project 1268 Non-Traditional Acoustic Communications (NTAC)

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0101226N *I Submarine Acoustic War Dev*

This capability provides advanced undersea acoustic communications across multiple platforms within the Navy. This program builds upon the baseline NTAC software capability and integrates the software components into new hardware to expand the effectiveness and reliability of the capability. Additional details are available at the classified level.

The SAWS Development Program transitions the research and development of new technologies and capabilities generated under the Future Naval Capabilities (FNC), Small Business and Innovative Research (SBIR), and other Research, Development, Test & Evaluation (RDT&E) initiatives. Hardware and software evaluations in representative acoustic environments, against projected threats utilizing digital and hardware-in-the-loop simulations determines the effectiveness and impact on improving submarine survivability. The technology is then integrated into the appropriate product line. Additionally, this effort also includes advanced studies, product development and improvements for Submarine Acoustic Warfare Systems (SAWS) including but not limited to AASP, CSA, SubTDS, CRAW and NTAC.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	6.815	69.190	92.483	-	92.483
Current President's Budget	6.548	37.693	64.752	-	64.752
Total Adjustments	-0.267	-31.497	-27.731	-	-27.731
• Congressional General Reductions	-	-0.309			
• Congressional Directed Reductions	-	-40.688			
• Congressional Rescissions	-	-			
• Congressional Adds	-	9.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.267	0.000			
• Program Adjustments	0.000	0.000	-26.287	-	-26.287
• Rate/Misc Adjustments	0.000	0.000	-1.444	-	-1.444

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 9999: *Congressional Adds*		
Congressional Add: *Acoustic Device Countermeasures*	0.000	9.500
Congressional Add Subtotals for Project: 9999	0.000	9.500
Congressional Add Totals for all Projects	0.000	9.500

Change Summary Explanation

FY22 budget net reduction for the removal of the SEA Devil Demonstration, increase support for integration of mobility into the ADC MK5, and CRAW funding re-phase to align to schedule.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*	Project (Number/Name) 1265 / *Sub Defensive Warfare*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
1265: *Sub Defensive Warfare*	60.250	6.548	11.505	16.887	-	16.887	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Submarine Acoustic Warfare (SAWS) Development Program develops acoustic countermeasures, submarine defense capabilities, external launch systems and all acoustic augmentation systems for the U.S. Navy submarines. The SAWS Development Program is comprised of the Submarine Defensive Warfare Program, which improves the survivability of all U.S. Submarines.

SubTDS
The ADC MK 5 acoustic countermeasure (ACAT III) developmental contract awarded in Sep 2018 and is currently in the Engineering and Manufacturing Development (E&MD) phase. The first development (Increment 1) effort of the overall SubTDS program is focused on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the fleet. The ADC MK5 development will result in delivering fully functional test units and Engineering Development Model (EDM) variants. The ADC MK5 will bring new technologies including adaptability packaged in a three-inch diameter body. The ADC MK5 efforts support on-going development including component and subsystem design, in support of the Preliminary Design Review (PDR). In FY21 program re-baselined as a result of funding shortfalls in FY20, technical challenges with the acoustic design and program delays due to authority to operate approvals with the acoustic design vendor. Efforts to procure material to support buildup of test articles shifted to FY21. Completion of the Critical Design Review (CDR) and contract award for procurement of multiple ADC MK5 EDM countermeasure variants will occur in FY22, which is a change from the FY 2021 submission.

FY22 funding will deliver four (4) Countermeasure Control Tools (CCT), eight (8) Sonar Test Units ((4) STU-E's (4) STU's), and seventeen (17) EDM-1. FY22 will include the Test Readiness Review (TRR) for EDM-1 and in water developmental testing for these units. FY22 will complete the Critical Design Review (CDR).

EDM-2 development and prototyping will continue in preparation for FY23 deliveries. The next development (Increment 2) effort focuses on the development of the External Countermeasure Launcher (ECL) 6-inch acoustic countermeasure, Tactical Decision Aid, and integration of communication interfaces with ship systems for enabling improved adaptive capabilities leading up to a contract award in FY26.

The Undersea Defense Working Group (UDWG) is a working group comprised of fleet, resource sponsor, (testing community) and acquisition community representatives to assess fleet threats and the effectiveness of our countermeasure and systems against these threats, both known and projected. This includes associated studies, demonstrations, models, and simulations. The Technical Direction Agent (TDA) and In-Service Engineering Agent (ISEA) will provide hardware and software development support for Acoustic Devices Countermeasure (ADC) as well as Countermeasures Set, Acoustic (CSA) systems, future variants, and Acoustic Augmentation Support Systems (AASS) in the Acoustic Augmentation Support Program (AASP), and advanced communication systems improvements in support of the AASP, including component level technical insertion.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Submarine Torpedo Defense System (SubTDS)	6.548	11.505	16.887	0.000	16.887
Articles:	-	29	122	-	122
Description: The ADC MK5 Acoustic Countermeasure (ACAT III) developmental contract awarded in Sep 2018 and is currently in the Engineering & Manufacturing phase. The first effort of addressing the overall SubTDS program focuses on delivering full internal countermeasure launcher functionality providing the ADC MK5 capability to all submarines in the fleet.					
FY 2021 Plans: - Complete program cost and schedule re-baselining efforts. - Continue ADC MK5 EDM design and prototype Builds. - Continue M&S assessment of known and projected torpedo threats. - Continue development of required program documentation. - Continue development of concept of operations and operational tactics. - Continue assessment of Threat for UDWG and WAF with updated vulnerability assessments. - Completion of Preliminary Design Review (PDR) - Initiate procurement of long lead items for four (4) Configuration Control Tool (CCT) for remotely programming and reprogramming the ADC MK 5, checking the ADC MK 5 device's status in-situ and retrieving recorded test data from the STU and EDM-1 devices. - Initiate procurement of long lead items for four (4) ADC MK 5 STUs to be utilized for the Government's preliminary acoustic testing. - Initiate procurement of long lead items for four (4) ADC MK 5 STU-E to be utilized for Hardware-In-the-Loop (HWIL) integration into the Weapons Analysis Facility (WAF) at the Naval Undersea Warfare Center, Division Newport (NUWCDIVNPT). - Initiate procurement of long lead items seventeen (17) EDM-1 countermeasures test articles to be utilized in preliminary system testing, and shall be recovered and re-used. - Approval of Acquisition Program Baseline (APB) and Test and Evaluation Master Plan (TEMP)					
FY 2022 Base Plans: - Continue ADC MK5 EDM design and prototype builds. - Conduct ADC MK5 Critical Design Review (CDR). - Continue M&S assessment of known and projected torpedo threats. - Continue development of required program documentation. - Continue development of concept of operations and operational tactics.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Continue assessment of Threat for UDWG and WAF with updated vulnerability assessments. - Deliver four (4) CCT. - Test Readiness Review (TRR) for STU/STU-E. - Initiate procurement of long lead items for twenty (20) EDM-2EQT to be utilized for Environmental Qualification Testing (EQT) - Initiate procurement of long lead items for three (3) EDM-2T to be utilized for Hazards of Electromagnetic Radiation to Ordnance (HERO) Testing - Initiate procurement of long lead items for ninety nine (99) EDM-2 to be utilize for in-water testing ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 increase due to start production of CCT, STU, STU-E, EDM-1 and begin procurement of EDM-2.					
Accomplishments/Planned Programs Subtotals	6.548	11.505	16.887	0.000	16.887

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• OPN/2210: *Submarine Acoustic Warfare System*	22.331	26.066	24.578	-	24.578	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Submarine Acoustic Warfare System (SAWS) develops Undersea Defensive Warfare technologies to improve the survivability of all U.S. Submarine classes.

SUBTDS

Through a full and open competition, the ADC MK5 development contract awarded in Sep 2018. The Cost Plus Incentive Fee (CPIF) contract funds the design and development of Engineering Development Model (EDM) variants, Technical Data Packages (TDP), and Low-Rate Initial Production (LRIP) units for accomplishing Operational Testing (OT). The Program ADC MK5 contractor subsystem testing and joint contractor/Navy Development Testing (DT) will occur in FY23 through FY25 and Navy OT in FY26. Milestone C is nominally in FY26. Initial Operational Capability (IOC) is nominally FY27 for the Internal Countermeasure Launcher (ICL) configuration. After successfully completing OT and Full Rate Production Decision Review (FRP DR), award of a full and open competitive production contract occurs in FY27. APB and TEMP will be approved in FY21. The next development effort for addressing the overall SubTDS program will begin in FY26 and focus on the

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

development of the External Countermeasure Launcher (ECL) 6-inch acoustic countermeasure. Development of the acquisition strategy will begin in FY21, with a contract award in FY26.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*	Project (Number/Name) 1265 / *Sub Defensive Warfare*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS WAF ANALYSIS UDWG	WR	NUWC : NEWPORT, RI	13.069	0.000		0.000		0.000		-		0.000	-	-	-
SubTDS SYSYTEM ENGINEERING	WR	NUWC : NEWPORT, RI	14.301	0.815	Dec 2019	1.514	Dec 2020	1.536	Nov 2021	-		1.536	-	-	-
SubTDS ADC MK5 New Development	C/CPIF	LEIDOS : RESTON, VA	9.578	4.900	Dec 2019	8.211	Dec 2020	11.663	Nov 2021	-		11.663	-	-	-
SubTDS ADC MK5 SYSTEM ENGINEERING	WR	NUWC : KEYPORT, WA	4.915	0.195	Dec 2019	0.440	Dec 2020	0.200	Nov 2021	-		0.200	-	-	-
SubTDS Modeling And Simulation	WR	NUWC : NEWPORT, RI	6.294	0.500	Dec 2019	0.550	Dec 2020	1.850	Nov 2021	-		1.850	-	-	-
SubTDS Tactical Decision Aid TacDA	WR	NUWC : NEWPORT, RI	6.481	0.000		0.000		0.000		-		0.000	-	-	-
Acoustic Augmentation Support Program (AASP)	WR	NUWC : NEWPORT, RI	0.435	0.000		0.000		0.000		-		0.000	-	-	-
Sabot Development	WR	NUWC : NEWPORT, RI	1.270	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	56.343	6.410		10.715		15.249		-		15.249	-	-	N/A

Remarks

FY22 funding will build and deliver four (4) Countermeasure Control Tools (CCT), and start production of eight (8) Special Test Units ((4) STU-E's (4) STU's) and seventeen (17) EDM-1 devices that are recoverable, rechargeable, and reusable. EDM-2 prototyping will begin in FY22 in preparation to start deliveries in FY23.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS System Test and Evaluation	WR	NUWC : NEWPORT, RI	0.000	0.000	Dec 2019	0.318	Dec 2020	1.258	Nov 2021	-		1.258	-	-	-
		Subtotal	0.000	0.000		0.318		1.258		-		1.258	-	-	N/A

Remarks

FY22 will include testing for the four (4) Countermeasure Control Tools (CCT) procured in FY21. FY22 will include the Test Readiness Review (TRR) for STU/STU-E.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War D ev*	Project (Number/Name) 1265 / *Sub Defensive Warfare*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SAWS TRAVEL	WR	NAVSEA : Washington, DC	0.842	0.000	Oct 2019	0.040	Oct 2020	0.040	Oct 2021	-		0.040	-	-	-
SubTDS PROGRAM MANAGEMENT SUPPORT	C/CPAF	TECH MARINE : Washington, DC	0.900	0.000		0.000		0.000		-		0.000	-	-	-
SubTDS PROGRAM MANAGEMENT SUPPORT	C/CPAF	BOOZ ALLEN : Washington, DC	2.165	0.138	Feb 2020	0.432	Feb 2021	0.000		-		0.000	-	-	-
SubTDS PROGRAM MANAGEMENT SUPPORT	C/CPAF	Synchron : Washington, DC	0.000	0.000		0.000		0.340	Jun 2022	-		0.340	-	-	-
		Subtotal	3.907	0.138		0.472		0.380		-		0.380	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	60.250	6.548		11.505		16.887		-		16.887	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

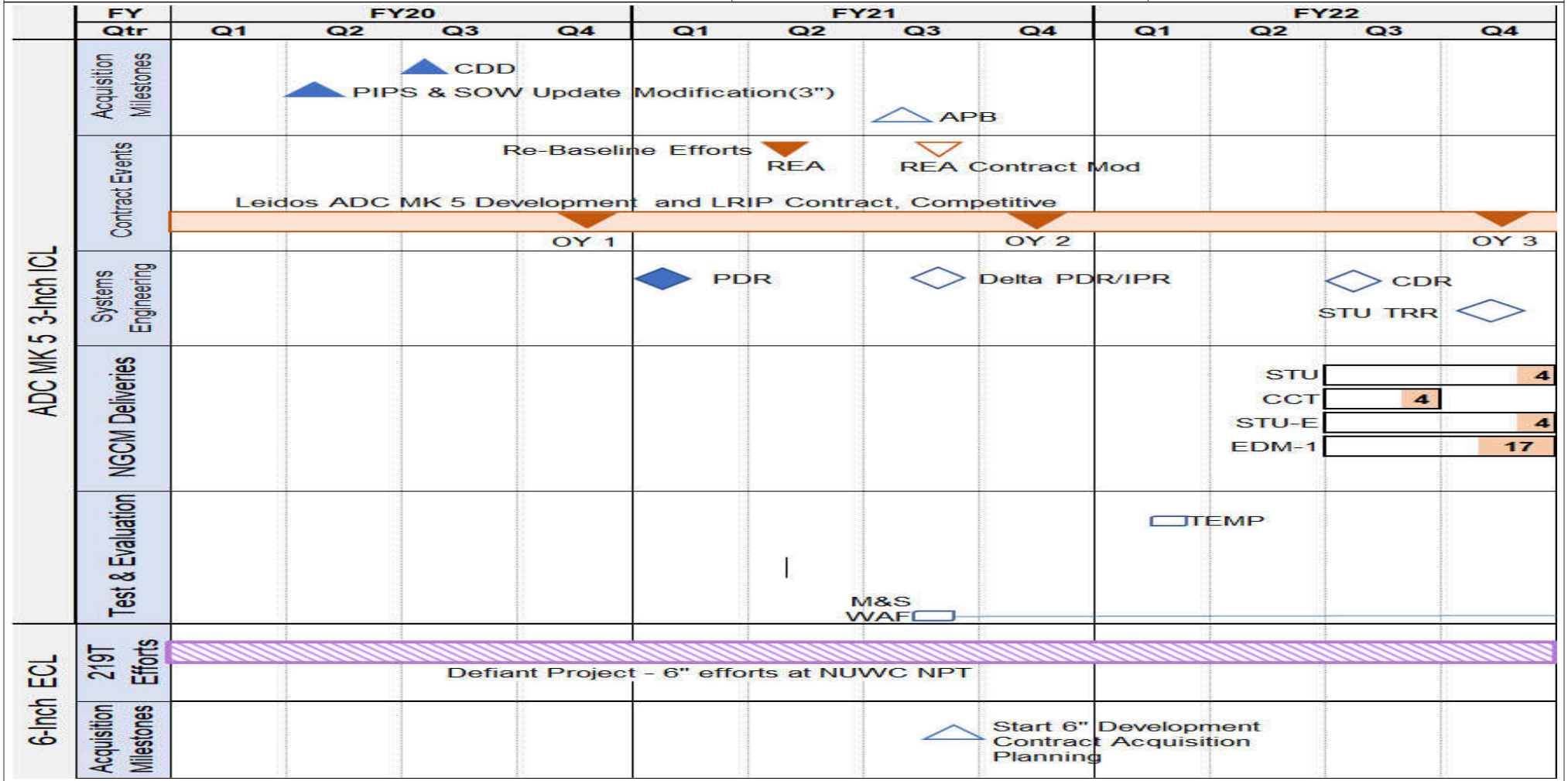

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1265 / *Sub Defensive Warfare*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1265				
Weapons Analysis Facility (WAF): Countermeasure (CM) Effectiveness/Weapon Analysis Facility (WAF) Vulnerability	1	2021	4	2022
Submarine Torpedo Defense Systems (SubTDS): SubTDS M&S	1	2020	4	2022
Submarine Torpedo Defense Systems (SubTDS): TEMP Development	1	2020	4	2020
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 Critical Design Review (CDR)	3	2022	3	2022
Submarine Torpedo Defense Systems (SubTDS): EDM-1 Production and Deliveries	3	2022	4	2022
Submarine Torpedo Defense Systems (SubTDS): DT (EDM-1)	4	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*	Project (Number/Name) 1267 / *Compact Rapid Attack Weapon (CRAW)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
1267: *Compact Rapid Attack Weapon (CRAW)*	0.000	0.000	13.363	44.854	-	44.854	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Compact Rapid Attack Weapon (CRAW) Development Design

CRAW is a very lightweight torpedo that can double as an Anti-Submarine Warfare (ASW) and Anti-Torpedo Torpedo (ATT). The Office of Naval Research (ONR) developed the initial CRAW design to be a multi- platform and multi-mission weapon. This program will update the design for the submarine application in the CRAW hardware and transition the technology into a production ready design. In addition, it will mature the software currently in development under an ONR Future Naval Capability (FNC) program and transition it into CRAW baseline system. The program will initially assemble units based upon the existing ONR design (TI-1), and then conduct a design spiral (TI-2) to address obsolescence issues and improve manufacturing necessary for production design. The program will transition and test the ASW software initially developed as part of the ONR FNC, and will develop and test ATT software capability for integration with TI-2 hardware builds. The program will test and qualify the integrated ASW/ATT system for safe operations, and stand-up a production line to achieve full rate production.

Compact Rapid Attack Weapon (CRAW) Submarine Integration
Submarine integration of CRAW into the external countermeasure launcher (ECL) assembly requires upgrades to the combat systems in support of pre-planning and launch control of the CRAW, a new launch tube assembly that fits into the ECL, and ship alteration and modernization planning documents. This effort requires upgrades to the submarine combat system as a part of the Submarine Federated and Warfare Tactical Systems (SWFTS) modernization cycle. The major components requiring hardware and software upgrades to support CRAW include the ECL assembly, Countermeasure Set Acoustic (CSA) launcher, BYG-1 combat system, and Common Weapon Launcher (CWL). The upgrades will come in two initial phases with a Temporary Alteration (TEMPALT) to Technical Insertion 20 (TI-20) for Office of Naval Research (ONR) Future Naval Capabilities (FNC) demonstration launch from a Virginia Class Submarine in FY2023, and then a permanent Ship Alteration (SHIPALT) in TI-24 for VA Blk III/IV class hulls. In addition, the necessary TEMPALT and SHIPALT documentation (e.g. design changes, safety reports, test reports, etc.) required for installation aboard a submarine will be developed. An integrated test program and operational testing with the Navy's Command Operational Test and Evaluation Force will be conducted post installation.

In FY2022 the program will begin a non-tactical TEMPALT data package and demonstrate the launch of a CRAW from an ECL on a submarine in FY2023. This test will inform the final SHIPALT needed for early integration and install of CRAW on a submarine beginning in FY2026. The program will also continue development of upgrades necessary to support CRAW launch and control from the BYG-1 combat system.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Compact Rapid Attack Weapon (CRAW) Development Design	0.000	10.228	39.789	0.000	39.789

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Articles:	-	-	-	-	-

Description: Compact Rapid Attack Weapon (CRAW) development will transition the current ONR design effort into a Middle Tier Acquisition rapid prototyping POR. The CRAW vehicle design and technology will be matured to meet Submarine ASW and Torpedo Defense requirements, system safety and reliability qualification standards, device interface with ship system of system launchers and combat control and development of a technical data package that can be completed for rapid fielding transition for TI-2 production.

FY 2021 Plans:
- Award PSU/ARL UARC contract for completing the ONR configuration
- Continue ONR development of launch tube assembly (LTA) all-up-round design
- Conduct ASW in-water test to support continued ONR FNC SW development
- Conduct Launch Tube test 1 (LT-1)
- Continue execution of ONR FNC system safety program
- Continue ONR development of Safe and Arm (S&A) design
- Develop acquisition documentation for MTA establishment
- Develop CRAW ANNEX to SubTDS CDD
- Release Request for Prototype Proposal (RPP)

FY 2022 Base Plans:
- Obtain Acquisition Decision Memorandum (ADM) approval for MTA rapid prototyping initiation
- Award OTA/UTIC contract and initiate knowledge transfer for future TI-1 to TI-2 transition
- Begin assembly of TI-1 CRAW devices
- Begin design and development of manufacturing test equipment
- Complete ASW software transition from ONR FNC ASW SW configuration
- Conduct in-water performance testing of ASW software
- Continue development of S&A design
- Begin development of Warhead design
- Conduct System Requirements Review (SRR)
- Complete SCEPS Thermite Start Charge development
- Transition from ONR and continue execution of CRAW system safety program
- Continue ONR development of launch tube assembly (LTA) all-up-round design
- Conduct Launch Tube test 2 (LT-2)
- Obtain approval of CRAW ANNEX to SubTDS CDD

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Begin development of program planning documents including Cyber Strategy, System Safety, Systems Engineering Plan, Test Strategy, Life Cycle Sustainment Plan, and Program Life Cycle Cost Estimate ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 increased by $29.561M in total. This increase will procure critical material needed for build-up of 24 TI-1 ASW CRAW devices, procure special test equipment and tooling needed for TI-1 device build-up, Continue the development of CRAW S&A, begin development of Warhead design, award OTA/UTIC contract to initiate knowledge transfer for future TI-1 to TI-2 transition, and continue development of launch tube design. In addition, the increase will support ONR FNC development work for integration of CRAW onto a submarine and software design and testing of CRAW ASW software.					
Title: Compact Rapid Attach Weapon (CRAW) Submarine Integration	0.000	3.135	5.065	0.000	5.065
Articles:	-	-	-	-	-
Description: Compact Rapid Attack Weapon (CRAW) platform design work and systems integration for submarines. This includes the engineering and design effort to modify submarine hardware systems, update the combat system, and create the necessary alteration documentation needed to integrate the CRAW capability onto a submarine. ***FY 2021 Plans:*** - Continue ONR development to combat systems software in support of FNC demonstration - Begin development of countermeasure set, acoustic (CSA) integration with Combat Weapons Launcher (CWL) - Continue ONR development of external countermeasure launch (ECL) design - Continue ONR development of concept of operation and employment - Begin development of Study TEMPALT package for Virginia Class ship in support of FNC demonstration ***FY 2022 Base Plans:*** - Conduct in-water test of launch tube assembly - Update launch tube assembly design based upon testing results - Continue development of External Countermeasure Launcher (ECL) design changes - Perform Critical Design Review of BYG-1 software upgrade					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Develop initial release of combat software (BYG-1) software upgrade - Continue development of countermeasure set, acoustic (CSA) integration with Combat Weapons Launcher (CWL) - Continue development of Study TEMPALT package for Virginia Class ship ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** In FY2022, submarine integration increased $1.93M. FY22 funding profile to continue development of the Virginia Class TEMPALT and develop upgrades to the combat system software (BYG-1) and countermeasure set acoustic (CSA) with CWL integration needed for both CRAW TI-1 and TI-2 configurations.					
Accomplishments/Planned Programs Subtotals	0.000	13.363	44.854	0.000	44.854

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

FY 2021 enacted budget marks resulted in a necessary realignment of the CRAW program acquisition approach and schedule that balanced support of the ongoing ONR FNC configuration development and establishment of CRAW as a Middle Tier Acquisition (MTA). As a result, establishment of CRAW as an MTA was delayed to FY22, and will be accomplished by executing two complementary rapid prototyping development efforts, which will be staggered by one year. This approach will result in the residual delivery of Anti-Submarine (ASW) and Ant-Torpedo Torpedo (ATT) operational capability to VIRGINIA Class submarines.
Listed below are milestones for each MTA across the FYDP:
- FY22 ADM-1 establishing CRAW MTA-1 (delivers ASW capability)
- FY23 ADM-2 establishing CRAW MTA-2 (delivers ATT capability)
- FY23 ONR FNC Demo and technology transfer complete
- FY26 EOC-1 (delivers ASW capability)

ONR FNC/PMS415 shared effort (FY21)
Efforts during this timeframe will focus on ONR FNC demonstration, and preparation for establishment of MTA-1. Planned activities include:
- Award a contract to PSU/ARL in Q3FY21 to complete the ONR FNC configuration in support of the ONR FNC Demonstration.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

- Continue combat system integration efforts to support the TEMPALT needed for the ONR FNC demonstration.
- Prepare required program documentation to support formal MTA-1 establishment in early FY22.
- Issue a Request for Prototype Proposal (RPP) for a four-year (FY22-26) competitive OTA/UTIC contract.

Additional activities in FY21 will include continued development of Safe & Arming capability by NSWC IHEOD. This design will be transitioned to future CRAW T-1 HW.
MTA-1 (FY22-26)
After MTA-1 establishment in FY22, the program will begin efforts to transition the ONR FNC CRAW HW configuration and deliver ASW operational capability to the fleet by EOC-1 in FY26. Planned activities include:
- Begin first Rapid Prototyping Phase (RP-1) in FY22.
- Support the ONR FNC demonstration in FY23 and transfer technology to MTA-1.
- Complete CRAW TI-1 HW and ASW software development, integration, and testing.
- Finalize and qualify the LTA design.
- Develop a SHIPALT package to support EOC-1 installations (mods to BYG-1 Combat System and CWL on VCS).
- Complete S&A device integration and testing.
- Develop Warhead capability and complete integration and qualification by NSWC IHEOD.

Award a four year (FY22-26) competitive OTA/UTIC prototyping contract to Industry for knowledge sharing with PSU/ARL in FY22 and beginning TI-2 hardware development in FY23, upon MTA-2 initiation.

PSU/ARL will execute the first rapid prototyping effort (RP-1) via sole source UARC contract (~$40M) by developing the CRAW TI-1 HW and ASW software baselines while completing the ONR FNC configuration demonstration in FY23. The ONR FNC demo will utilize the production representative LTA configuration for use with the final CRAW ASW baseline configuration. This configuration will result in a final LTA TDP and support EOC-1 in FY26 and EOC-2 in FY27.

NSWC IHEOD will continue integration and testing with TI-1 HW and procure sufficient WH/S&A devices to begin qualification testing in FY24. After qualification testing is completed in FY25, NSWC IHEOD will be responsible for manufacturing the CRAW warhead for all CRAW configurations.

MTA-2 (FY23-27)
During this phase, CRAW TI-2 HW will be developed, and EOC-2 will deliver combined ASW and ATT capability in FY27. MTA-2 will leverage efforts from MTA-1 and use combat control and LTA integration with the VCS ECL to provide these capabilities. Planned activities include:

- Begin the second rapid prototyping phase (RP-2) in FY23.
- Complete CRAW TI-2 HW and ATT software development efforts.
- Industry partner development of TI-2 hardware and build/deliver EDM's. Scope of work will include establishing a producible TI-2 hardware baseline that resolves TI-1 obsolescence and enhances manufacturing methods.
- Integrate a certified WH/S&A device.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

- Transition to initial production of the TI-2 prototype baseline configurations for device/system testing and qualification as an All-Up Round (AUR).

A four-year competitive OTA/UTIC development contract will be solicited to industry and awarded to start transitioning the TI-1 baseline to the TI-2 baseline in FY23. The successful bidder will develop the TI-2 baseline by addressing TI-1 hardware obsolescence, improving manufacturing methods, and enabling the stand-up and establishment of a production line. A follow-on FAR-based sole-source contract will be released in FY26. This contract will support the initial development and production of test articles. Between FY24 to FY25, the industry partner will build and deliver thirty (30) TI-2 CRAW devices for use in qualification testing, Developmental Testing (DT), Live Fire Test and Evaluation (LFT&E).

Concurrently, PSU/ARL will continue to build upon the ASW software baseline to develop the ATT software. The TI-2 configuration will be completed after integrating CRAW TI-2 device hardware with the ATT software baseline along with the previously developed Warhead/S&A.

CRAW Program Submarine Integration
PMS 415 and the CRAW program will be responsible for developing TEMPALT or SHIPALT work packages and for coordinating installations with in-service ship programs during scheduled availabilities.
Initial submarine integration of combat control and ECL launch capability began under the ONR FNC and will continue in FY22 as part of RP-1. The development effort for both the Combat systems and ECL, will provide prototypes that will be qualified for a TI-20 configured VCS and installed via a TEMPALT package in support of the ONR FNC demonstration in FY23, Development will continue and the TEMPALT configuration will be matured. Completing the RP-1 integration effort will result in a SHIPALT to a TI-24 SWFTS baseline submarine in FY26 that will support EOC-1 and EOC-2.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRAW - ONR FNC System Engineering	WR	NUWC : Newport, RI	0.000	0.000		0.500	Mar 2021	1.786	Dec 2021	-		1.786	-	-	-
CRAW - ONR FNC Launch Tube Assembly	WR	Applied Research Laboratory Penn State University : State College, PA	0.000	0.000		1.700	Apr 2021	2.786	Jan 2022	-		2.786	-	-	-
CRAW - Hardware Design (TI-1)	C/CPAF	Applied Research Laboratory Penn State University : State College, PA	0.000	0.000		1.500	Apr 2021	1.525	Jan 2022	-		1.525	-	-	-
CRAW - Software Development	C/CPAF	Applied Research Laboratory Penn State University : State College, PA	0.000	0.000		0.000		2.350	Jan 2022	-		2.350	-	-	-
CRAW - Safe and Arm Design / Development	WR	NSWC : Indian Head, MD	0.000	0.000		2.900	Mar 2021	4.343	Dec 2021	-		4.343	-	-	-
CRAW - Warhead Design Analysis	WR	NSWC : Indian Head, MD	0.000	0.000		0.000		6.100	Dec 2021	-		6.100	-	-	-
CRAW - Systems Engineering (Requirements)	WR	NUWC : Newport, RI	0.000	0.000		1.050	Mar 2021	1.485	Dec 2021	-		1.485	-	-	-
CRAW - Systems Engineering (Safety)	WR	NSWC : Indian Head, MD	0.000	0.000		0.250	Mar 2021	0.750	Dec 2021	-		0.750	-	-	-
CRAW - Systems Engineering (Cyber)	WR	NUWC : Keyport, WA	0.000	0.000		0.196	Mar 2021	0.486	Dec 2021	-		0.486	-	-	-
CRAW - Systems Engineering (Integration)	WR	Applied Research Laboratory Penn State University : State College, PA	0.000	0.000		0.475	Apr 2021	1.929	Dec 2021	-		1.929	-	-	-
CRAW - Systems Engineering (Ship Design Manager	WR	NSWC : Carderock, MD	0.000	0.000		0.035	Mar 2021	0.150	Dec 2021	-		0.150	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRAW - Systems Engineering (Requirements)	C/CPFF	Amentum : Washington, DC	0.000	0.000		0.150	Apr 2021	0.200	Dec 2021	-		0.200	-	-	-
CRAW - Engineering Developmental Models (TI-1) Assembly	C/CPAF	Applied Research Laboratory Penn State University : State College, PA	0.000	0.000		0.000		2.286	Jan 2022	-		2.286	-	-	-
CRAW - Modeling and Simulation	WR	NUWC : Newport, RI	0.000	0.000		0.000		2.786	Jan 2022	-		2.786	-	-	-
CRAW - Modeling and Simulation	C/CPFF	Applied Research Laboratory Penn State University : State College, PA	0.000	0.000		0.000		0.300	Jan 2022	-		0.300	-	-	-
CRAW - Integrated Logistics Planning	WR	NUWC : Keyport, WA	0.000	0.000		0.000		0.770	Dec 2021	-		0.770	-	-	-
CRAW - Integration - Ship Alteration Design	WR	NUWC : Newport, RI	0.000	0.000		0.500	Mar 2021	1.475	Dec 2021	-		1.475	-	-	-
CRAW - Integration - Combat System ECL Control	WR	NUWC : Keyport, WA	0.000	0.000		0.000		0.700	Dec 2021	-		0.700	-	-	-
CRAW - Integration - Combat Systems Integration	C/CPAF	Progeny : Washington, DC	0.000	0.000		0.400	Mar 2021	2.687	Jan 2022	-		2.687	-	-	-
CRAW Integration - Combat System Systems Engineering	WR	NUWC : Newport, RI	0.000	0.000		1.200	Mar 2021	1.000	Dec 2021	-		1.000	-	-	-
CRAW - Integration - CSA/ CWL development	C/CPAF	General Dyamics Electric Boat : Not Specified	0.000	0.000		1.500	Mar 2021	1.210	Jan 2022	-		1.210	-	-	-
CRAW - Hardware Design (TI-2)	C/CPFF	TBD : TBD	0.000	0.000		0.000		2.000	Mar 2022	-		2.000	-	-	-
		Subtotal	0.000	0.000		12.356		39.104		-		39.104	-	-	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*	Project (Number/Name) 1267 / *Compact Rapid Attack Weapon (CRAW)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

FY2022 Product Development increase of $30.169M to CRAW TI-1 baseline development, TI-1 EDM assembly, CSA/CWL integration for future SHIPALTs, support systems engineering, Warhead development, S&A development, systems safety, model development, cybersecurity and ILS for CRAW TI-1.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRAW - Test Planning	WR	NUWC : Keyport, RI	0.000	0.000		0.075	Mar 2021	0.500	Dec 2021	-		0.500	-	-	-
CRAW - Test Planning	WR	COMPOTEVFOR : Norfolk, VA	0.000	0.000		0.000		0.250	Dec 2021	-		0.250	-	-	-
CRAW - ONR FNC In Water Testing	WR	NUWC : Keyport, WA	0.000	0.000		0.200	Mar 2021	1.000	Dec 2021	-		1.000	-	-	-
CRAW - APB-1 Testing	WR	NUWC : Keyport, WA	0.000	0.000		0.350	Mar 2021	1.100	Dec 2021	-		1.100	-	-	-
CRAW - Test Asset Preparation	C/CPFF	Applied Research Laboratory Penn State University : State College, PA	0.000	0.000		0.000		1.800	Jan 2022	-		1.800	-	-	-
		Subtotal	0.000	0.000		0.625		4.650		-		4.650	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRAW - Program Management Support	C/CPAF	Booz Allen Hamilton : Washington, DC	0.000	0.000		0.375	Apr 2021	0.000		-		0.000	-	-	-
CRAW Travel	WR	NAVSEA : Washington, DC	0.000	0.000		0.007	Mar 2021	0.100	Dec 2021	-		0.100	-	-	-
CRAW - Program Management Support	C/CPAF	Synchron : Washington, DC	0.000	0.000		0.000		1.000	Jan 2022	-		1.000	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	0.000	0.000		0.382		1.100		-		1.100	-	-	N/A

Remarks

In FY2022 there is an increase of $4.743M to support additional hardware and software developmental testing.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		13.363		44.854		-		44.854	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

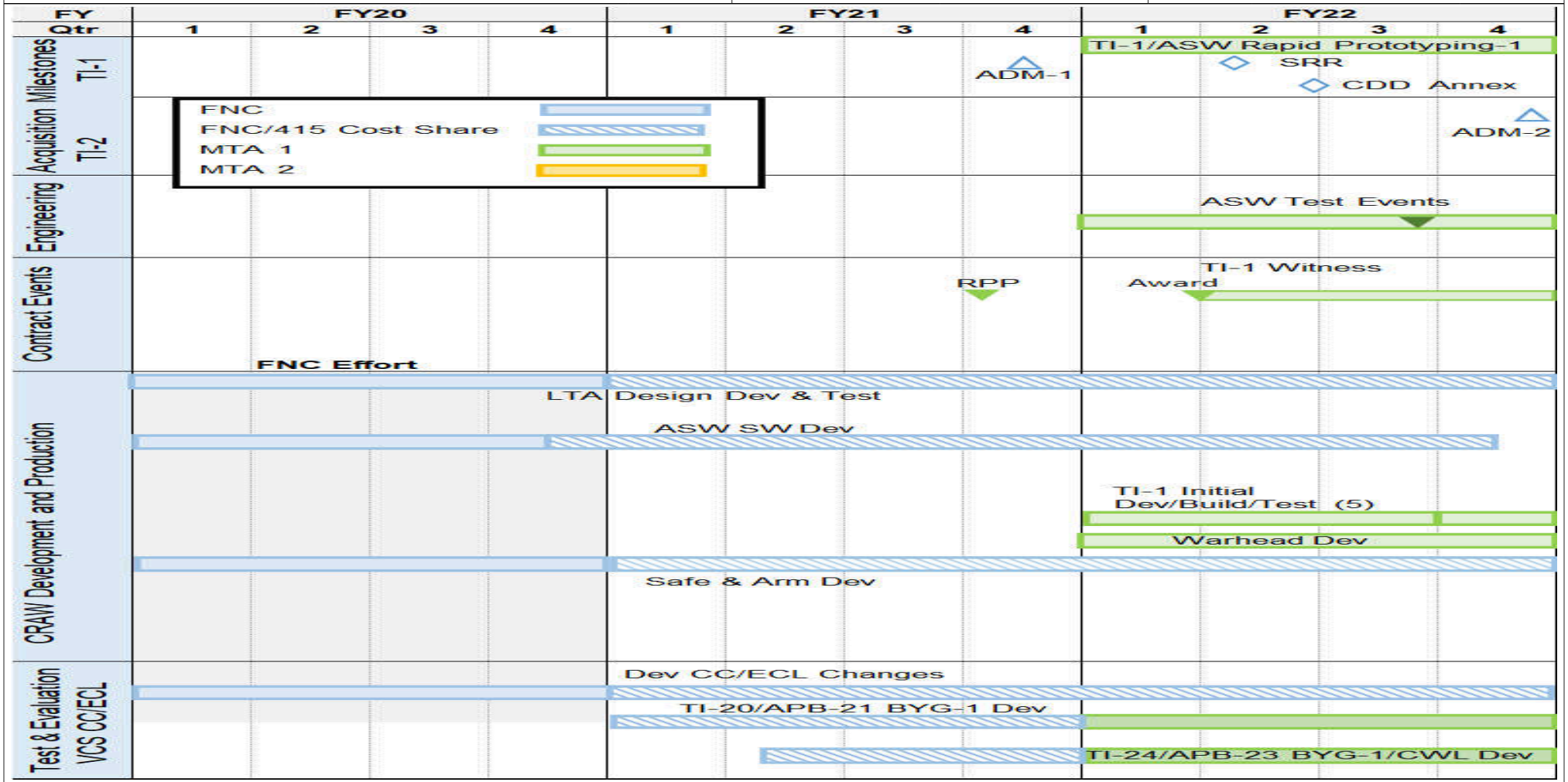

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1267 / *Compact Rapid Attack Weapon (CRAW)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1267				
REQUIREMENTS: SubTDS Capabilities Development Document (CDD) CRAW ANNEX Approval	2	2022	4	2022
AQUISITION MILESTONES: Rapid Prototyping - 1 (RP-1) Acquisition Decision Memorandum (ADM)	1	2022	1	2022
MAJOR CONTRACT EVENTS: Undersea Technology Innovation Consortium: OTA Request for Proposal (RFP)	3	2021	3	2021
MAJOR CONTRACT EVENTS: UTIC / OTA TI-1 Knowledge Transfer Build-Up	2	2022	4	2022
SYSTEMS ENGINEERING: System Requirements Review (SRR)	2	2022	3	2022
CRAW DEVELOPMENT & PRODUCTION: Anti-Surface Warfare (ASW) Dev/Test	1	2022	4	2022
CRAW DEVELOPMENT & PRODUCTION: Technical Insertion-1 Dev/Test/Build (24 Engineering Development Model (EDM)	1	2022	4	2022
CRAW DEVELOPMENT & PRODUCTION: S&A Dev	1	2021	4	2022
CRAW DEVELOPMENT & PRODUCTION: Warhead Development	1	2022	4	2022
TEST & EVALUATION (VCS TI-20 TEMPALT): Dev CCA / External Countermeasure Launcher (ECL) Changes	1	2021	4	2022
TEST & EVALUATION (VCS TI-20 TEMPALT): Dev PCS/BYG-1 Changes	1	2021	4	2022
TEST & EVALUATION (VCS TI-24 SHIPALT): Advanced Processor Build-23 / Technical Insertion-24 BYG-1 / CWL Dev	3	2021	4	2022
S&T EFFORTS - Future Nvel Capability (FNC): Anti-Surface Warfare (ASW) Software (SW)	1	2021	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*	Project (Number/Name) 1268 / *Non-Traditional Acoustic Communications (NTAC)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
1268: *Non-Traditional Acoustic Communications (NTAC)*	0.000	0.000	3.325	3.011	-	3.011	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Non-Traditional Acoustic Communications (NTAC) is a software based solution that leverages existing hardware components on target platforms, including submarines. The NTAC program is responsible for establishing formal program requirements, support installation of NTAC software on various platforms, and upgrade the software to support new hardware to improve NTAC performance. The new software capability at an unclassified level is referred to as NTAC software delivery package.

Additional details are available at the classified level.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Non-Traditional Acoustic Communications (NTAC)	0.000	3.325	3.011	0.000	3.011
Articles:	-	-	-	-	-
Description: Non-Traditional Acoustic Communications (NTAC) This capability provides advanced undersea acoustic communications. Additional details can be provided at the classified level. This program will build upon the baseline NTAC capability and integrate it into new hardware to expand the capability effectiveness and reliability. ***FY 2021 Plans:*** - Conduct analysis of Top Level Requirements (TLR) and System Level Requirements (SLR) - Conduct Foreign Release-ability (FR) analysis - Generate formal Security Classification Guide (SCG) - Conduct Concept of Operations (CONOPS) analysis - Analyze data from tactical exercises to improve capability reliability and performance - Develop improvements for secure communications - Conduct advanced capabilities technology risk assessment ***FY 2022 Base Plans:*** - Continue secure communications development - Improve transmit and receive operability					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1268 / *Non-Traditional Acoustic Communications (NTAC)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Integrate into ARCI - At Sea Testing of advanced transmission capability - Finalize formal Security Classification Guide (SCG) ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2021 to FY 2022 decrease of -0.314 is due to completion of program documents plans in FY 2021. Software package development continues into FY 2022.					
Accomplishments/Planned Programs Subtotals	0.000	3.325	3.011	0.000	3.011

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

NTAC is a Government developed software application that integrates into other system components. NUWC Newport will continue to do the required software development and hardware integration required to enhance the NTAC capability. In Fiscal Year (FY) 2021, the program will formally document top level requirements, system level requirements and concept of operation for fleet integration. In addition, the program will begin evaluating a new approach to integrating NTAC on a submarine and conduct the necessary studies and requirements development to complete preliminary design of the NTAC software package development package capability on new hardware.

In FY22, the program will continue detailed design of the NTAC software development package and conduct developmental testing of the advanced transmission capability, that meet the criteria of the top level and system level requirements developed in FY21. Additionally NTAC will be integrated into ARCI. In FY23, the program will prepare its software development package for integration into various nodes pending fleet demand and program financing beyond FY23.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1268 / *Non-Traditional Acoustic Communications (NTAC)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTAC - Systems Engineering	WR	NUWC : Newport, RI	0.000	0.000		0.984	Mar 2021	0.250	Jan 2022	-		0.250	-	-	-
NTAC - Software Development	WR	NUWC : Newport, RI	0.000	0.000		0.984	Mar 2021	2.618	Jan 2022	-		2.618	-	-	-
NTAC - Fleet Data Analysis	C/CPAF	NTT : Not Specified	0.000	0.000		0.752	Mar 2021	0.000		-		0.000	-	-	-
NTAC - Tactical Decision Aid	WR	NUWC : Newport, RI	0.000	0.000		0.320	Mar 2021	0.000		-		0.000	-	-	-
		Subtotal	0.000	0.000		3.040		2.868		-		2.868	-	-	N/A

Remarks

FY22 continues design efforts started and begins developmental testing.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
NTAC - Program Management Support	C/CPAF	Booz Allen Hamilton : Washington, DC	0.000	0.000		0.250	Apr 2021	0.000		-		0.000	-	-	-
NTAC - Travel	WR	NAVSEA : Washington, DC	0.000	0.000		0.035	Sep 2021	0.051	Jan 2022	-		0.051	-	-	-
NTAC - Program Management Support	C/CPAF	Synchron : Washington, DC	0.000	0.000		0.000		0.092	Jan 2022	-		0.092	-	-	-
		Subtotal	0.000	0.000		0.285		0.143		-		0.143	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		3.325		3.011		-		3.011	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1268 / *Non-Traditional Acoustic Communications (NTAC)*

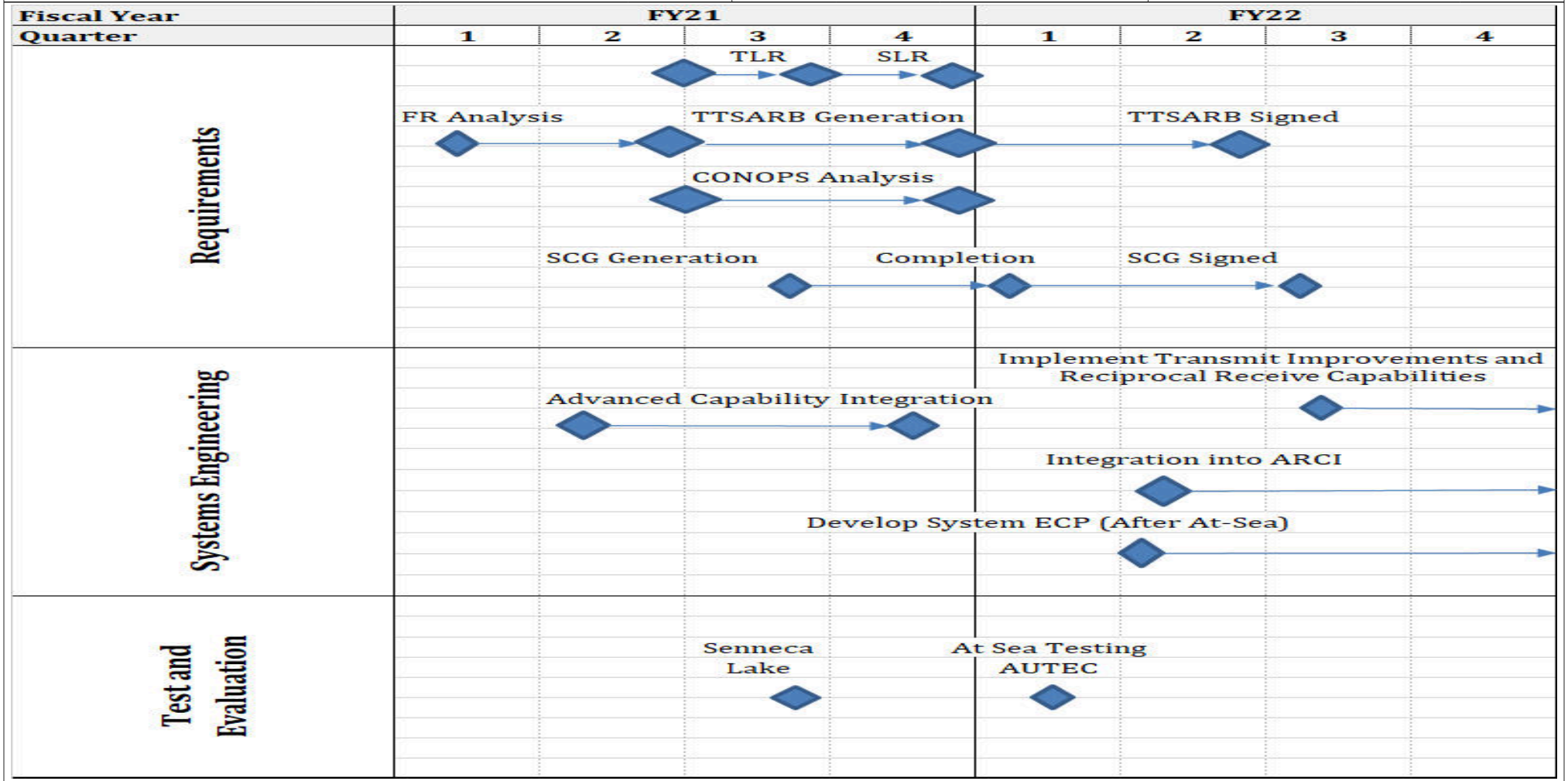

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 1268 / *Non-Traditional Acoustic Communications (NTAC)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1268				
Top Level Requirements Development	2	2021	3	2021
CONOPS/CONEMPS Analysis	2	2021	4	2021
TTSARB generation	2	2021	4	2021
TTSARB Signed	2	2022	2	2022
System Level Requirements Development	3	2021	4	2021
Requirements: SCG Generation	2	2021	1	2022
Requirements: SCG Signature	3	2022	3	2022
Requirements: Foreign Release-ability Analysis	1	2021	2	2022
System Engineering: Advanced Capability Integration	2	2021	4	2021
System Engineering: Improve Transmit/Receive Capabilities	3	2022	4	2022
System Engineering: ARCI Integration	2	2021	3	2021
Test and Evaluation: Seneca Lake Testing	3	2021	3	2021
Test and Evaluation: At-Sea Testing	1	2022	1	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / *Submarine Acoustic War Dev*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	9.500	0.000	-	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Submarine Acoustic Warfare (SAWS) Development Program develops acoustic countermeasures, submarine defense capabilities, external launch systems and all acoustic augmentation systems for the U.S. Navy submarines. The SAWS Development Program is comprised of the Submarine Defensive Warfare Program, which improves the survivability of all U.S. Submarines.

The Congressional add will be used to advance development of ADC MK5 (Next Generation Countermeasure). Technical areas of focus will include acoustic transducer / hydrophone development, modeling and simulation environment updates to incorporate new capabilities, device mobility introduction, and power improvements.

SubTDS
The ADC MK 5 acoustic countermeasure (ACAT III) developmental contract awarded in Sep 2018 and is currently in the Engineering and Manufacturing Development (E&MD) phase. The first development (Increment 1) effort of the overall SubTDS program is focused on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the fleet. The ADC MK5 development will result in delivering fully functional test units and Engineering Development Model (EDM) variants. The ADC MK5 will bring new technologies including adaptability packaged in a three-inch diameter body. The ADC MK5 efforts support on- going development including component and subsystem design, in support of the Preliminary Design Review (PDR). Completion of the Critical Design Review (CDR) and contract award for procurement of multiple ADC MK5 EDM countermeasure variants will occur in FY22.

FY22 funding will build and deliver four (4) Countermeasure Control Tools (CCT), eight (8) Sonar Test Units ((4) STU-E's (4) STU's), and seventeen (17) EDM-1. FY22 will include the Test Readiness Review (TRR) for EDM-1 and in water developmental testing for these units.

EDM-2 development and prototyping will continue in preparation for FY23 deliveries. The next development (Increment 2) effort focuses on the development of the External Countermeasure Launcher (ECL) 6-inch acoustic countermeasure, Tactical Decision Aid, and integration of communication interfaces with ship systems for enabling improved adaptive capabilities leading up to a contract award in FY24.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: Acoustic Device Countermeasures	0.000	9.500
FY 2020 Accomplishments: N/A		
FY 2021 Plans: - Continue ADC MK5 EDM design and prototype Builds.		

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
- Conduct ADC MK5 critical design review (CDR). - Continue M&S assessment of known and projected torpedo threats. - Continue development of required program documentation. - Continue development of concept of operations and operational tactics. - Continue assessment of Threat for UDWG and WAF with updated vulnerability assessments. - Procure four (4) Configuration Control Tool (CCT) for remotely programming and reprogramming the ADC MK 5, checking the ADC MK 5 device's status in-situ and retrieving recorded test data from the STU and EDM-1 devices. - Procure four (4) ADC MK 5 Special Test Units (STUs) to be utilized for the Government's preliminary acoustic testing. - Procure four (4) ADC MK 5 Special Test Units Electronics (STU-E) to be utilized for Hardware-In-the-Loop (HWIL) integration into the Weapons Analysis Facility (WAF) at the Naval Undersea Warfare Center, Division Newport (NUWCDIVNPT). - Contract award for procurement of seventeen (17) EDM-1 countermeasures test articles to be utilized in preliminary system testing, and shall be recovered and re-used.		
Congressional Adds Subtotals	0.000	9.500

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• OPN/2210: *Submarine Acoustic Warfare System*	22.331	26.066	24.897	-	24.897	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Submarine Acoustic Warfare System (SAWS) develops Undersea Defensive Warfare technologies to improve the survivability of all U.S. Submarine classes.

SUBTDS

Through a full and open competition, the ADC MK5 development contract awarded in Sep 2018. The Cost Plus Incentive Fee (CPIF) contract funds the design and development of Engineering Development Model (EDM) variants, Technical Data Packages (TDP), and Low-Rate Initial Production (LRIP) units for accomplishing Operational Testing (OT). ADC MK5 contractor subsystem testing and joint contractor/Navy Development Testing (DT) will occur in FY23 through FY24 and Navy OT in FY2025 through FY2026. Milestone C is nominally in FY2025. Initial Operational Capability (IOC) is nominally FY2026 for the Internal Countermeasure Launcher (ICL) configuration. After successfully completing OT and Full Rate Production Decision Review (FRP DR), award of a full and open competitive production contract occurs in

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 9999 / *Congressional Adds*

FY2025. This contract award will be a build to spec with a technical data package approach. The next development effort for addressing the overall SubTDS program will begin in FY24 and focus on the development of the External Countermeasure Launcher (ECL) 6-inch acoustic countermeasure, Tactical Decision Aid, and integration of communication interfaces with ship systems for enabling mobility with adaptive capabilities. Development of the acquisition strategy will begin in FY21.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS ADC MK5 New Development	C/CPIF	LEIDOS : RESTON, VA	0.000	0.000		6.903	Apr 2021	0.000		-		0.000	-	-	-
SubTDS WAF Analysis UDWG	WR	NUWC : NEWPORT, VA	0.000	0.000		1.537	Mar 2021	0.000		-		0.000	-	-	-
		Subtotal	0.000	0.000		8.440		0.000		-		0.000	-	-	N/A

Remarks

FY22 funding will build and deliver four (4) Countermeasure Control Tools (CCT), eight (8) Sonar Test Units ((4) STU-E's (4) STU's) and seventeen (17) EDM-1 devices that are recoverable, rechargeable, and reusable. EDM-2 prototyping will begin in FY22 in preparation for FY23 deliveries.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS System Engineering	WR	NUWC : NEWPORT, RI	0.000	0.000		0.680	Mar 2021	0.000		-		0.000	-	-	-
		Subtotal	0.000	0.000		0.680		0.000		-		0.000	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS Program Mgmt Support	Allot	NAVSEA : Washington, DC	0.000	0.000		0.380	Apr 2021	0.000		-		0.000	-	-	-
		Subtotal	0.000	0.000		0.380		0.000		-		0.000	-	-	N/A

	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		9.500		0.000		-		0.000	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 9999 / *Congressional Adds*

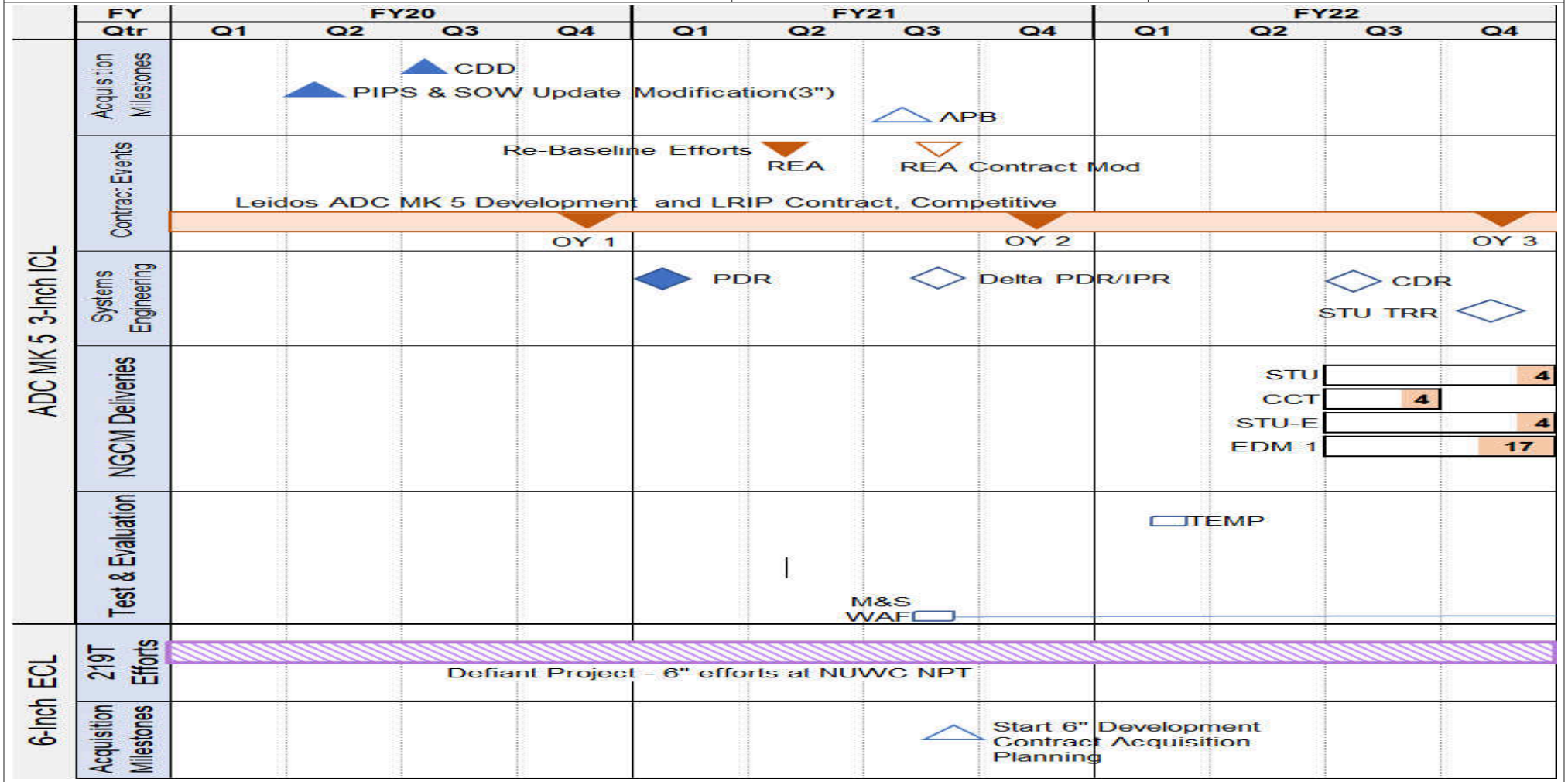

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0101226N / *Submarine Acoustic War Dev*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Weapons Analysis Facility (WAF): Countermeasures (CM) Effectiveness/Weapon Analysis Facility (WAF) Vulnerability: Submarine Torpedo Defense Systems (SubTDS): SubTDS M&S	1	2020	4	2022
Weapons Analysis Facility (WAF): Countermeasures (CM) Effectiveness/Weapon Analysis Facility (WAF) Vulnerability: Submarine Torpedo Defense Systems (SubTDS): TEMP Development	1	2020	4	2020
Weapons Analysis Facility (WAF): Countermeasures (CM) Effectiveness/Weapon Analysis Facility (WAF) Vulnerability: Submarine Torpedo Defense Systems (SubTDS): ADC MK5 Critical Design Review (CDR)	3	2022	3	2022
Weapons Analysis Facility (WAF): Countermeasures (CM) Effectiveness/Weapon Analysis Facility (WAF) Vulnerability: Submarine Torpedo Defense Systems (SubTDS): EDM-1 Production and Deliveries	3	2022	4	2022
Weapons Analysis Facility (WAF): Countermeasures (CM) Effectiveness/Weapon Analysis Facility (WAF) Vulnerability: Submarine Torpedo Defense Systems (SubTDS): DT (EDM-1)	4	2022	4	2022