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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	531.068	113.219	94.386	142.000	-	142.000	157.296	97.499	107.276	65.564	Continuing	Continuing
1412: <i>HAAWC</i>	18.903	0.965	0.200	2.726	-	2.726	3.442	5.535	5.560	5.657	Continuing	Continuing
2234: <i>Lightweight Hybrid Torpedo</i>	396.868	16.487	12.131	12.244	-	12.244	15.882	15.202	14.526	14.815	Continuing	Continuing
3418: <i>Advanced Anti-Submarine Lightweight Torpedo</i>	115.297	95.767	82.055	127.030	-	127.030	137.972	76.762	87.190	45.092	Continuing	Continuing

A. Mission Description and Budget Item Justification

Funding increases from FY22 to FY23 in Project Units 1412, 2234, and 3418 for the following:

(1)PU 1412: Increase of \$2.526M for requirements updates/development for a High Altitude Anti-Submarine Warfare Weapon Capability (HAAWC) that will be compatible with the MK 54 MOD 2 Advanced Lightweight Torpedo (ALWT). The MK 54 MOD 2 ALWT is scheduled to complete subsystem level Critical Design Reviews (CDRs) in FY22 and System Level CDR in early FY23.

(2)PU 2234: For continued development of MK 54 MOD 1 Increment 2 APB 6 engineering builds, conducting in water engineering runs, and Weapons Analysis Facility (WAF) system testing.

(3)PU 3418: Increase of \$44.975M due to the completion of MK 54 MOD 2 subsystem level critical design phase in FY22, proceeding with the detailed design of the weapon and conducting system level Critical Design Review (CDR). FY23 focus will be on completing the System Level Critical Design phase and delivering Proof of Design (POD) hardware to allow for completion of land-based testing and beginning the in-water engineering testing program with the POD Hardware. Additionally, the program will award the All Up Round (AUR) Proof of Manufacture (POM) phase Other Transaction Authority (OTA) contract at the end of FY23. Long lead material procurements for the MK 54 MOD 2 POM phase will begin in FY23. Additionally, funding for MH-60 and P-8A platforms will also be provided to begin design and development of integration efforts with aircraft necessary to support the MK 54 MOD 2 Test and Evaluation program that begins with test shape and interface testing during the Engineering Test period.

The Lightweight Torpedo (LWT) program designs, integrates and tests the MK 54 LWT and supports an incremental developmental acquisition approach combining hardware and Advanced Processor Build (APB) software upgrades to enable rapid fielding of improvements to the fleet. The program will focus on common LWT and Heavyweight Torpedo (HWT) hardware and software architecture enhancements that will provide improvements to the array, warhead, propulsion, and APB software to address capability gaps against challenging adversary submarines and environments. Future APB software builds will utilize common torpedo software to deliver capability and tactics improvements to the MK 54 LWT. The program will also support development of enhanced weapon delivery methods, including the high altitude launch of the MK 54 from the P-8A Maritime Patrol and Reconnaissance Aircraft (MPRA) with the HAAWC Air Launch Accessory (ALA) and development of a common HAAWC capability compatible with the MK 54 MOD 2.

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The HAAWC development program provides the P-8A MPRA with the ability to release LWTs from high altitude to prosecute enemy submarine threats. Operational Testing (OT) was conducted at the end of FY20, and the Commander Operational Test & Evaluation Force (COMOPTEVFOR) report was issued in FY21, recommending fielding. Follow-on T&E (FOT&E) was conducted in FY22 with updated flight control software. The current HAAWC design was developed to deploy the MK 54 MOD 0/1. The MK 54 MOD 2 is not compatible with HAAWC due to having different mass properties and outer mold line from the MOD 0/1 LWT. The funding in FY 23 will be utilized to conduct requirements analysis for a HAAWC solution for the MK 54 MOD 2 and solicitation in FY23 for the award of a development contract in FY24.

The MK 54 MOD 1 provides significant performance improvements compared to MK 54 MOD 0 for challenging littoral, shallow water environments and adversary countermeasures. The MOD 1 program is split into 2 increments: Increment 1 focusing on the updated sonar hardware and associated APB 5 common software to provide an improved LWT to the Fleet to replace the MK 54 MOD 0s; Increment 2 is the APB 6 software (SW) only upgrade to fully take advantage of the improved sonar hardware developed under Increment 1, update the platform interface to reduce Fleet Operator workload, and provide new capabilities such as Salvo and terminal homing improvements. APB 6 will run on MOD 1 but also serve as the SW baseline for the MK 54 MOD 2.

The MK 54 MOD 2 improves the lethality and speed of the LWT by upgrading the Warhead and Propulsion system to counter challenging near-peer adversary submarines that are faster and deeper diving, leveraging the sonar hardware improvements developed under the MOD 1 program. The program awarded four Other Transaction Authority (OTA) agreements to industry partners in FY20 for the design of the Guidance and Control (G&C) section, Warhead, Stored Chemical Energy Propulsion System (SCEPS) afterbody sections, and All Up Round (AUR) system integrator. Industry partners are focused primarily on the development of torpedo hardware and support equipment while the USN maintains the responsibility of developing the software under the APB process and will develop specific software modules for the MK 54 MOD 2 variant. In FY22, the program will complete the preliminary design and begin engineering testing of Proof of Design (POD) hardware, as well as refining the critical design in preparation for qualification and Developmental Testing (DT). FY23 will focus on completing Critical Design and awarding the POM phase II OTA to produce POM units for qualification and DT, as well as prepare for Production Readiness prior to Low Rate Initial Production (LRIP).

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	115.102	94.386	0.000	-	0.000
Current President's Budget	113.219	94.386	142.000	-	142.000
Total Adjustments	-1.883	0.000	142.000	-	142.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.883	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	142.000	-	142.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	

Change Summary Explanation

Proj 1412 HAAWC: The FY 2023 funding request was reduced by \$0.179M to account for the availability of prior year execution balances. Increase of \$2.526M from FY22 to FY23 request for requirements analysis, update, and development for a HAAWC design that will be compatible with the MK 54 MOD 2 Advanced Lightweight torpedo.

Proj 2234 Lightweight Hybrid Torpedo: The FY 2023 funding request was reduced by \$2.388M to account for the availability of prior year execution balances. FY23 funding request based on continued development of MK 54 MOD 1 Increment 2 APB 6 engineering builds, conducting in water engineering runs, and Weapons Analysis Facility (WAF) system testing.

Funding increased by \$44.975M from FY22 to FY23 in support of MK 54 MOD 2. Product Development increased by (\$43.052M) to fund: remaining Proof of Design (POD) phase and support Platform Integration to ensure launch platforms are ready for the required Developmental & Operational testing commencing in FY25; OTA hardware development contracts for 1) inert and tactical warheads required to execute engineering land-based and in-water test events, 2) 5 Guidance & Control sections to support engineering in-water runs, 3) All-Up-Round Integration Fleet Exercise Section (FES) design plus 5 FESs and 38 FES turn-around kits for Engineering In-Water runs, and 4)for 16 power plant and tail turn-around kits for engineering in-water runs, 5) new Phase II AUR OTA contract award for POM test units; and APB 7 software development. Additionally, government support funding is provided for Set-to-Hit target certification analysis, upgrades to EC-WAF to model MK 54 MOD 2, Support Engineering In-Water Run torpedo builds and post-run analysis, Warhead Environmental Testing, Surface Ship platform integration. Additionally, Support increased by (\$0.828M) and Test and Evaluation increased by (\$1.095M) to start initial system integration testing.

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>				Project (Number/Name) 1412 / HAAWC			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
1412: HAAWC	18.903	0.965	0.200	2.726	-	2.726	3.442	5.535	5.560	5.657	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The program will design, develop, and procure a High Altitude Anti-Submarine Warfare Weapon Capability (C-HAAWC) Air Launch Accessory (ALA) for the MK 54 MOD 2 Lightweight Torpedo (LWT). This capability will allow fixed-wing employment of the MK 54 MOD 2 torpedo in the same manner as the HAAWC allows for the MK 54 MOD 0/1 Torpedoes: at high altitude, with stand-off ranges, and the ability for precision guidance to the intended water entry point (WEP) without affecting the in-water operation of the torpedo.

The MK 54 MOD 2 is not compatible with current HAAWC design due to having different mass properties and outer mold line from the MOD 0/1 LWT. FY 23 funding will be utilized to conduct requirements analysis and development for a common HAAWC solution and solicitation in FY23 for the award of a development contract.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: High Altitude Anti-Submarine Warfare Weapon Capability (HAAWC) Development	0.965	0.200	2.726	0.000	2.726
Articles:	-	-	-	-	-
FY 2022 Plans: Conduct FOT&E to evaluate Operational Flight Program (OFP) 3.5 Declare HAAWC Initial Operational Capability (IOC) Conduct FRP Decision Review Continue HAAWC assessment and requirements review for MOD 2 Prepare Common HAAWC Acquisition					
FY 2023 Base Plans: Continue HAAWC assessment and requirements review for MOD 2 Preparation of HAAWC development for use on MOD 2 solicitation for initial award					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: Proj 1412 HAAWC: Increase of \$2.526M from FY22 to FY23 request for requirements analysis, update, and development for a HAAWC design that will be compatible with the MK 54 MOD 2 Advanced Lightweight torpedo.					
Accomplishments/Planned Programs Subtotals	0.965	0.200	2.726	0.000	2.726

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 1412 / HAAWC

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u> <u>Base</u>	<u>FY 2023</u> <u>OCO</u>	<u>FY 2023</u> <u>Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• WPN/3215: <i>MK-54 Torpedo Mods</i>	103.441	106.112	106.772	-	106.772	162.338	145.541	136.013	137.681	0.000	2,271.450

Remarks

LI 3215 FYDP funds MK54 MOD 0, MK54 MOD 1, MK54 MOD 2, and HAAWC procurements.

D. Acquisition Strategy

The Engineering and Manufacturing Development (EMD) contract held by Boeing Company supports an incremental approach to delivering full HAAWC capability, Air Launch Accessory (ALA) assets and equipment, as well as associated engineering services and support. The schedule for the completion of the EMD phase of the MK 54 HAAWC AUR development is closely linked to the P-8A Increment 2 design and integration schedule. The EMD contract was awarded in April 2013, with options for the procurement of LRIP units. A future full rate production contract was evaluated through market research and Request For Information (RFIs) for competitive award. The Navy has decided after in depth evaluation, it is in the best interest of the government to award a sole source contract to Boeing. Contract award planned for FY 2022, upon successfully meeting Initial Operating Capability (IOC) requirements and conducting a Full Rate Production Decision Review.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 1412 / HAAWC
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Hardware Development - HAAWC	C/CPFF	Boeing : St. Louis, MO	6.185	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Hardware Development - HAAWC	WR	NSWC : Indian Head, MD	0.040	0.000		0.000		0.000		-		0.000	0.000	0.040	-
Systems Engineering - HAAWC	WR	NAWC : Pax River, MD	0.475	0.751	Nov 2020	0.000		0.544	Nov 2022	-		0.544	0.000	1.770	-
Systems Engineering - HAAWC	WR	NAWC : China Lake, CA	0.740	0.000	Nov 2020	0.000		0.185	Nov 2022	-		0.185	0.000	0.925	-
Systems Engineering - HAAWC	WR	Boeing : St. Louis, MO	0.663	0.000		0.000		0.000		-		0.000	0.000	0.663	-
Hardware Development - HAAWC	WR	NSWC : Carderock, MD	0.015	0.000		0.000		0.000		-		0.000	0.000	0.015	-
Hardware Development - HAAWC	WR	NUWC : Newport, RI	0.000	0.107	Nov 2020	0.200	Nov 2021	1.000	Nov 2022	-		1.000	0.000	1.307	-
Hardware Development - HAAWC	WR	NUWC : Keyport, WA	0.000	0.000		0.000		0.997	Nov 2022	-		0.997	0.000	0.997	-
Subtotal			8.118	0.858		0.200		2.726		-		2.726	Continuing	Continuing	N/A

Remarks
Increase for requirements updates/development for a Common High Altitude Anti-Submarine Warfare Weapon Capability (HAAWC) design that will be compatible with the MK 54 MOD 2 Advanced Lightweight Torpedo

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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 - HAAWC	WR	NUWC : Keyport	1.266	0.107	Nov 2020	0.000		0.000		-		0.000	0.000	1.373	-
Subtotal			1.266	0.107		0.000		0.000		-		0.000	0.000	1.373	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 1412 / HAAWC
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Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
System Test & Evaluation - HAAWC	C/CPFF	Boeing : St. Louis, MO	4.124	0.000		0.000		0.000		-		0.000	0.000	4.124	-
System Test & Evaluation - HAAWC	WR	NUWC : Keyport, WA	1.058	0.000		0.000		0.000		-		0.000	0.000	1.058	-
System Test & Evaluation - HAAWC	C/BA	NUWC : Newport, RI	1.388	0.000		0.000		0.000		-		0.000	0.000	1.388	-
System Test & Evaluation - HAAWC	WR	NAWC : China Lake, CA	0.425	0.000		0.000		0.000		-		0.000	0.000	0.425	-
System Test & Evaluation - HAAWC	WR	NAWC : Pax River, MD	0.825	0.000		0.000		0.000		-		0.000	0.000	0.825	-
System Test & Evaluation - HAAWC	WR	OPTEVFOR : Norfolk, VA	1.504	0.000		0.000		0.000		-		0.000	0.000	1.504	-
Hardware Development - HAAWC	WR	NSWC : Indian Head, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
System Engineering - HAAWC	WR	NAVAIR : China Lake, CA	0.025	0.000		0.000		0.000		-		0.000	0.000	0.025	-
System Engineering - HAAWC	WR	NUWC : Newport, RI	0.100	0.000		0.000		0.000		-		0.000	0.000	0.100	-
System Test & Evaluation - HAAWC	WR	NSWC : Indian Head, MD	0.070	0.000		0.000		0.000		-		0.000	0.000	0.070	-
Subtotal			9.519	0.000		0.000		0.000		-		0.000	0.000	9.519	N/A

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	18.903	0.965	0.200	2.726	-	2.726	Continuing	Continuing	N/A

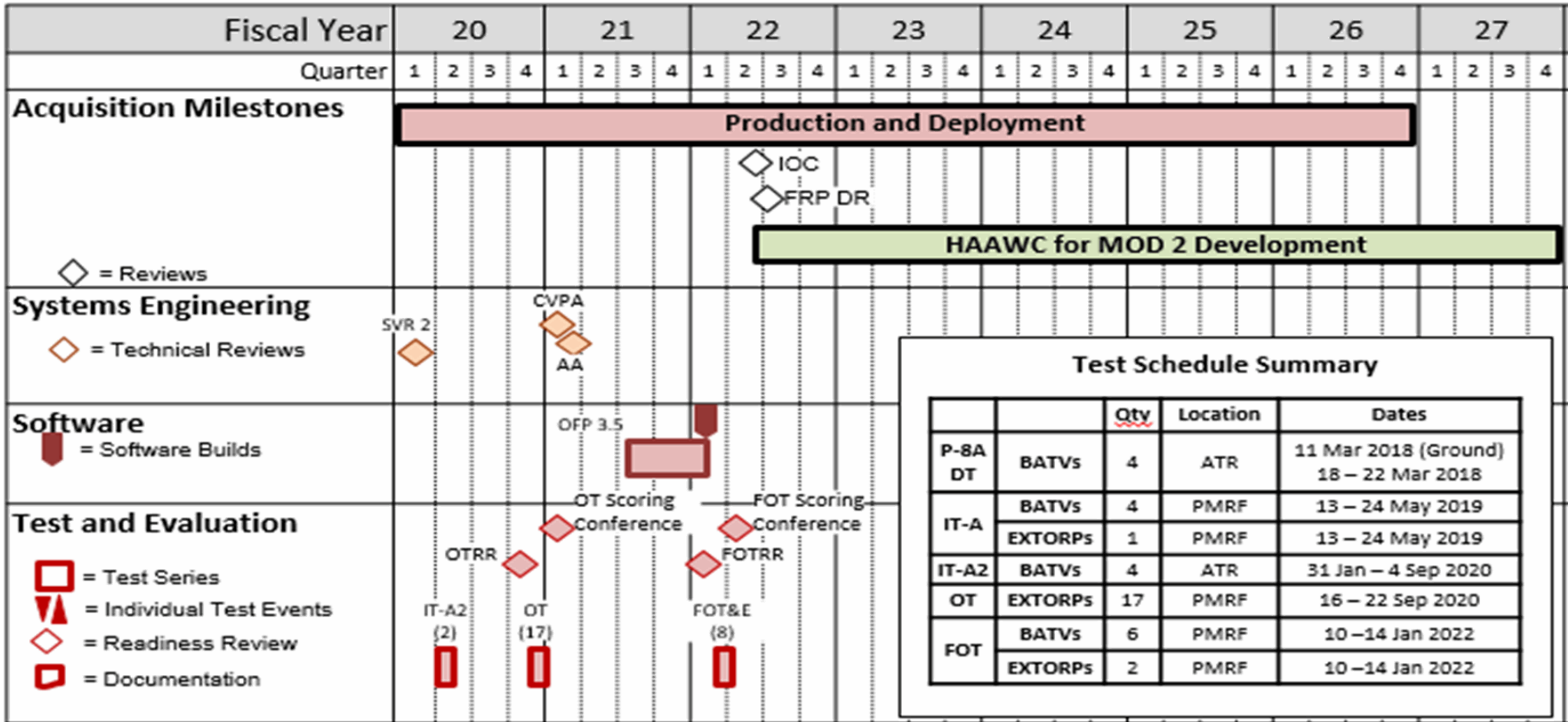
Remarks

Appropriation/Budget Activity
1319 / 5

R-1 Program Element (Number/Name)
PE 0604610N / *Lightweight Torpedo Development*

Project (Number/Name)
1412 / HAAWC

HAAWC Acquisition Schedule



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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 1412 / HAAWC

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 1412				
HAAWC Design/Development/Qualification: HAAWC IOC	2	2022	2	2022
HAAWC Design/Development/Qualification: HAAWC FOT&E	2	2022	2	2022
HAAWC Design/Development/Qualification: Common HAAWC Development	3	2022	4	2027

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>				Project (Number/Name) 2234 / <i>Lightweight Hybrid Torpedo</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
2234: <i>Lightweight Hybrid Torpedo</i>	396.868	16.487	12.131	12.244	-	12.244	15.882	15.202	14.526	14.815	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The program designs, integrates and tests the LWT MK54. The LWT provides performance improvements in shallow water, counter-measure environments. The MK 54 MOD 1 program consists of two increments: (1) Increment 1 consisting of Advanced Processor Build (APB) 5 / Tech Insertion 1 (TI-1); and (2) Increment 2, consisting of APB-6 software upgrade.

FY23 funding is for continued development of MK 54 MOD 1 Increment 2 APB 6 engineering builds, conducting in-water engineering test runs, and Weapons Analysis Facility (WAF) system testing.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: MK54 Pre-Planned Product Improvement	16.487	12.131	12.244	0.000	12.244
Articles:	-	-	-	-	-
FY 2022 Plans:					
Complete MK 54 MOD 1 OT					
Declare IOC					
Continue Fleet Exercise Section (FES) development					
Continue Environmentally Centric Weapons Facility (EC WAF) integration					
Continue APB 6 (INC 2) software development					
Conduct Engineering In Water Testing for APB 6 (INC 2)					
FY 2023 Base Plans:					
Continue Fleet Exercise Section (FES) development					
Continue Environmentally Centric Weapons Facility (EC WAF) Integration					
Continue APB 6 (INC 2) software development					
Conduct Engineering In Water Testing for APB 6 (INC 2)					
FY 2023 OCO Plans:					
N/A					
FY 2022 to FY 2023 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Increase for continued development of MK 54 MOD 1 Increment 2 APB 6 engineering builds, conducting in water engineering runs, and Weapons Analysis Facility (WAF) system testing.					
Accomplishments/Planned Programs Subtotals	16.487	12.131	12.244	0.000	12.244

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

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• WPN/3215: <i>MK-54 Torpedo Mods</i>	103.441	106.112	106.772	-	106.772	162.338	145.541	136.013	137.681	0.000	2,271.450

Remarks

LI 3215 FYDP funds MK54 MOD 0, MK54 MOD 1, MK54 MOD 2 and HAAWC procurements.

D. Acquisition Strategy

Leveraging a Phase III SBIR, a MK 54 MOD 1 LRIP contract was awarded to Progeny in 2016, for the delivery of MOD 1 assets to support Operational Testing (OT). EOC approved by MDA in Dec 2021 and IOC has been delayed to 4QFY22 due to lack of target availability to conduct OT events. Continuing on with the SBIR contractor, a second LRIP contract was awarded to Progeny for MOD 1 kits in 2018, with an option for Full Rate Production in FY 2022. A new Sole Source FRP contract award planned for FY 2023. In conjunction with these MK 54 MOD 1 hardware procurements, APB software upgrades will provide significant torpedo performance improvements. APB 5 and APB 6 software development and testing is performed by NUWC Division Newport.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy												Date: April 2022			
Appropriation/Budget Activity 1319 / 5				R-1 Program Element (Number/Name) PE 0604610N / Lightweight Torpedo Development				Project (Number/Name) 2234 / Lightweight Hybrid Torpedo							
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Hardware Development - PRIOR YEAR	WR	NUWC : Newport/ Keyport	47.640	0.000		0.000		0.000		-		0.000	0.000	47.640	-
Hardware Development - MK 54 MOD 1	WR	NUWC : Newport	4.769	2.700	Nov 2020	0.000		0.000		-		0.000	0.000	7.469	-
Hardware Development - MK 54 MOD 1	SS/FP	Progeny Systems : Not Specified	24.394	0.000		0.000		0.000		-		0.000	0.000	24.394	-
Hardware Development - HAAWC	WR	NSWCCD : Carderock, MD	0.050	0.000		0.000		0.000		-		0.000	0.000	0.050	-
Hardware Development - HAAWC	C/CPAF	Boeing : St. Louis, MO	98.216	0.000		0.000		0.000		-		0.000	0.000	98.216	-
Hardware Development - HAAWC	WR	NSWCDD : Dahlgren, VA	0.400	0.000		0.000		0.000		-		0.000	0.000	0.400	-
Hardware Development - INSENSITIVE MUNITIONS	WR	NUWC : Newport	0.950	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Hardware Development - INSENSITIVE MUNITIONS	WR	NSWC : Indian Head, MD	0.871	0.100	Nov 2020	0.150	Nov 2021	0.150	Nov 2022	-		0.150	Continuing	Continuing	Continuing
Hardware Development - INSENSITIVE MUNITIONS	WR	NUWC : Keyport	0.437	0.033	Nov 2020	0.749	Nov 2021	0.196	Nov 2022	-		0.196	Continuing	Continuing	Continuing
Hardware Development - MK54 MOD 1	WR	NSWC : Indian Head, MD	6.950	0.000		0.000		0.000		-		0.000	0.000	6.950	-
Hardware Development - MK54 MOD 1	MIPR	DMEA : McClellan, CA	0.520	0.000		0.000		0.000		-		0.000	0.000	0.520	-
Software Development - PRIOR YEAR	WR	NUWC : Newport/ Keyport	20.454	0.000		0.000		0.000		-		0.000	0.000	20.454	-
Software Development - MK 54 MOD 1	WR	NUWC : Newport	0.590	2.442	Nov 2020	2.757	Nov 2021	2.862	Nov 2022	-		2.862	0.000	8.651	-
Software Development - MK 54 MOD 1	MIPR	MIT : Boston, MA	1.358	0.000		0.000		0.000		-		0.000	0.000	1.358	-
Software Development - MK 54 MOD 1	C/BA	ARL/PSU : State College, PA	1.441	0.000		0.814	Jan 2022	0.500	Jan 2023	-		0.500	0.000	2.755	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 2234 / <i>Lightweight Hybrid Torpedo</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Systems Engineering - VLA	SS/FP	Lockheed Martin: VLA : Akron, OH	7.606	0.000		0.000		0.000		-		0.000	0.000	7.606	-
Systems Engineering - HAAWC	WR	NSWC PMA 290 : Patuxent, MD	9.582	0.000		0.000		0.000		-		0.000	0.000	9.582	-
Systems Engineering - HAAWC	WR	NAWCWD : China Lake	6.606	0.000		0.000		0.000		-		0.000	0.000	6.606	-
Systems Engineering - HAAWC	C/CPFF	John Hopkins University : Baltimore, MD	0.050	0.000		0.000		0.000		-		0.000	0.000	0.050	-
System Test & Evaluation - HAAWC	WR	NUWC : Newport/ Keyport	21.931	0.000		0.000		0.000		-		0.000	0.000	21.931	-
Hardware Development - ADV LWT	WR	NUWC : Newport	1.218	0.000		0.000		0.000		-		0.000	0.000	1.218	-
Hardware Development - ADV LWT	WR	NUWC : Keyport	0.300	0.000		0.000		0.000		-		0.000	0.000	0.300	-
Hardware Development - ADV LWT	WR	NSWC : Indian Head, MD	0.270	0.000		0.000		0.000		-		0.000	0.000	0.270	-
Hardware Development - ADV LWT	WR	NAVSEA : Washington, DC	0.025	0.000		0.000		0.000		-		0.000	0.000	0.025	-
Hardware Development - ADV LWT	WR	NAVAIR : Pax River, MD	0.025	0.000		0.000		0.000		-		0.000	0.000	0.025	-
Software Development - APB 6	WR	NUWC : Newport	1.672	1.743	Nov 2020	2.222	Nov 2021	1.947	Nov 2022	-		1.947	0.000	7.584	-
Software Development - APB 6	C/CPFF	Sonalyt : Waterford, CT	0.410	0.294	Nov 2020	0.000		0.000		-		0.000	0.000	0.704	-
Software Development - FCT program	C/BA	NUWC : Newport/ Keyport	1.150	0.000		0.000		0.000		-		0.000	0.000	1.150	-
Subtotal			259.885	7.312		6.692		5.655		-		5.655	Continuing	Continuing	N/A

Remarks
Decrease of \$1.037M in Product Development from FY22 to FY23 due to completion of MOD 1 OT events.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 2234 / <i>Lightweight Hybrid Torpedo</i>
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Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Hardware Development	WR	NUWC : Newport/ Keyport	5.532	0.000		0.000		0.000		-		0.000	0.000	5.532	-
Program Management Support	WR	NUWC : Newport/ Keyport	10.841	1.150	Nov 2020	1.302	Nov 2021	1.328	Nov 2022	-		1.328	0.000	14.621	-
Program Management Support	C/BA	ARL/PSU : State College, PA	0.441	0.000		0.000		0.000		-		0.000	0.000	0.441	-
Program Management Support	Various	NAVSEA : Not Specified	0.168	0.000		0.000		0.000		-		0.000	0.000	0.168	-
Systems Engineering	WR	NUWC : Newport/ Keyport	0.120	0.000		0.000		0.000		-		0.000	0.000	0.120	-
System Test and Evaluation	WR	NUWC : Newport/ Keyport	31.309	0.997	Nov 2020	1.834	Nov 2021	1.870	Nov 2022	-		1.870	0.000	36.010	-
System Test and Evaluation	WR	NSWC : Carderock, MD	0.008	0.000		0.000		0.000		-		0.000	0.000	0.008	-
System Test and Evaluation	WR	NSWC : Dahlgren, VA	0.069	0.000		0.000		0.000		-		0.000	0.000	0.069	-
System Test and Evaluation	WR	NAVFAC LANT : Washington, DC	0.056	0.000		0.000		0.000		-		0.000	0.000	0.056	-
Subtotal			48.544	2.147		3.136		3.198		-		3.198	0.000	57.025	N/A

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Systems Engineering - MK 54 MOD 1	WR	NSWC : Carderock	1.259	0.000		0.000		0.000		-		0.000	0.000	1.259	-
System Test and Evaluation - PRIOR YEAR	WR	NUWC : Newport/ Keyport	32.191	0.000		0.000		0.000		-		0.000	0.000	32.191	-
System Test and Evaluation - MK 54 MOD 1	WR	NUWC : Keyport	14.065	4.043	Nov 2020	1.763	Nov 2021	0.450	Nov 2022	-		0.450	0.000	20.321	-
System Test and Evaluation - MK 54 MOD 1	WR	NUWC : Newport	20.223	2.794	Nov 2020	0.211	Nov 2021	1.651	Nov 2022	-		1.651	0.000	24.879	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 2234 / <i>Lightweight Hybrid Torpedo</i>
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Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
System Test and Evaluation - MK 54 MOD 1	WR	NSWC : Indian Head, MD	1.676	0.000		0.000		0.000		-		0.000	0.000	1.676	-
System Test and Evaluation - MK 54 MOD 1	C/CPIF	ARL/PSU : State College, PA	2.029	0.000	Nov 2020	0.000	Dec 2021	0.000		-		0.000	0.000	2.029	-
System Test and Evaluation - MK 54 MOD 1	WR	Aberdeen Test Center : Aberdeen, MD	0.731	0.000		0.000		0.000		-		0.000	0.000	0.731	-
System Test and Evaluation - MK 54 MOD 1	WR	OPTEVFOR : Norfolk, VA	4.259	0.163	Dec 2020	0.039	Nov 2021	1.000	Nov 2022	-		1.000	0.000	5.461	-
System Test and Evaluation - PRIOR YEAR	WR	OPTEVFOR : Norfolk, VA	3.490	0.000		0.000		0.000		-		0.000	0.000	3.490	-
System Test and Evaluation - HAAWC	WR	OPTEVFOR : Norfolk, VA	0.750	0.000		0.000		0.000		-		0.000	0.000	0.750	-
System Test and Evaluation - HAAWC	WR	NSWC : Dalgren, VA	0.091	0.000		0.000		0.000		-		0.000	0.000	0.091	-
System Test and Evaluation - HAAWC	WR	NUWC : Keyport	0.618	0.000		0.000		0.000		-		0.000	0.000	0.618	-
System Test and Evaluation - HAAWC	WR	NUWC : Newport	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
System Test and Evaluation - WEAPON TRANSPORT	WR	NUWC : Keyport	0.081	0.000		0.000		0.000		-		0.000	0.000	0.081	-
System Test and Evaluation - ADV LWT	WR	NUWC : Newport	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
System Test and Evaluation - ADV LWT	WR	NUWC : Keyport	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
System Test and Evaluation - ADV LWT	WR	NSWC : Indian Head, MD	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
System Test and Evaluation - MK54 MOD 1	WR	NAVSEA : Washington, DC	0.039	0.000		0.000		0.000		-		0.000	0.000	0.039	-
Subtotal			81.502	7.000		2.013		3.101		-		3.101	0.000	93.616	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 2234 / <i>Lightweight Hybrid Torpedo</i>
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Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			

Remarks
Increase of \$1.088M in Test and Evaluation from FY22 to FY23 due to Increment 2 engineering and Development in water testing.

Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Travel	WR	NAVSEA : Washington, DC	0.563	0.028	Nov 2020	0.028	Nov 2021	0.028	Nov 2022	-		0.028	Continuing	Continuing	Continuing
Program Management Support	C/FPIF	EWCSS : Washington, DC	5.467	0.000	Nov 2020	0.262	Nov 2021	0.262	Nov 2022	-		0.262	0.000	5.991	-
Program Management Support	C/CPFF	ARL/PSU : Philadelphia, PA	0.588	0.000		0.000		0.000		-		0.000	0.000	0.588	-
Program Management Support	Various	NAVSEA : Washington, DC	0.093	0.000		0.000		0.000		-		0.000	0.000	0.093	-
Acquisition Workforce Fund	Various	Not Specified : Not Specified	0.226	0.000		0.000		0.000		-		0.000	0.000	0.226	-
Subtotal			6.937	0.028		0.290		0.290		-		0.290	Continuing	Continuing	N/A

	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	396.868	16.487	12.131	12.244	-	12.244	Continuing	Continuing	N/A

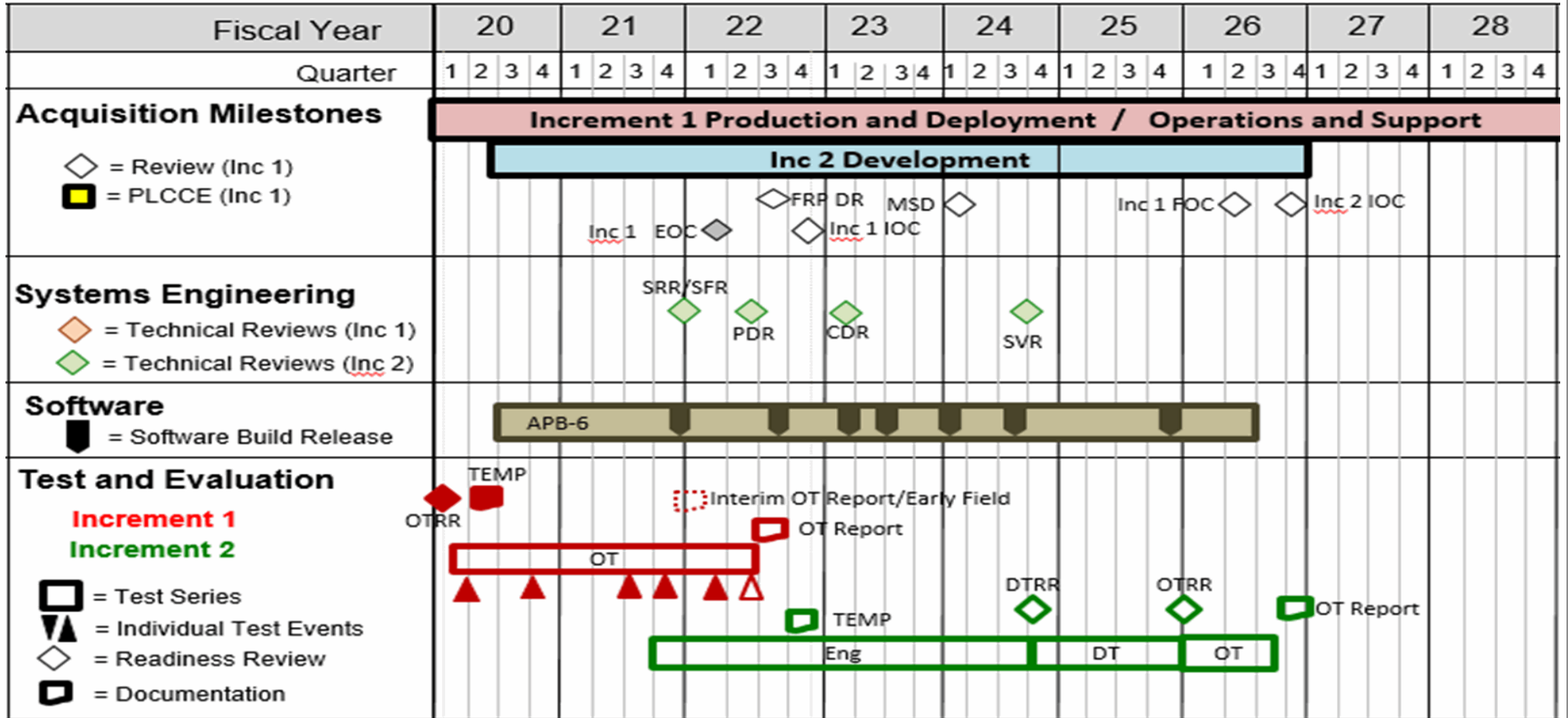
Remarks

Appropriation/Budget Activity
1319 / 5

R-1 Program Element (Number/Name)
PE 0604610N / *Lightweight Torpedo Development*

Project (Number/Name)
2234 / *Lightweight Hybrid Torpedo*

MK 54 MOD 1 Acquisition Schedule



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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 2234 / <i>Lightweight Hybrid Torpedo</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 2234				
MK54 MOD 1 Inc 1: APB 5 / TI-1 Inc 1 OT	1	2021	2	2022
MK54 MOD 1 Inc 1: APB 5 / TI-1 Inc 1 EOC	1	2022	1	2022
MK54 MOD 1 Inc 1: APB 5 / TI-1 Inc 1 IOC	4	2022	4	2022
MK54 MOD 1 Inc 2: APB 6 Tactical Software Development	1	2021	2	2026
MK54 MOD 1 Inc 2: Engineering Testing	4	2021	3	2024
MK54 MOD 1 Inc 2: DT	4	2024	4	2025
MK54 MOD 1 Inc 2: OT	1	2026	3	2026

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>				Project (Number/Name) 3418 / <i>Advanced Anti-Submarine Lightweight Torpedo</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3418: <i>Advanced Anti-Submarine Lightweight Torpedo</i>	115.297	95.767	82.055	127.030	-	127.030	137.972	76.762	87.190	45.092	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MK 54 MOD 2 (ALWT) is developing capability to improve the lethality and speed of the LWT by upgrading the Warhead and Propulsion system to counter challenging near-peer adversary submarines that are faster and deeper diving, leveraging the sonar hardware improvements developed under the MOD 1 program. The Analysis of Alternatives (AoA) and Capability Development Document (CDD) have been completed and approved. The program is leveraging UARCs and Government Agencies for requirements definition and early development, and the use of Other Transactional Authority (OTA)s for system and subsystem detailed design.

FY23 funding will be used to finalize the detailed design of the weapon and conducting system level Critical Design Review (CDR). Focus will be on completing the System Level Critical Design phase and delivering Proof of Design (POD) hardware to allow for completion of land-based testing and beginning the in-water engineering testing program with the POD Hardware. Additionally, the program will be preparing for of award of the All Up Round (AUR) Proof of Manufacture (POM) phase Other Transaction Authority (OTA) at the end of FY23. Long lead material procurements for the MK 54 MOD 2 POM phase will begin in FY23 to reduce the schedule risk prior to awarding the POM phase OTA for an AUR integrator to complete system level production readiness efforts. Additionally, funding to the rotary and fixed wing platforms will also be provided to begin design and development of integration efforts with aircraft necessary to support the MK 54 MOD 2 Test and Evaluation program that begins with test shape and interface testing during the Engineering Test period.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: ALWT Development	95.767	82.055	127.030	0.000	127.030
Articles:	-	-	-	-	-
FY 2022 Plans:					
-Conduct MS B					
-Conduct subsystem Critical Design Reviews (CDRs)					
-Continue MOD 2 APB software development					
-Continue Fleet Exercise Section (FES) development					
-Continue test set (Warhead/Engine/All up Round) development					
-Continue ship integration interface design					
-Continue hardware development for Warhead section, Guidance & Control section, and Propulsion					
-Continue EC WAF modeling and simulation accreditation					
-Propulsion Section Proof of Design build and testing					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022		
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 3418 / <i>Advanced Anti-Submarine Lightweight Torpedo</i>			
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
<ul style="list-style-type: none"> -Guidance and Control (G&C) Section Proof of Design build and testing -Warhead Section Proof of Design build and testing -Continue system test bed development -Continue MH-60R/P-8A integration interface design (hardware updates and interface software development) -Continue Air Launch Accessory (ALA) initial system design -Complete Integrated Logistics Assessment (ILA) -Continue to Procure long lead material supporting Phase II Proof of Manufacture design -Conduct AUR Phase II Solicitation for completing design and development <p>FY 2023 Base Plans:</p> <ul style="list-style-type: none"> -Conduct System Level Critical Design Review (CDR) -Continue MOD 2 APB software development -Continue Fleet Exercise Section (FES) development -Continue test set (Warhead/Engine/All up Round) development -Continue ship integration interface design -Continue hardware development for Warhead section, Guidance & Control section, and Propulsion -Continue EC WAF modeling and simulation accreditation -Complete Propulsion Section Proof of Design testing and delivery -Complete Guidance and Control (G&C) Section Proof of design testing and delivery -Complete Warhead section Proof of Design testing and delivery -Continue system test bed development -Continue MH-60R/P-8A Integration Interface Design (hardware updates and interface software development) -Continue Air Launch Accessory (ALA) Initial System Design -Continue to Procure Long Lead Material supporting Phase II Proof of Manufacture Design -Award AUR Phase II OTA for completing design and development -Conduct initial in-water engineering runs <p>FY 2023 OCO Plans: N/A</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Funding increased by \$44.975M from FY22 to FY23 in support of MK 54 MOD 2. Product Development increased by (\$43.052M) to fund: remaining Proof of Design (POD) phase and support Platform Integration to ensure launch platforms are ready for the required Developmental & Operational testing commencing in</p>					
FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 3418 / <i>Advanced Anti-Submarine Lightweight Torpedo</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
FY25; OTA hardware development contracts for 1) inert and tactical warheads required to execute engineering land-based and in-water test events, 2) 5 Guidance & Control sections to support engineering in-water runs, 3) All-Up-Round Integration Fleet Exercise Section (FES) redesign plus 5 FESs and 38 FES turn-around kits for Engineering In-Water runs, and 4) for the New Engine for 16 power plant and tail turn-around kits for engineering in-water runs, 5) new Phase II AUR OTA contract award for POM test units; and APB 7 software development. Additionally, government support funding is provided for Set-to-Hit target certification plan, upgrades to EC-WAF to model MK 54 MOD 2, Support Engineering In-Water Run torpedo builds and post-run analysis, Warhead Environmental Testing, Surface Ship platform integration. Additionally, Support increased by (\$0.828M) for the commencement of initial system integration testing. Finally, Test and Evaluation increased by (\$1.095M) to start initial system integration testing.					
Accomplishments/Planned Programs Subtotals	95.767	82.055	127.030	0.000	127.030

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

<u>Line Item</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023 Base</u>	<u>FY 2023 OCO</u>	<u>FY 2023 Total</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• WPN/3215: <i>MK-54 Torpedo Mods</i>	103.441	106.112	106.772	-	106.772	162.338	145.541	136.013	137.681	0.000	2,271.450

Remarks

LI 3215 FYDP funds MK54 MOD 0, MK54 MOD 1, MK54 MOD 2 and HAAWC procurements.

D. Acquisition Strategy

The Acquisition Strategy is to use University Affiliated Research Centers (UARCs), Warfare Centers, and competitive Other Transactional Authority (OTA) agreements with industry to prototype a new Advanced Lightweight Torpedo. The program will then pursue accelerated acquisition LRIP opportunities while preparing for full and open FRP competition. This accelerated approach requires full initial funding to ensure all prototyping efforts deliver a fully integrated and production-ready weapon. Scope of effort includes weapon, launch platform integration, and all associated subsystems and supporting capabilities.

Four OTAs awarded and executing Proof of Design (POD) phase:

- (1) Northrop Grumman - Warhead Section
- (2) Aerojet - Afterbody Section
- (3) Progeny - G&C Section
- (4) Raytheon - All-Up-Round (AUR), Test Sets, Test Shapes, Air Launch Accessories, and Fleet Exercise Sections (FES)

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 3418 / <i>Advanced Anti-Submarine Lightweight Torpedo</i>
Proof of Manufacturing (POM) phase competitive OTA contract will be awarded to a single prime and LRIP sole-source contract will be awarded award to the POM phase prime contractor.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 5				PE 0604610N / <i>Lightweight Torpedo Development</i>				3418 / <i>Advanced Anti-Submarine Lightweight Torpedo</i>							
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Software Development	WR	NUWC NPT : Newport, RI	1.282	6.354	Nov 2020	7.131	Nov 2021	7.877	Nov 2022	-		7.877	0.000	22.644	-
Hardware Development	WR	NUWC NPT : Newport, RI	7.705	2.143	Nov 2020	2.846	Nov 2021	3.860	Nov 2022	-		3.860	Continuing	Continuing	Continuing
Hardware Development	WR	NUWC KPT : Keyport, WA	6.830	3.216	Nov 2020	5.005	Nov 2021	9.831	Nov 2022	-		9.831	0.000	24.882	-
Hardware Development	WR	NSWC, IH : Indian Head, MD	2.651	2.052	Nov 2020	0.625	Nov 2021	3.409	Nov 2022	-		3.409	0.000	8.737	-
Hardware Development - AUR	C/CPFF	ARL/PSU : State College, PA	21.192	15.712	Nov 2020	3.076	Nov 2021	10.578	Nov 2022	-		10.578	0.000	50.558	-
Hardware Development	WR	PEO-IWS : Washington, DC	2.613	0.256	Dec 2020	0.250	Nov 2021	0.276	Nov 2022	-		0.276	0.000	3.395	-
Software Development - Platform Integration	WR	NAVAIR : Pax River, MD	3.256	7.268	Nov 2020	9.659	Nov 2021	4.293	Nov 2022	-		4.293	0.000	24.476	-
Hardware Development - G&C	C/CPIF	OTA - Progeny : Manassas, VA	5.864	0.000	Jan 2021	7.600	Dec 2021	5.984	Dec 2022	-		5.984	0.000	19.448	-
Hardware Development - New engine	C/CPIF	OTA - Aerojet Rocketdyne : Huntsville, AL	32.334	24.807	Jan 2021	18.071	Jan 2022	13.312	Jan 2023	-		13.312	0.000	88.524	-
Hardware Development - Warhead	C/CPIF	OTA - Northrop Grumman Innovation Systems : Plymouth, MN	14.649	13.500	Jan 2021	8.504	Jan 2022	16.016	Jan 2023	-		16.016	0.000	52.669	-
Hardware Development - AUR	C/CPIF	OTA - Raytheon : Portsmouth, RI	11.248	17.759	Jan 2021	16.858	Jan 2022	23.412	Jan 2023	-		23.412	0.000	69.277	-
Hardware Development	WR	NSWC Philadelphia : Philadelphia, PA	0.000	0.000		0.000		0.346	Nov 2022	-		0.346	0.000	0.346	-
Software Development	WR	NSWCCD : Carderock, MD	0.000	0.000		0.000		1.168	Nov 2022	-		1.168	0.000	1.168	-
Software Development - Platform Integration	C/CPFF	CTR - TBD : TBD	0.000	0.000		0.000		9.315	Feb 2023	-		9.315	0.000	9.315	-
Hardware Development Phase II AUR	C/CPIF	OTA - TBD : TBD	0.000	0.000		0.000		13.000	Jan 2023	-		13.000	0.000	13.000	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 3418 / <i>Advanced Anti-Submarine Lightweight Torpedo</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Subtotal			109.624	93.067		79.625		122.677		-		122.677	Continuing	Continuing	N/A

Remarks
Increase of \$43.052M in Product Development funding from FY22 to FY23 is required to fund remaining Proof of Design (POD) phase to support award Proof of Manufacturing (POM) contract in FY23. Additional funding required for new competitive Phase II POM contract award and support contract award in FY23 for P-8A platform integration to launch MOD 2.

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Systems Engineering	WR	NUWC NPT : Newport, RI	1.180	1.247	Nov 2020	0.960	Nov 2021	1.788	Nov 2022	-		1.788	0.000	5.175	-
Subtotal			1.180	1.247		0.960		1.788		-		1.788	0.000	5.175	N/A

Remarks
Increase of \$.828M in support of FY23 commencement of initial system integration testing.

Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
System Test and Evaluation	WR	NUWC NPT : Newport, RI	3.724	0.553	Nov 2020	0.570	Nov 2021	1.410	Nov 2022	-		1.410	0.000	6.257	-
Program Support	WR	OPTEVFOR : Norfolk, VA	0.000	0.000		0.000		0.255	Nov 2022	-		0.255	0.000	0.255	-
Subtotal			3.724	0.553		0.570		1.665		-		1.665	0.000	6.512	N/A

Remarks
Increase of \$1.095M in support of FY23 commencement of initial system integration testing.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy

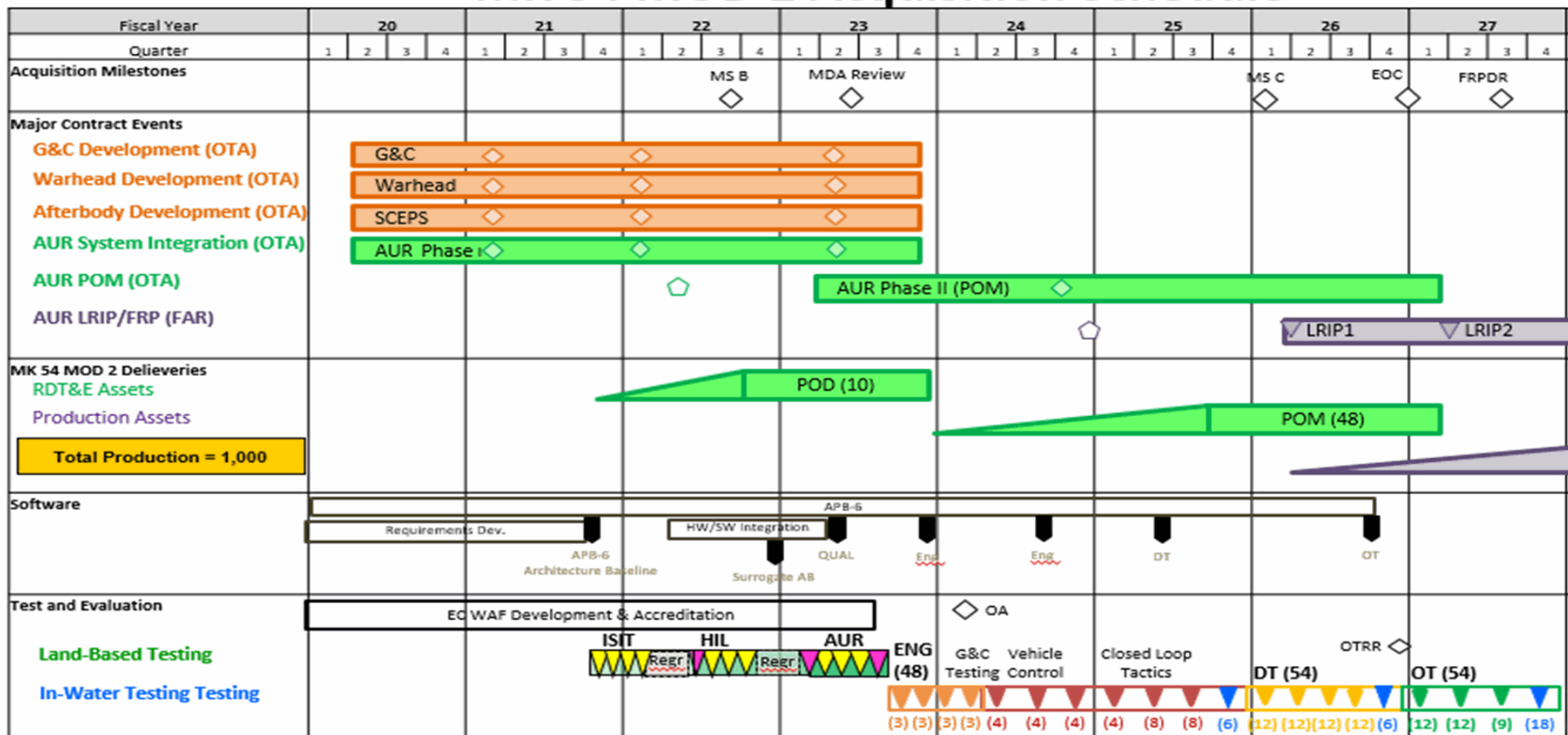
Date: April 2022

Appropriation/Budget Activity
1319 / 5

R-1 Program Element (Number/Name)
PE 0604610N / *Lightweight Torpedo Development*

Project (Number/Name)
3418 / *Advanced Anti-Submarine
Lightweight Torpedo*

MK 54 MOD 2 Acquisition Schedule



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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 3418 / <i>Advanced Anti-Submarine Lightweight Torpedo</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 3418				
Advanced Lightweight Torpedo (ALWT): ALWT MS-B	3	2022	3	2022
Advanced Lightweight Torpedo (ALWT): ALWT SCEPS Development	1	2021	4	2023
Advanced Lightweight Torpedo (ALWT): ALWT Warhead Development	1	2021	4	2023
Advanced Lightweight Torpedo (ALWT): ALWT G&C Hardware / Software Development	1	2021	4	2023
Advanced Lightweight Torpedo (ALWT): ALWT AUR Development Integration	1	2021	4	2023
Advanced Lightweight Torpedo (ALWT): ALWT Land Based Testing	4	2021	3	2023
Advanced Lightweight Torpedo (ALWT): Engineering Testing	4	2023	4	2025
Advanced Lightweight Torpedo (ALWT): Development Testing	1	2026	4	2026
Advanced Lightweight Torpedo (ALWT): Operational Testing	1	2027	4	2027