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

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy I BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0101226N I <i>Submarine Acoustic War Dev</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	37.993	9.439	11.311	6.815	-	6.815	14.663	29.028	37.847	23.723	Continuing	Continuing
1265: <i>Sub Defensive Warfare</i>	37.993	9.439	11.311	6.815	-	6.815	14.663	29.028	37.847	23.723	Continuing	Continuing

A. Mission Description and Budget Item Justification

FY20 funding request was reduced by \$2.249M to account for the availability of prior year execution balances.

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. This program is comprised of the Submarine Defensive Warfare Program which improves the survivability of all U.S. Submarines. The Submarine Defensive Warfare Program efforts include Submarine Torpedo Defense System (Sub TDS), Undersea Defense Working Group ((UDWG), was formerly Torpedo Defense Working Group -(TDWG)), Technical Direction Agent (TDA), and In-Service Engineering Agent (ISEA) development support.

Submarine Torpedo Defense System (SubTDS) program, (ACAT III) currently is in Engineering and Manufacturing Development (E&MD) and has been restructured to focus on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the Fleet. The restructuring made the program more affordable by diverting funding in a zero sum transfer from the sabot development effort which, as a portion of the SubTDS program will be developed later. The overall program will develop the Tactical Decision Aid (TacDA) and SABOT that permits the ADC MK5 to be employed from external countermeasure launcher (ECL). 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.

FY2019 funding will primarily support on-going SubTDS development including component and subsystem design, design and delivery of three Engineering Development Model (EDM) variants, and joint contractor and government testing. Governmental development of the TacDA will continue to include initial integration with the contractor developed ADC MK5 device.

FY2020 funding will support continued SubTDS development and testing efforts. 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.

The SAWS Development Program transitions the research and development of new technologies and capabilities developed under the Future Naval Capabilities (FNC), Small Business and Innovative Research (SBIR), and other Research, Development, Test & Evaluation (RDT&E) initiatives. New and emerging hardware and software are evaluated in representative acoustic environments, against projected threats through both digital and hardware-in-the-loop simulations, to determine their effectiveness and impact on improving submarine survivability. The technology is then incorporated 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 and SubTDS.

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Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0101226N I <i>Submarine Acoustic War Dev</i>
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B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	12.053	11.311	9.309	-	9.309
Current President's Budget	9.439	11.311	6.815	-	6.815
Total Adjustments	-2.614	0.000	-2.494	-	-2.494
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.295	0.000			
• SBIR/STTR Transfer	-0.319	0.000			
• Program Adjustments	0.000	0.000	-2.301	-	-2.301
• Rate/Misc Adjustments	0.000	0.000	-0.193	-	-0.193

Change Summary Explanation

Financial:

The FY20 funding request was reduced by \$2.249M to account for the availability of prior year execution balances. Additional adjustments included contract services reform reduction (-\$0.053M) and miscellaneous rate adjustments (-\$0.193M), bringing the total difference from PB 19 to PB 20 to -\$2.494M.

The Department assessed FY18 by \$0.319M for Small Business Innovative Research, and reprogrammed \$2.295M for higher navy priorities.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
1265: Sub Defensive Warfare	37.993	9.439	11.311	6.815	-	6.815	14.663	29.028	37.847	23.723	Continuing	Continuing
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. This program is comprised of the Submarine Defensive Warfare Program which improves the survivability of all U.S. Submarines. The Submarine Defensive Warfare Program efforts include Submarine Torpedo Defense System (Sub TDS), Undersea Defense Working Group ((UDWG), was formerly Torpedo Defense Working Group -(TDWG)), Technical Direction Agent (TDA), and In-Service Engineering Agent (ISEA) development support.

Submarine Torpedo Defense System (SubTDS) program, (ACAT III) currently is in Engineering and Manufacturing Development (E&MD) and has been restructured to focus on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the Fleet. The restructuring made the program more affordable by diverting funding in a zero sum transfer from the sabot development effort which, as a portion of the SubTDS program will be developed later. The overall program will develop the Tactical Decision Aid (TacDA) and SABOT that permits the ADC MK5 to be employed from external countermeasure launcher (ECL).

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.

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FY2020 funding will support continued SubTDS development and testing efforts. 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.

The SAWS Development Program transitions the research and development of new technologies and capabilities developed under the Future Naval Capabilities (FNC), Small Business and Innovative Research (SBIR), and other Research, Development, Test & Evaluation (RDT&E) initiatives. New and emerging hardware and software are evaluated in representative acoustic environments, against projected threats through both digital and hardware-in-the-loop simulations, to determine their effectiveness and impact on improving submarine survivability. The technology is then incorporated 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 and SubTDS.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy				Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Submarine Torpedo Defense System (SubTDS)		9.439	11.311	6.815	0.000	6.815
Articles:		-	3	29	-	29
FY 2019 Plans:						
- Continue EDM designs and builds						
- Continue development of deliver three ADC MK5 Engineering Development Model (EDM) variants						
- Continue M&S for known and projected torpedo threats						
- Continue development of required Acquisition program documentation						
- Continue development of CONOPS and TacDA for fleet tactics						
- Start contractor and government testing of EDM-1 variants						
- Continue assessment of threat by UDWG and WAF with updated vulnerability assessments						
- Complete SubTDS TEMP						
FY 2020 Base Plans:						
- Deliver three ADC MK5 EDM Variants						
- Continue ADC MK5 EDM Designs and Builds						
- Conduct ADC MK5 Critical Design Review						
- Continue M&S for known and projected torpedo threats						
- Continue development of required program documentation						
- Continue development of Concept of Operations (CONOPS) and TacDA for fleet tactics						
- Continue assessment of threat by UDWG and WAF with updated vulnerability assessments						
- Begin Development Testing (DT) of EDM-1 variants						
FY 2020 OCO Plans:						
N/A						
FY 2019 to FY 2020 Increase/Decrease Statement:						
The FY19 to FY 20 decrease is due to three(3) ADC MK5 EDMs delivered in FY19 and SubTDS TEMP is completed in FY19.						
Accomplishments/Planned Programs Subtotals		9.439	11.311	6.815	0.000	6.815

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0101226N / <i>Submarine Acoustic War Dev</i>			Project (Number/Name) 1265 / <i>Sub Defensive Warfare</i>			
C. Other Program Funding Summary (\$ in Millions)											
			<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2020</u>					<u>Cost To</u>	
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>Base</u>	<u>OCO</u>	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Complete</u>	<u>Total Cost</u>
• OPN/2210: <i>Submarine Acoustic Warfare System</i>	21.449	21.615	23.545	-	23.545	23.860	24.677	24.969	26.632	Continuing	Continuing
Remarks											
D. Acquisition Strategy											
Submarine Acoustic Warfare System (SAWS) develops Undersea Defensive Warfare technologies to improve the survivability of all U.S. Submarine classes.											
The integration of technology into the ADC MK5 and the ADC MK5-capable CSA MK 3/4 external countermeasure launcher system will continue through FY2027. The ADC MK5 development contract awarded in FY2018, through a full and open competition, Cost Plus Incentive Fee (CPIF) contract. Engineering Development Model (EDM) variants, Technical Data Packages (TDP), and Low-Rate Initial Production (LRIP) units for accomplishing Operational Testing, will be delivered to the Navy under this contract. ADC MK5 contractor subsystem testing in FY2019 through FY2022 and joint contractor/Navy Development Testing (DT) will be in FY2020 through FY2022, with Navy Operational Testing (OT) in FY2023 through FY2024. Milestone C is nominally in FY2023. Initial Operational Capability (IOC) is nominally FY2025 for the Internal Countermeasure Launcher (ICL). After successfully completing OT and Full Rate Production Decision Review (FRP DR) approval, award production contract in FY2024, as a full and open competition, build to print approach with either a single producer or leader/follower production contract.											
E. Performance Metrics											
Progress Reviews											
Execution Reporting and Reviews											
Milestone Reviews											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS WAF ANALYSIS UDWG	WR	NUWC : NEWPORT, RI	12.514	0.275	Dec 2017	0.280	Dec 2018	0.000	Dec 2019	-		0.000	Continuing	Continuing	Continuing
SubTDS SYSYTEM ENGINEERING	WR	NUWC : NEWPORT, RI	11.640	1.566	Dec 2017	1.095	Dec 2018	1.400	Dec 2019	-		1.400	Continuing	Continuing	Continuing
SubTDS ADC MK5 New Development	C/CPIF	LEIDOS : RESTON, VA	0.000	2.805	Aug 2018	5.266	Dec 2018	2.134	Dec 2019	-		2.134	Continuing	Continuing	Continuing
SubTDS CSA MK5 SYSTEM ENGINEERING	WR	NUWC : KEYPORT, WA	3.015	1.200	Dec 2017	0.700	Dec 2018	1.100	Dec 2019	-		1.100	Continuing	Continuing	Continuing
SubTDS Modeling And Simulation	WR	NUWC : NEWPORT, RI	3.862	1.332	Dec 2017	1.100	Dec 2018	0.700	Dec 2019	-		0.700	Continuing	Continuing	Continuing
SubTDS Tactical Decision Aid TacDA	WR	NUWC : NEWPORT, RI	2.400	1.781	Dec 2017	2.300	Dec 2018	0.400	Dec 2019	-		0.400	Continuing	Continuing	Continuing
Acoustic Augmentation Support Program (AASP)	WR	NUWC : NEWPORT, RI	0.435	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Sabot Development	WR	NUWC : NEWPORT, RI	1.270	0.000		0.000		0.000		-		0.000	0.000	1.270	-
Subtotal			35.136	8.959		10.741		5.734		-		5.734	Continuing	Continuing	N/A
Remarks															
With the restructure of Sub TDS to focus on delivering full internal countermeasure launcher (ICL) functionality providing the Acoustic Device Countermeasure (ADC) MK5 capability to all submarines in the Fleet a zero sum transfer from the sabot development effort diverted FY18 funding of \$0.8 million to the SubTDS TacDA (\$0.481 million) and to the SBIR assessment (\$0.319 million). The FY2019 sabot development funding of \$1.0M was transferred to the ADC MK5 contract execution. The restructuring made the program more affordable by diverting funding in a zero sum transfer from the sabot development effort which, as a portion of the SubTDS program will be developed later.															
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SubTDS System Test and Evaluation	WR	NUWC : NEWPORT, RI	0.000	0.000		0.000		0.500	Dec 2019	-		0.500	0.000	0.500	-
Subtotal			0.000	0.000		0.000		0.500		-		0.500	0.000	0.500	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Remarks SubTDS Developmental Testing begins in FY2020.															
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SAWS TRAVEL	WR	NAVSEA : Washington, DC	0.692	0.080	Oct 2017	0.070	Oct 2018	0.071	Oct 2019	-		0.071	Continuing	Continuing	Continuing
SubTDS PROGRAM MANAGEMENT SUPPORT	C/CPAF	TECH MARINE : Washington, DC	0.900	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
SubTDS PROGRAM MANAGEMENT SUPPORT	C/CPAF	BOOZ ALLEN : Washington, DC	1.265	0.400	Dec 2017	0.500	Dec 2018	0.510	Dec 2019	-		0.510	Continuing	Continuing	Continuing
Subtotal			2.857	0.480		0.570		0.581		-		0.581	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			37.993	9.439		11.311		6.815		-		6.815	Continuing	Continuing	N/A
Remarks The restructure of Sub TDS focuses on delivering full ICL functionality providing the ADC MK5 capability to all submarines in the Fleet.															

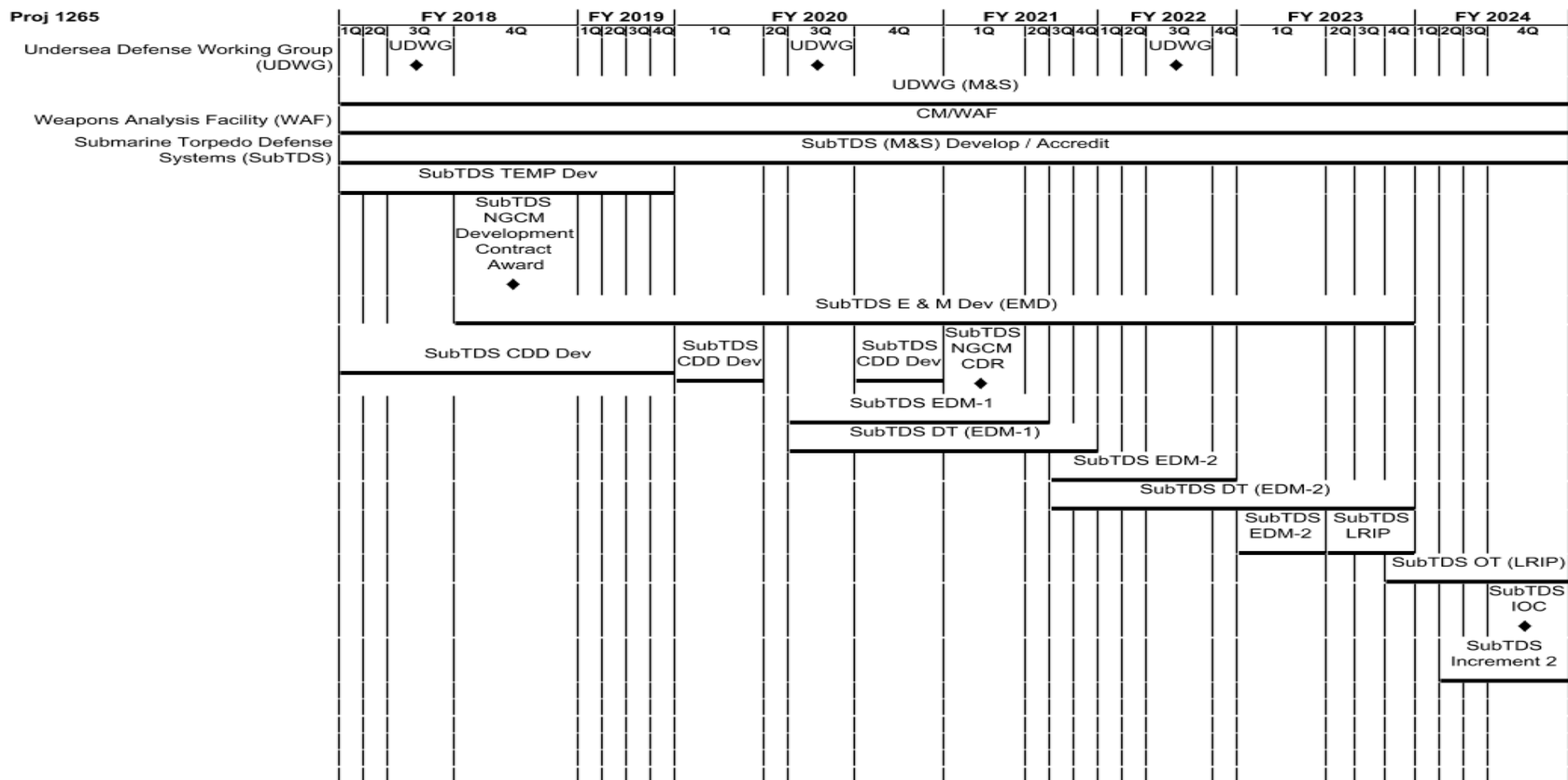
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PE 0101226N: *Submarine Acoustic War Dev*
Navy

Appropriation/Budget Activity 1319 / 7
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R-1 Program Element (Number/Name) PE 0101226N / <i>Submarine Acoustic War</i> <i>Dev</i>

Project (Number/Name)	1265 / <i>Sub Defensive Warfare</i>
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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0101226N / <i>Submarine Acoustic War Dev</i>	Project (Number/Name) 1265 / <i>Sub Defensive Warfare</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 1265				
Undersea Defense Working Group (UDWG): FY18 UDWG	3	2018	3	2018
Undersea Defense Working Group (UDWG): FY20 UDWG	3	2020	3	2020
Undersea Defense Working Group (UDWG): FY22 UDWG	3	2022	3	2022
Undersea Defense Working Group (UDWG): FY24 UDWG	3	2024	3	2024
Undersea Defense Working Group (UDWG): UDWG Modeling & Simulation (M&S)	1	2018	4	2024
Weapons Analysis Facility (WAF): Countermeasure (CM) Effectiveness/Weapon Analysis Facility (WAF) Vulnerability	1	2018	4	2024
Submarine Torpedo Defense Systems (SubTDS): SubTDS M&S	1	2018	4	2024
Submarine Torpedo Defense Systems (SubTDS): TEMP Development	1	2018	4	2019
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 Development Contract Award	4	2018	4	2018
Submarine Torpedo Defense Systems (SubTDS): Engineering & Manufacturing Development (EMD)	4	2018	4	2023
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 CDD Development	1	2018	4	2019
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 Critical Design Review (CDR)	1	2021	1	2021
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 EDM-1 CDR	1	2020	1	2020
Submarine Torpedo Defense Systems (SubTDS): ADC MK5 EDM-2 CDR	4	2020	4	2020
Submarine Torpedo Defense Systems (SubTDS): EDM-1 Deliveries	3	2020	2	2021
Submarine Torpedo Defense Systems (SubTDS): DT (EDM-1)	3	2020	4	2021
Submarine Torpedo Defense Systems (SubTDS): EDM-2 Deliveries	3	2021	4	2022
Submarine Torpedo Defense Systems (SubTDS): DT (EDM-2)	3	2021	4	2023

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy			Date: March 2019		
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		Start		End	
Events by Sub Project		Quarter	Year	Quarter	Year
Submarine Torpedo Defense Systems (SubTDS): LRIP Deliveries		2	2023	4	2023
Submarine Torpedo Defense Systems (SubTDS): MS-C Decision Reviews		1	2023	1	2023
Submarine Torpedo Defense Systems (SubTDS): OT (LRIP)		4	2023	4	2024
Submarine Torpedo Defense Systems (SubTDS): IOC		4	2024	4	2024
Submarine Torpedo Defense Systems (SubTDS): Increment 2		2	2024	4	2024