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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
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Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>					PE 0604610N / <i>Lightweight Torpedo Development</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	345.501	21.057	63.147	148.349	-	148.349	145.421	98.060	65.317	58.728	Continuing	Continuing
1412: <i>HAAWC</i>	0.000	8.516	3.916	6.754	-	6.754	0.000	0.000	0.000	0.000	0.000	19.186
2234: <i>Lightweight Hybrid Torpedo</i>	345.501	12.541	22.831	17.798	-	17.798	16.824	13.938	14.152	14.427	Continuing	Continuing
3418: <i>Advanced Anti-Submarine Lightweight Torpedo</i>	0.000	0.000	36.400	123.797	-	123.797	128.597	84.122	51.165	44.301	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Lightweight Torpedo (LWT) program designs, integrates and tests the LWT MK 54. The LWT development program provides performance improvements in shallow water and counter-measure environments. The High Altitude Anti-Submarine Warfare Weapon Capability (HAAWC) development and Low Rate Initial Production (LRIP) contract was awarded to Boeing on April 2013. The Advanced Lightweight Torpedo effort has completed Analysis of Alternatives (AoA) and out briefed the selected material solution. The effort is currently in the system requirements and development phase for FY 2019.

Budget 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 re-architecture, broadband array improvements, and APB software improvements. Future APB software builds will utilize the common torpedo software to deliver capability and tactic 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 Reconnaissance Aircraft (MPRA) with the HAAWC.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	28.076	95.147	159.755	-	159.755
Current President's Budget	21.057	63.147	148.349	-	148.349
Total Adjustments	-7.019	-32.000	-11.406	-	-11.406
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-32.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Program Adjustments	0.000	0.000	-10.000	-	-10.000
• Rate/Misc Adjustments	0.000	0.000	-1.406	-	-1.406

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Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)		R-1 Program Element (Number/Name) PE 0604610N / Lightweight Torpedo Development			
• Congressional Directed Reductions Adjustments		-7.019	-	-	-
Change Summary Explanation Proj: 1412 HAAWC - Increase of \$2.838M from FY19 to FY20 is required to support in-water test runs for Operational Testing (OT), and funds to contractor Boeing to pay for test support and planning, development close-out, and software upgrades. Proj: 2234 Lightweight Hybrid Torpedo - Decrease of \$5.033M from FY19 to FY20 based on a reduction in the number of in-water developmental test runs. Proj: 3418 Advanced Anti-Submarine Lightweight Torpedo - Increase of \$87.397M from FY19 to FY20 required for Other Transactional Authority (OTA) agreements for the development of an improved propulsion system, modified Otto Fuel engine, new warhead development, new Guidance & Control(G&C) Section, All up Round (AUR) integration, P-8A and Helo platform integration, New Fleet Exercise Section development, and New Test Set development in support of Advanced Lightweight Torpedo (MK54 MOD 2) development.					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019		
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 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
1412: HAAWC	0.000	8.516	3.916	6.754	-	6.754	0.000	0.000	0.000	0.000	0.000	19.186
Quantity of RDT&E Articles		23	-	-	-	-	-	-	-	-		
A. Mission Description and Budget Item Justification												
The program will design, develop, and procure a High Altitude Anti-Submarine Warfare Weapon Capability (HAAWC) Air Launch Accessory (ALA) for the MK 54 Lightweight Torpedo (LWT). This capability will allow employment of the MK 54 outside the current fixed wing launch envelope. This includes the ability to employ the MK 54 LWT at high altitude, with stand-off ranges, and with the ability for precision guidance to the intended water entry point (WEP) without affecting the in-water operation of the LWT. This ALA is intended for employment with the Navy's latest Maritime Patrol and Reconnaissance Aircraft (MPRA), the P-8A Poseidon.												
FY 2020 achievement of HAAWC IOC												
HAAWC program was previously funded in FY 2016 - FY 2017 from Proj. 2234 Lightweight Hybrid Torpedo.												
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: High Altitude Anti-Submarine Warfare Weapon Capability (HAAWC) Development								8.516	3.916	6.754	0.000	6.754
								23	-	-	-	-
FY 2019 Plans: Continue Integrated Testing with P-8A Platform. Complete Operational test Readiness Review (OTRR) Begin Operational Testing (OT) Conduct System Verification Review (SVR) Conduct Flight Readiness Review (FRR) Complete Developmental Testing with P-8A Platform												
FY 2020 Base Plans: Complete Operational Test (OT) Complete Cybersecurity reviews development closeout Conduct final Safety reviews Closeout Flight Simulator software and documentation												
FY 2020 OCO Plans:												

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy				Date: March 2019	
Appropriation/Budget Activity 1319 / 5		R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>		Project (Number/Name) 1412 / HAAWC	

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Increase of \$2.838M from FY19 to FY20 is based on additional engineering support for in-water test runs for OT and funds to contractor, Boeing, to pay for test support and planning, development close-out, and software upgrades.					
Accomplishments/Planned Programs Subtotals	8.516	3.916	6.754	0.000	6.754

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• WPN/3215: <i>MK54 Torpedo Mods</i>	94.699	83.825	119.502	-	119.502	136.115	148.186	198.937	202.905	0.000	2,075.337
Remarks											
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 will be in FY 2020, upon successfully meeting Initial Operating Capability (IOC) requirements and conducting a Full Rate Production Decision Review.											
E. Performance Metrics Milestone reviews Program Management reviews System engineering technical review											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy **Date:** March 2019

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 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
Hardware Development - HAAWC	C/CPFF	Boeing : St. Louis, MO	0.000	5.585	Nov 2017	0.000	Dec 2018	0.600	Nov 2019	-		0.600	0.000	6.185	-
Hardware Development - HAAWC	WR	NSWC : Indian Head, MD	0.000	0.040	Nov 2017	0.200	Nov 2018	0.000		-		0.000	0.000	0.240	-
Systems Engineering - HAAWC	WR	NSWC : Pax River, MD	0.000	0.475	Nov 2017	0.000	Nov 2018	0.000		-		0.000	0.000	0.475	-
Systems Engineering - HAAWC	WR	NAWC : China Lake, CA	0.000	0.740	Nov 2017	0.090	Nov 2018	0.000		-		0.000	0.000	0.830	-
Systems Engineering - HAAWC	WR	NUWC : Newport	0.000	0.000		0.340	Nov 2018	0.000		-		0.000	0.000	0.340	-
Subtotal			0.000	6.840		0.630		0.600		-		0.600	0.000	8.070	N/A

Remarks

Funding required in FY20 on Boeing contract for hardware support and planning.

Support (\$ 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
Systems Engineering - HAAWC	WR	NUWC : Keyport	0.000	0.000		0.219	Nov 2018	0.900	Nov 2019	-		0.900	Continuing	Continuing	Continuing
Subtotal			0.000	0.000		0.219		0.900		-		0.900	Continuing	Continuing	N/A

Remarks

Increased funding required in FY20 for HAAWC documentation and systems engineering agent support.

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
System Test & Evaluation - HAAWC	C/CPFF	Boeing : St. Louis, MO	0.000	0.000		0.500	Dec 2018	2.233	Nov 2019	-		2.233	0.000	2.733	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
Appropriation/Budget Activity 1319 / 5						R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>				Project (Number/Name) 1412 / HAAWC					

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
System Test & Evaluation - HAAWC	WR	NUWC : Keyport, WA	0.000	0.525	Nov 2017	1.260	Nov 2018	0.284	Nov 2019	-		0.284	0.000	2.069	-
System Test & Evaluation - HAAWC	C/BA	NUWC : Newport, RI	0.000	0.751	Nov 2017	0.000	Dec 2018	0.637	Nov 2019	-		0.637	0.000	1.388	-
System Test & Evaluation - HAAWC	WR	NAWC : China Lake, CA	0.000	0.000		0.560	Nov 2018	0.400	Nov 2019	-		0.400	0.000	0.960	-
System Test & Evaluation - HAAWC	WR	NAWC : Pax River, MD	0.000	0.000		0.297	Nov 2018	0.700	Nov 2019	-		0.700	0.000	0.997	-
System Test & Evaluation - HAAWC	WR	OPTEVFOR : Norfolk, VA	0.000	0.400	Nov 2017	0.450	Dec 2018	1.000	Nov 2019	-		1.000	0.000	1.850	-
System Test & Evaluation - HAAWC	C/BA	Not Specified : Not Specified	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Subtotal			0.000	1.676		3.067		5.254		-		5.254	0.000	9.997	N/A

Remarks Increased funding in FY20 required to conduct Operational Testing (OT), complete final OT report, complete reviews for cyber security and safety, and closeout flight simulator software/documentation.															
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	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	0.000	8.516	3.916	6.754	-	6.754	Continuing	Continuing	N/A

Remarks									
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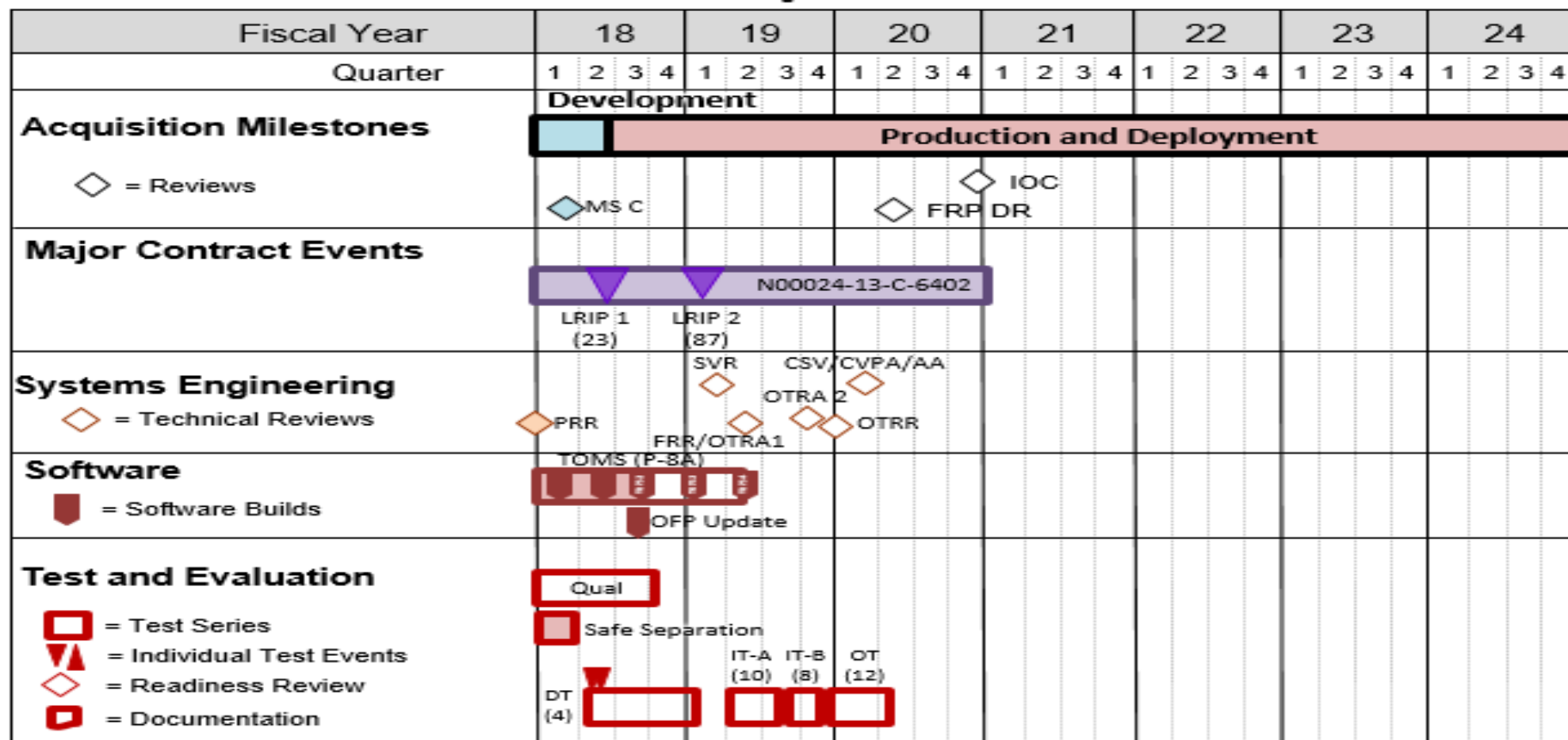
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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy

Date: March 2019

Appropriation/Budget Activity
1319 / 5R-1 Program Element (Number/Name)
PE 0604610N / *Lightweight Torpedo Development*Project (Number/Name)
1412 / HAAWC

HAAWC Development Schedule



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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy			Date: March 2019
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
<i>Proj 1412</i>				
HAAWC Design/Development/Qualification: HAAWC MS C	1	2018	1	2018
HAAWC Design/Development/Qualification: HAAWC IT / OT	2	2019	2	2020
HAAWC Design/Development/Qualification: HAAWC IOC	4	2020	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019		
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 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
2234: <i>Lightweight Hybrid Torpedo</i>	345.501	12.541	22.831	17.798	-	17.798	16.824	13.938	14.152	14.427	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 to two increments: 1) Advanced Processor Build (APB) 5/Tech Insertion 1 (TI1) and 2) APB-6 software upgrade.												
FY 2021 achievement of MK 54 MOD 1 IOC												
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MK54 Pre-Planned Product Improvement								12.541	22.831	17.798	0.000	17.798
								Articles: -	-	-	-	-
FY 2019 Plans: Conduct MK 54 MOD 1 IT Conduct MK 54 MOD 1 Operational Test Readiness Review (OTRR) Begin APB 6 (INC 2) software development FY 2020 Base Plans: Conduct MK54 MOD 1 Operational Testing (OT) Continue Countermeasure Procurement Continue Fleet Exercise Section(FES)Development Continue Environmentally Centric Weapons Facility (EC WAF) Integration Continue APB 6 (INC 2) software development FY 2020 OCO Plans: N/A FY 2019 to FY 2020 Increase/Decrease Statement: Decrease of \$5.033M from FY19 to FY20 based on a reduction in the number of in-water operational test runs.												
Accomplishments/Planned Programs Subtotals								12.541	22.831	17.798	0.000	17.798

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019	
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>			
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>
• WPN/3215: <i>MK54 Torpedo Mods</i>	94.699	83.825	119.502	-	119.502	136.115	148.186	198.937	202.905	0.000	2,075.337
Remarks											
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) leading to a planned IOC in 2021. 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 2021. 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.											
E. Performance Metrics											
Milestone reviews											
System engineering technical review											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
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>					
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
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	1.385	0.681	Nov 2017	1.400	Nov 2018	1.282	Nov 2019	-		1.282	0.000	4.748	-
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 - HAAWC	WR	NSWC : Indian Head	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Hardware Development - INSENSITIVE MUNITIONS	WR	NUWC : Newport	0.420	0.110	Oct 2017	0.210	Jan 2019	0.210	Nov 2019	-		0.210	Continuing	Continuing	Continuing
Hardware Development - INSENSITIVE MUNITIONS	WR	NSWC : Indian Head, MD	0.480	0.150	Jan 2018	0.150	Jan 2019	0.150	Nov 2019	-		0.150	Continuing	Continuing	Continuing
Hardware Development - INSENSITIVE MUNITIONS	WR	NUWC : Keyport	0.000	0.122	Nov 2017	0.196	Jan 2019	0.101	Nov 2019	-		0.101	Continuing	Continuing	Continuing
Hardware Development - MK54 MOD 1	WR	NSWC : Indian Head, MD	5.030	1.920	Jun 2018	0.000		0.000		-		0.000	0.000	6.950	-
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	0.010	0.000	Oct 2017	0.075	Nov 2018	0.580	Nov 2019	-		0.580	0.000	0.665	-
Software Development - MK 54 MOD 1	MIPR	MIT : Boston, MA	1.358	0.000	Feb 2018	0.000		0.000		-		0.000	0.000	1.358	-
Software Development - MK 54 MOD 1	C/BA	ARL/PSU : Philadelphia, PA	0.621	0.820	Jan 2018	0.000		0.000		-		0.000	0.000	1.441	-

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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
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 Enginnering - 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	0.000	1.218	Oct 2017	0.000		0.000		-		0.000	0.000	1.218	-
Hardware Development - ADV LWT	WR	NUWC : Keyport	0.000	0.300	Oct 2017	0.000		0.000		-		0.000	0.000	0.300	-
Hardware Development - ADV LWT	WR	NSWC : Indian Head, MD	0.000	0.270	Oct 2017	0.000		0.000		-		0.000	0.000	0.270	-
Software Development - APB 6	WR	NUWC : Newport	0.000	0.000		0.395	Dec 2018	0.403	Nov 2019	-		0.403	0.000	0.798	-
Software Development - FCT program	C/BA	NUWC : Newport/ Keyport	0.000	1.150	Jul 2018	0.000		0.000		-		0.000	0.000	1.150	-
Hardware Development - ADV LWT	WR	NAVSEA : Washington, DC	0.000	0.025	Jul 2018	0.000		0.000		-		0.000	0.000	0.025	-
Hardware Development - ADV LWT	WR	NAVAIR : Pax River, MD	0.000	0.025	Jul 2018	0.000		0.000		-		0.000	0.000	0.025	-
Subtotal			246.233	6.791		2.426		2.726		-		2.726	Continuing	Continuing	N/A

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Support (\$ 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
Hardware Development	WR	NUWC : Newport/ Keyport	5.347	0.185	Nov 2017	0.000		0.000		-		0.000	0.000	5.532	-
Program Management Support	WR	NUWC : Newport/ Keyport	8.805	0.468	Dec 2017	1.672	Nov 2018	1.193	Nov 2019	-		1.193	0.000	12.138	-
Program Management Support	C/BA	ARL/PSU : Philadelphia, 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		0.235	Nov 2018	0.000		-		0.000	0.000	0.355	-
System Test and Evaluation	WR	NUWC : Newport/ Keyport	30.293	0.000	Nov 2017	0.565	Nov 2018	0.428	Nov 2019	-		0.428	0.000	31.286	-
Hardware Development	WR	NSWC : Indian Head, MD	0.000	0.000	Oct 2017	0.000		0.000		-		0.000	0.000	0.000	-
Program Management Support	WR	NSWC : Indian Head, MD	0.000	0.000	Oct 2017	0.000		0.000		-		0.000	0.000	0.000	-
Subtotal			45.174	0.653		2.472		1.621		-		1.621	0.000	49.920	N/A
Remarks Decreased support funding required in FY20 based on reduced number of in-water developmental test runs.															
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
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	2.454	0.863	Dec 2017	4.242	Jan 2019	4.351	Nov 2019	-		4.351	0.000	11.910	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
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>					
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
System Test and Evaluation - MK 54 MOD 1	WR	NUWC : Newport	3.923	3.218	Dec 2017	12.601	Nov 2018	6.978	Nov 2019	-		6.978	0.000	26.720	-
System Test and Evaluation - MK 54 MOD 1	WR	NSWC : Indian Head, MD	1.576	0.000		0.100	Nov 2018	0.100	Nov 2019	-		0.100	0.000	1.776	-
System Test and Evaluation - MK 54 MOD 1	C/CPIF	ARL/PSU : Philadephia, PA	0.068	0.000		0.000		0.288	Nov 2019	-		0.288	0.000	0.356	-
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 : Not Specified	1.000	0.629	Nov 2017	0.500	Nov 2018	1.235	Nov 2019	-		1.235	0.000	3.364	-
System Test and Evaluation - PRIOR YEAR	WR	OPTEVFOR : Not Specified	3.490	0.000		0.000		0.000		-		0.000	0.000	3.490	-
System Test and Evaluation - HAAWC	WR	OPTEVFOR : Not Specified	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	0.053	0.028	Oct 2017	0.000		0.000		-		0.000	0.000	0.081	-
System Test and Evaluation - ADV LWT	WR	NUWC : Newport	0.000	0.000	Oct 2017	0.000		0.000		-		0.000	0.000	0.000	-
System Test and Evaluation - ADV LWT	WR	NUWC : Keyport	0.000	0.000	Oct 2017	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	Oct 2017	0.000		0.000		-		0.000	0.000	0.000	-
System Test and Evaluation - MK54 MOD 1	WR	NAVSEA : Washington, DC	0.000	0.039	Oct 2017	0.000		0.000		-		0.000	0.000	0.039	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy													Date: March 2019		
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>					
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
Subtotal			48.204	4.777		17.443		12.952		-		12.952	0.000	83.376	N/A
Remarks Decreased T&E funding required in FY20 based on reduced number of in-water developmental test runs.															
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
Travel	WR	NAVSEA : Washington, DC	0.487	0.020	Jan 2018	0.028	Feb 2019	0.028	Nov 2019	-		0.028	Continuing	Continuing	Continuing
Program Management Support	C/FPIF	EWCSS : Washington, DC	4.496	0.300	Mar 2018	0.462	Feb 2019	0.471	Nov 2019	-		0.471	0.000	5.729	-
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			5.890	0.320		0.490		0.499		-		0.499	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			345.501	12.541		22.831		17.798		-		17.798	Continuing	Continuing	N/A
Remarks															

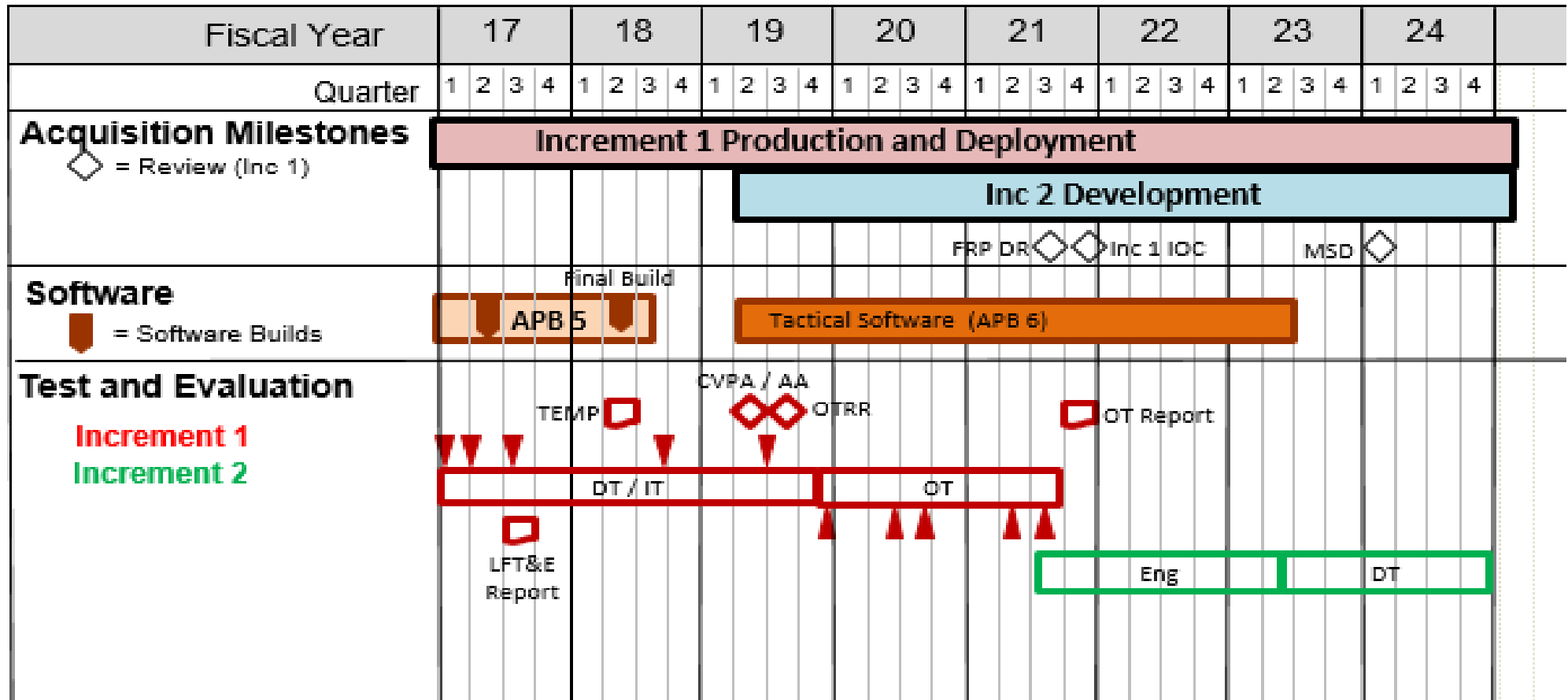
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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy

Date: March 2019

Appropriation/Budget Activity
1319 / 5R-1 Program Element (Number/Name)
PE 0604610N / *Lightweight Torpedo Development*Project (Number/Name)
2234 / *Lightweight Hybrid Torpedo*

MK 54 MOD 1 Schedule



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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy			Date: March 2019
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
<i>Proj 2234</i>				
APB 5 /TI-1: Continue APB 5 / TI-1 DT/IT	1	2018	4	2019
APB 5 /TI-1: APB 5 / TI-1 OT	4	2019	3	2021
APB 5 /TI-1: APB 5 / TI-1 IOC	4	2021	4	2021
Inc 2: APB 6 Tactical Software Development	2	2019	3	2023
Inc 2: APB 6 Development Testing (DT)	2	2023	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019		
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 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
3418: <i>Advanced Anti-Submarine Lightweight Torpedo</i>	0.000	0.000	36.400	123.797	-	123.797	128.597	84.122	51.165	44.301	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Developing an Advanced Lightweight Torpedo (ALWT) capable of prosecuting challenging adversary submarine targets. The effort has completed Analysis of Alternatives (AoA) and out briefed the selected material solution. Improvements to various hardware subsystems were evaluated for performance improvements along with software and algorithm updates. The AoA completed 4Q FY 2017. In FY 2019, the program will leverage the use of Other Transactional Authority (OTA)s for system and subsystem development strategies. FY 2019 funding will allow for more detailed design and development work (HW/SW) to commence. The FY will begin with significant system requirements and initial functional allocation work.

In FY20, the program will begin additional development of support equipment, test sets, and air launch accessories. The program will conduct additional testing and platform integration (surface and air) to further support initial system design work. Funds will be distributed on OTAs for development of Guidance and Control (G&C) subsystems, warhead modifications, modified Air Launch Accessory (ALA) wing kit, and modified afterbodies; Otto fuel and improved propulsion system. Additional funding will be provided on UARC contracts for integration support and to NUWCs for government software development and support. Subsystem prototype build and test for major subsystems is the biggest cost driver from FY19 to FY20 (materials, build process development, and test program included). Significant aircraft integration tasks begin (P-8A and MH-60R) which will include software and interface design activities. PDR is occurring in FY20 which leads to detailed system modeling with associated simulation runs, analysis and drawing preparation. This task requires assessing analysis to date and subsystem prototype performance to ensure we are moving out with the correct initial system design. Milestone B preparation will also require additional subject matter expert (SME) involvement for assessment and documentation development.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: ALWT Development	0.000	36.400	123.797	0.000	123.797
Articles:	-	-	-	-	-
FY 2019 Plans: -Award all OTAs for weapon development -Conduct and closeout System Requirements Review (SRR). -Begin MOD 2 APB Software Development (requirements and architecture analysis) -Begin Fleet Exercise Section (FES) Development -Begin Test Set (Warhead/Engine/All up Round) Development -Begin Ship Integration Interface Design					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019			
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
<div>-Begin Hardware Development for Warhead Section, Guidance & Control Section, and Propulsion</div> <div>-Begin EC WAF Modeling and Simulation Accreditation</div> <div>-Begin System Test Bed Development</div> <div>-Conduct System Functional Review (SFR).</div> <div>FY 2020 Base Plans:</div> <div>-Continue MOD 2 APB Software Development (requirements and architecture analysis)</div> <div>-Continue Fleet Exercise Section (FES) Development</div> <div>-Continue Test Set (Warhead/Engine/All up Round) Development</div> <div>-Continue Ship Integration Interface Design</div> <div>-Continue Hardware Development for Warhead Section, Guidance & Control Section, and Propulsion</div> <div>-Continue EC WAF Modeling and Simulation Accreditation</div> <div>-Propulsion Section Prototype Build and Testing</div> <div>-Guidance and Control (G&C) Section Prototype Build and Testing</div> <div>-Warhead Section Prototype Build and Testing</div> <div>-Continue System Test Bed Development</div> <div>-Begin MH-60R/P-8A Integration Interface Design (requirements/analysis/software)</div> <div>-Begin Air Launch Accessory (ALA) Requirements and Initial System Design</div> <div>-Initial Software/Hardware (SW/HW) Integration</div> <div>-Conduct Milestone B preparation documentation reviews</div> <div>-Conduct Preliminary Design Review (PDR).</div> <div>FY 2020 OCO Plans:</div> <div>N/A</div> <div>FY 2019 to FY 2020 Increase/Decrease Statement:</div> <div>Increase of \$87.397M from FY19 to FY20 required for Other Transactional Authority (OTA) agreements for the development of an improved propulsion system, modified Otto Fuel engine, new warhead development, new Guidance & Control(G&C) Section, All up Round (AUR) integration, P-8A and Helo platform integration, new Fleet Exercise Section (FES) development, and New Test Set development in support of Advanced Lightweight Torpedo (MK54 MOD 2) development.</div>						
Accomplishments/Planned Programs Subtotals		0.000	36.400	123.797	0.000	123.797

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy									Date: March 2019			
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>				
C. Other Program Funding Summary (\$ in Millions)												
	<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
•	WPN/3215: <i>MK-54 Torpedo Mods</i>	94.699	83.825	119.502	-	119.502	136.115	148.186	198.937	202.905	0.000	2,075.337
Remarks												
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 that will be production ready in FY23. 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.												
E. Performance Metrics												
Milestone reviews												
System engineering technical review												

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
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>					
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
Software Development	WR	NUWC NPT : Newport, RI	0.000	0.000		3.297	Dec 2018	3.500	Nov 2019	-		3.500	0.000	6.797	-
Software Development	C/CPFF	Carnegie Mellon : Pittsburgh, PA	0.000	0.000		0.400	Jan 2019	0.400	Nov 2019	-		0.400	0.000	0.800	-
Hardware Development	WR	NUWC NPT : Newport, RI	0.000	0.000		1.800	Dec 2018	0.850	Nov 2019	-		0.850	Continuing	Continuing	Continuing
Hardware Development	WR	NUWC KPT : Keyport, WA	0.000	0.000		0.350	Dec 2018	0.500	Nov 2019	-		0.500	0.000	0.850	-
Hardware Development	WR	NSWC, IH : Indian Head, MD	0.000	0.000		0.900	Dec 2018	0.900	Nov 2019	-		0.900	0.000	1.800	-
Hardware Development - AUR	C/CPFF	ARL/PSU : State College, PA	0.000	0.000		4.500	Jan 2019	7.150	Nov 2019	-		7.150	0.000	11.650	-
Hardware Development	WR	PEO-IWS : Washington, DC	0.000	0.000		4.650	May 2019	4.000	Nov 2019	-		4.000	0.000	8.650	-
Hardware Development	WR	NAVAIR : Pax River, MD	0.000	0.000		0.250	Dec 2018	16.450	Nov 2019	-		16.450	0.000	16.700	-
Hardware Development - G&C	C/CPIF	OTA - Progeny : Manassas, VA	0.000	0.000		1.800	Mar 2019	6.000	Jan 2020	-		6.000	0.000	7.800	-
Hardware Development - New engine	C/CPIF	OTA - Aerojet Rocketdyne : Huntsville, AL	0.000	0.000		7.600	Mar 2019	26.900	Jan 2020	-		26.900	0.000	34.500	-
Hardware Development - Otto Fuel	C/CPIF	OTA - Aerojet Rocketdyne : Huntsville, AL	0.000	0.000		1.700	Mar 2019	2.500	Jan 2020	-		2.500	0.000	4.200	-
Hardware Development - Warhead	C/CPIF	OTA - Northrop Grumman Innovation Systems : Plymouth, MN	0.000	0.000		4.000	Mar 2019	18.500	Jan 2020	-		18.500	0.000	22.500	-
Hardware Development - AUR	C/CPIF	OTA - Raytheon : Portsmouth, RI	0.000	0.000		1.000	Mar 2019	8.000	Jan 2020	-		8.000	0.000	9.000	-
Hardware Development - FES Development	C/CPIF	OTA - TBD : TBD	0.000	0.000		0.000	Apr 2019	3.524	Jan 2020	-		3.524	0.000	3.524	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
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>					
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
Hardware Development - AUR Test Set Development	C/CPIF	OTA - TBD : TBD	0.000	0.000		0.000	Apr 2019	11.000	Jan 2020	-		11.000	0.000	11.000	-
Subtotal			0.000	0.000		32.247		110.174		-		110.174	Continuing	Continuing	N/A
Remarks															
Increase from FY19 to FY20 required to for Other Transactional Agreements (OTA) for development of Stored Chemical Energy Propulsion System (SCEPS), modified Otto Fuel engine, new warhead development, new Guidance & Control (G&C) Section, and All up Round integration in support of Advanced Lightweight Torpedo development. NAVAIR increase in FY20 required for MK54 MOD 2 P-8A and Helo platform integration.															
Support (\$ 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
Systems Engineering	WR	NUWC NPT : Newport, RI	0.000	0.000		0.200	Nov 2018	1.700	Nov 2019	-		1.700	0.000	1.900	-
Systems Engineering	WR	NUWC KPT : Keyport, WA	0.000	0.000		0.000	Nov 2018	4.600	Nov 2019	-		4.600	0.000	4.600	-
Hardware Development	WR	NUWC NPT : Newport, RI	0.000	0.000		0.200	Nov 2018	0.000		-		0.000	0.000	0.200	-
Program Management Support	WR	NUWC NPT : Newport, RI	0.000	0.000		0.591	Nov 2018	0.591	Nov 2019	-		0.591	0.000	1.182	-
Subtotal			0.000	0.000		0.991		6.891		-		6.891	0.000	7.882	N/A
Remarks															
Increase in FY20 to support increased development and testing efforts and integration of Safety.															

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy												Date: March 2019			
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>					
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
System Test and Evaluation	WR	NUWC NPT : Newport, RI	0.000	0.000		0.700	Mar 2019	4.400	Nov 2019	-		4.400	0.000	5.100	-
System Test and Evaluation	WR	NSWC IH : Indian Head, MD	0.000	0.000		0.200	Mar 2019	0.200	Nov 2019	-		0.200	0.000	0.400	-
System Test and Evaluation	C/CPIF	Raytheon : Portsmouth, RI	0.000	0.000		0.900	Mar 2019	0.270	Jan 2020	-		0.270	0.000	1.170	-
System Test and Evaluation	WR	NUWC KPT : Keyport, WA	0.000	0.000		1.100	Mar 2019	1.400	Nov 2019	-		1.400	0.000	2.500	-
Subtotal			0.000	0.000		2.900		6.270		-		6.270	0.000	9.170	N/A
Remarks Increased funding for Prototype level testing in FY20 to support PDR.															
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
Program Management Support	C/FPIF	EWCSS : Washington, DC	0.000	0.000		0.262	Nov 2018	0.462	Jan 2020	-		0.462	0.000	0.724	-
Subtotal			0.000	0.000		0.262		0.462		-		0.462	0.000	0.724	N/A
Remarks Increased Funding in FY20 to support MK54 MOD 2 program management and execution.															
			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			0.000	0.000		36.400		123.797		-		123.797	Continuing	Continuing	N/A
Remarks															

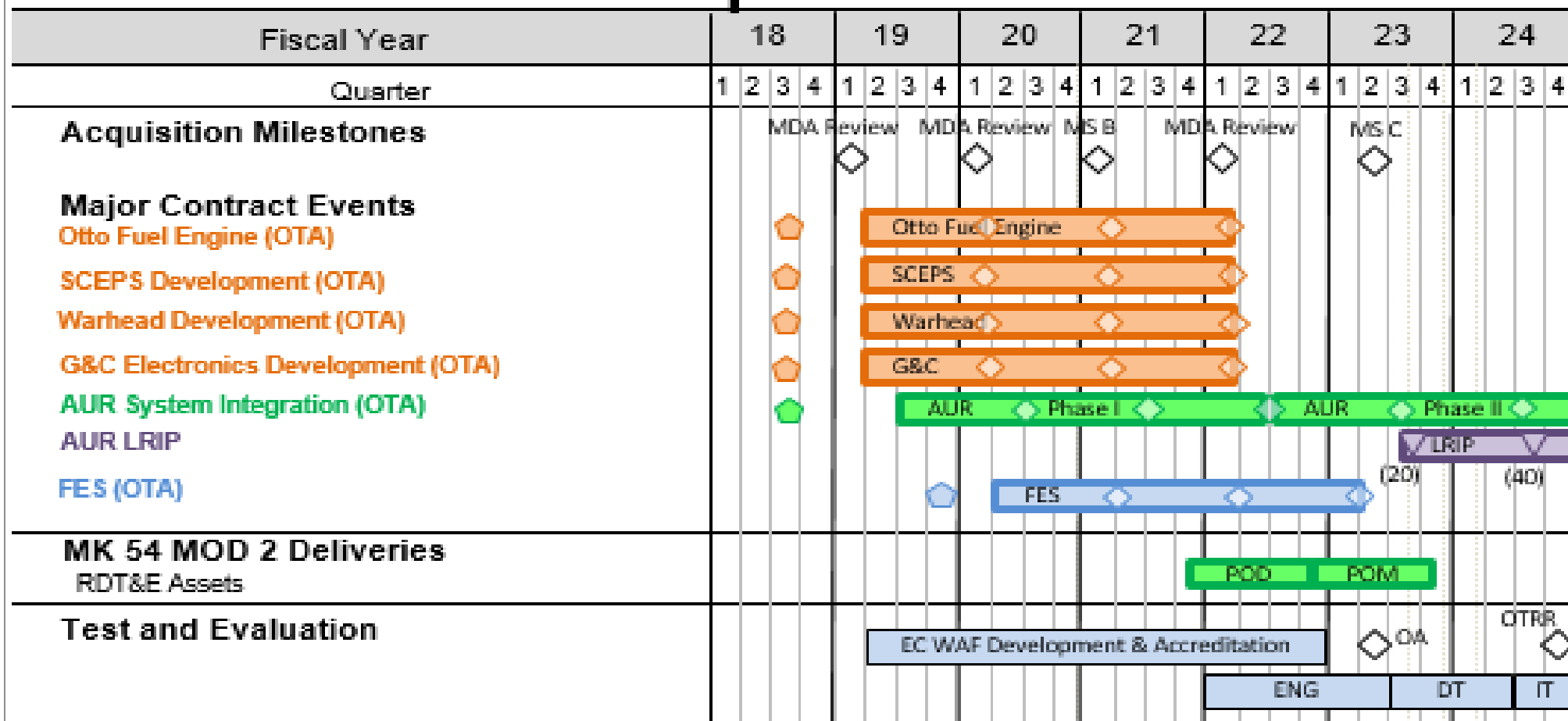
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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy

Date: March 2019

Appropriation/Budget Activity
1319 / 5R-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 2020 Navy			Date: March 2019
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	1	2021	1	2021
Advanced Lightweight Torpedo (ALWT): ALWT MS C	2	2023	2	2023
Advanced Lightweight Torpedo (ALWT): ALWT SCEPS Development	2	2019	1	2022
Advanced Lightweight Torpedo (ALWT): ALWT Warhead Development	2	2019	1	2022
Advanced Lightweight Torpedo (ALWT): ALWT G&C Hardware / Software Development	2	2019	1	2022
Advanced Lightweight Torpedo (ALWT): ALWT Otto Fuel Engine Development	2	2019	1	2022
Advanced Lightweight Torpedo (ALWT): ALWT FES Development	2	2020	2	2023
Advanced Lightweight Torpedo (ALWT): ALWT AUR Development Integration Phase I	2	2019	2	2022
Advanced Lightweight Torpedo (ALWT): ALWT Engineering Testing	1	2022	2	2023
Advanced Lightweight Torpedo (ALWT): Developmental Testing (DT)	2	2023	2	2024
Advanced Lightweight Torpedo (ALWT): Integrated Testing (IT)	2	2024	4	2024
Advanced Lightweight Torpedo (ALWT): OTRR	4	2024	4	2024