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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy **Date:** February 2018

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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	344.930	29.567	28.076	95.147	-	95.147	159.755	146.173	98.632	92.390	Continuing	Continuing
1412: <i>HAAWC</i>	0.000	0.000	8.516	3.916	-	3.916	6.792	0.000	0.000	0.000	0.000	19.224
2234: <i>Lightweight Hybrid Torpedo</i>	325.605	19.896	19.560	22.831	-	22.831	18.468	17.204	14.229	14.587	Continuing	Continuing
3418: <i>Advanced Anti-Submarine Lightweight Torpedo</i>	0.000	0.000	0.000	68.400	-	68.400	134.495	128.969	84.403	77.803	Continuing	Continuing
9999: <i>Congressional Adds</i>	19.325	9.671	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	28.996

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 Engineering Development Model (EDM) contract has delivered 21 MK 54 MOD 1 EDM units to support the in-water test program. The EDM contract for the MK 54 MOD 1 was awarded to Progeny Systems Corporation in September 2008. 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 AoA and out briefed the selected material solution. The effort is currently in the program development and requirements phase for FY 2018.

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.

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B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	20.178	28.076	52.607	-	52.607
Current President's Budget	29.567	28.076	95.147	-	95.147
Total Adjustments	9.389	0.000	42.540	-	42.540
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.611	0.000			
• Rate/Misc Adjustments	0.000	0.000	42.540	-	42.540
• Congressional Add Adjustments	10.000	-	-	-	-

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 9999: *Congressional Adds*

 Congressional Add: *LWT SBIR (Cong)*

Congressional Add Subtotals for Project: 9999

Congressional Add Totals for all Projects

	FY 2017	FY 2018
	9.671	0.000
	9.671	0.000
	9.671	0.000

Change Summary Explanation

The FY 2019 funding request was reduced by \$0.292 million to reflect the Department of Navy's effort to support the Office of Management and Budget directed reforms for Efficiency and Effectiveness that include a lean, accountable, more efficient government.

1412 High Altitude Anti-Submarine Warfare Weapon Capability (HAAWC)- Reduction of \$0.172M in FY 2019 due to technical correction and miscellaneous purchase inflation rate adjustments.

2234 Lightweight Hybrid Torpedo - Overall program increase of \$9.1M in FY 2019 is required for additional in-water runs, additional targets, and Fleet assets for Integrated Test (IT) events required to move IOC from FY 2023 to FY 2021.

3418 Advanced Anti-Submarine Lightweight Torpedo (ALWT)- Overall program increase of \$33.5M in FY 2019 required to award and support ALWT development and award software and hardware development contracts.

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy **Date:** February 2018

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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COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
1412: HAAWC	0.000	0.000	8.516	3.916	-	3.916	6.792	0.000	0.000	0.000	0.000	19.224
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 (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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: High Altitude Anti-Submarine Warfare Weapon Capability (HAAWC) Development	0.000	8.516	3.916	0.000	3.916
Articles:	-	23	-	-	-
FY 2018 Plans:					
Milestone C Review					
Low Rate Initial Production (LRIP) 1 Award					
Conduct System Verification Review (SVR)					
Conduct Physical Configuration Audit (PCA)					
Conduct Flight Readiness Review (FRR)					
Conduct Integrated Testing with P-8A Platform.					
FY 2019 Base Plans:					
Continue Integrated Testing with P-8A Platform.					
Complete Operational test Readiness Review (OTRR)					
Begin Operational Testing (OT)					
Low Rate Initial Production (LRIP)2 Award					
FY 2019 OCO Plans:					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
N/A					
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> FY 2019 decrease Production Development funding as program transitions to Operational Testing (OT).					
Accomplishments/Planned Programs Subtotals	0.000	8.516	3.916	0.000	3.916

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019 Base</u>	<u>FY 2019 OCO</u>	<u>FY 2019 Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• WPN/3215: <i>MK54 Torpedo Mods</i>	97.092	104.044	105.946	-	105.946	120.309	136.539	148.498	199.439	0.000	1,905.943

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 will be evaluated through market research and/or RFIs for competitive award. Contract award would be in FY 2020, upon successfully meeting 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 2019 Navy **Date:** February 2018

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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	0.000	0.000		5.585	Nov 2017	0.000	Dec 2018	-		0.000	0.000	5.585	-
Hardware Development - HAAWC	WR	NSWC : Indian Head, MD	0.000	0.000		0.040	Nov 2017	0.200	Nov 2018	-		0.200	0.000	0.240	-
Systems Engineering - HAAWC	WR	NSWC : Pax River, MD	0.000	0.000		0.475	Nov 2017	0.000	Nov 2018	-		0.000	0.000	0.475	-
Systems Engineering - HAAWC	WR	NAWC : China Lake, CA	0.000	0.000		0.740	Nov 2017	0.090	Nov 2018	-		0.090	0.000	0.830	-
Systems Engineering - HAAWC	WR	NUWC : Newport	0.000	0.000		0.000		0.340	Nov 2018	-		0.340	0.000	0.340	-
Subtotal			0.000	0.000		6.840		0.630		-		0.630	0.000	7.470	N/A

Remarks
FY 2019 decrease Production Development funding as program transitions to Operational Testing (OT).

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 - HAAWC	WR	NUWC : Keyport	0.000	0.000		0.000		0.219	Nov 2018	-		0.219	0.000	0.219	-
Subtotal			0.000	0.000		0.000		0.219		-		0.219	0.000	0.219	N/A

Remarks
Funding required for HAAWC documentation and systems engineering agent support.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	0.000	0.000		0.000		0.500	Dec 2018	-		0.500	0.000	0.500	-

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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	WR	NUWC : Keyport, WA	0.000	0.000		0.525	Nov 2017	1.260	Nov 2018	-		1.260	0.000	1.785	-
System Test & Evaluation - HAAWC	C/BA	NUWC : Newport, RI	0.000	0.000		0.751	Nov 2017	0.000	Dec 2018	-		0.000	0.000	0.751	-
System Test & Evaluation - HAAWC	WR	NAWC : China Lake, CA	0.000	0.000		0.000		0.560	Nov 2018	-		0.560	0.000	0.560	-
System Test & Evaluation - HAAWC	WR	NAWC : Pax River, MD	0.000	0.000		0.000		0.297	Nov 2018	-		0.297	0.000	0.297	-
System Test & Evaluation - HAAWC	WR	OPTEVFOR : Norfolk, VA	0.000	0.000		0.400	Nov 2017	0.450	Dec 2018	-		0.450	0.000	0.850	-
Subtotal			0.000	0.000		1.676		3.067		-		3.067	0.000	4.743	N/A

Remarks
FY 2019 increase in funding to support Operational Testing (OT) events.

	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000	8.516	3.916	-	3.916	0.000	12.432	N/A

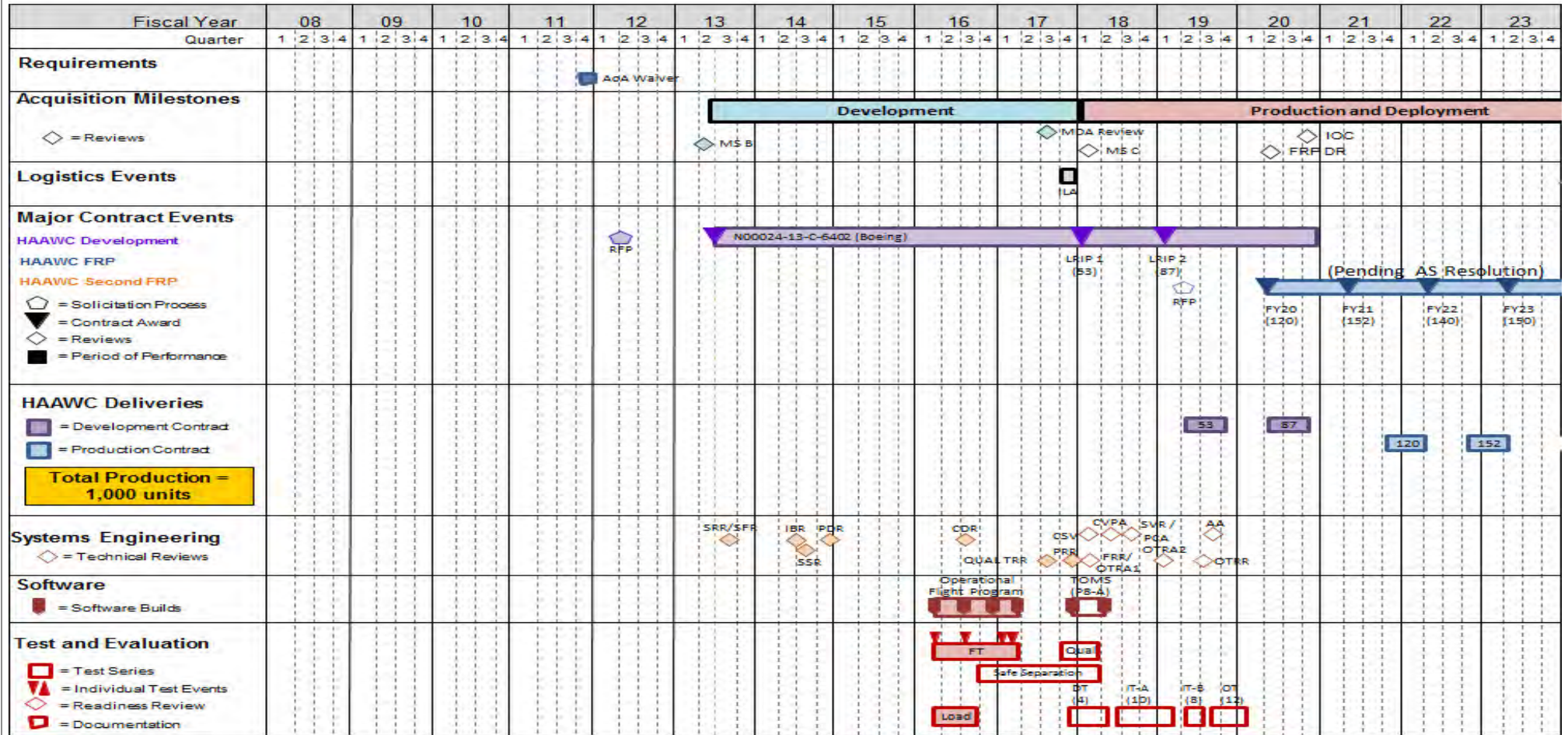
Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy Date: February 2018

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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HAAWC Acquisition Schedule



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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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 Production Readiness Review	4	2017	4	2017
HAAWC Design/Development/Qualification: HAAWC MS C	1	2018	1	2018
HAAWC Design/Development/Qualification: HAAWC IT / OT	2	2018	2	2020
HAAWC Design/Development/Qualification: HAAWC IOC	4	2020	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy										Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
2234: <i>Lightweight Hybrid Torpedo</i>	325.605	19.896	19.560	22.831	-	22.831	18.468	17.204	14.229	14.587	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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: MK54 Pre-Planned Product Improvement	19.896	19.560	22.831	0.000	22.831
Articles:	-	-	-	-	-
FY 2018 Plans: Complete MK 54 MOD 1 DT Continue MK 54 MOD 1 Software Development Complete MS-B for ALWT					
FY 2019 Base Plans: Complete final MK54 MOD 1 INC 1 software build Conduct MK 54 MOD 1 IT Conduct MK54 MOD 1 Operational Test Readiness Review (OTRR)					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: FY 2019 increase in funding required for additional in-water runs, additional targets, and Fleet assets for Integrated Test (IT) events required to move IOC from FY 2023 to FY 2021.					
Accomplishments/Planned Programs Subtotals	19.896	19.560	22.831	0.000	22.831

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy		Date: February 2018
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• WPN/3215: <i>MK54 Torpedo Mods</i>	97.092	104.044	105.946	-	105.946	120.309	136.539	148.498	199.439	0.000	1,905.943

Remarks

D. Acquisition Strategy

Continue procurement until inventory requirements are met and all MK46 torpedoes are replaced with MK54. MK54 MOD 1 contract will leverage Phase III SBIR as a sole source justification. Execute life of type buys to reduce cost of redesign and requalification due to obsolescence. Next competitive contract for MK54 MOD 0 array is planned for FY 2018. Continue to incrementally develop technology to pace the threats.

E. Performance Metrics

Milestone reviews
System engineering technical review

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy **Date:** February 2018

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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	Continuing	Continuing	Continuing
Hardware Development - MK 54 MOD 1	WR	NUWC : Newport	1.025	0.360	Oct 2016	2.973	Nov 2017	1.400	Nov 2018	-		1.400	0.000	5.758	-
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	91.703	6.513	Oct 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
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	0.210	0.210	Oct 2016	0.000		0.210	Jan 2019	-		0.210	0.000	0.630	-
Hardware Development - INSENSITIVE MUNITIONS	WR	NSWC : Indian Head, MD	0.240	0.240	Oct 2016	0.110	Jan 2018	0.150	Jan 2019	-		0.150	0.000	0.740	-
Hardware Development - INSENSITIVE MUNITIONS	WR	NUWC : Keyport	0.000	0.000		0.199	Nov 2017	0.196	Jan 2019	-		0.196	0.000	0.395	-
Hardware Development - PRIOR YEAR	WR	NSWC : Indian Head, MD	5.030	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Software Development - PRIOR YEAR	WR	NUWC : Newport/ Keyport	20.454	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Software Development - MK 54 MOD 1	WR	NUWC : Newport	0.010	0.000		0.415	Oct 2017	0.075	Nov 2018	-		0.075	0.000	0.500	-
Software Development - MK 54 MOD 1	MIPR	MIT : Boston, MA	1.010	0.348	Jan 2017	0.349	Feb 2018	0.000		-		0.000	0.000	1.707	-
Software Development - MK 54 MOD 1	C/BA	ARL/PSU : Philadelphia, PA	0.408	0.213	Jan 2017	0.219	Jan 2018	0.000		-		0.000	0.000	0.840	-

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Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	8.582	1.000	Oct 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering - HAAWC	WR	NAWCWD : China Lake	5.606	1.000	Oct 2016	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	21.581	0.350	Oct 2016	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Hardware Development - ADV LWT	WR	NUWC : Newport	0.000	0.000		2.040	Oct 2017	0.000		-		0.000	0.000	2.040	-
Hardware Development - ADV LWT	WR	NUWC : Keyport	0.000	0.000		0.213	Oct 2017	0.000		-		0.000	0.000	0.213	-
Hardware Development - ADV LWT	WR	NSWC : Indian Head, MD	0.000	0.000		0.575	Oct 2017	0.000		-		0.000	0.000	0.575	-
Software Development - APB 6	WR	NUWC : Newport	0.000	0.000		0.000		0.395	Dec 2018	-		0.395	0.000	0.395	-
Subtotal			235.999	10.234		7.093		2.426		-		2.426	Continuing	Continuing	N/A

Remarks
 - FY 2019 does not include funding for the Advanced Lightweight Torpedo (ALWT) post AoA requirements documentation and systems engineering development support. Starting in FY 2019, all ALWT tasks will be funded under Project Unit 3418.
 - Decrease in required funds in FY 2019 as the program transitions to Operational Testing (OT)

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	4.347	1.000	Oct 2016	0.310	Nov 2017	0.000		-		0.000	0.000	5.657	-

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Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	WR	NUWC : Newport/ Keyport	7.581	1.224	Oct 2016	2.605	Dec 2017	1.672	Nov 2018	-		1.672	0.000	13.082	-
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		0.000		0.235	Nov 2018	-		0.235	0.000	0.355	-
System Test and Evaluation	WR	NUWC : Newport/ Keyport	28.540	1.753	Oct 2016	2.507	Nov 2017	0.565	Nov 2018	-		0.565	Continuing	Continuing	Continuing
Hardware Development	WR	NSWC : Indian Head, MD	0.000	0.000		0.050	Oct 2017	0.000		-		0.000	0.000	0.050	-
Program Management Support	WR	NSWC : Indian Head, MD	0.000	0.000		0.200	Oct 2017	0.000		-		0.000	0.000	0.200	-
Subtotal			41.197	3.977		5.672		2.472		-		2.472	Continuing	Continuing	N/A

Remarks
FY 2019 - \$3.2M reduction for program management support and System T&E at NUWC Newport and NUWC Keyport.

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	Continuing	Continuing	Continuing
System Test and Evaluation - MK 54 MOD 1	WR	NUWC : Keyport	1.097	1.357	Oct 2016	2.481	Dec 2017	4.242	Jan 2019	-		4.242	0.000	9.177	-
System Test and Evaluation - MK 54 MOD 1	WR	NUWC : Newport	1.561	2.362	Oct 2016	2.889	Dec 2017	12.601	Nov 2018	-		12.601	0.000	19.413	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy **Date:** February 2018

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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	1.343	0.233	Oct 2016	0.000		0.100	Nov 2018	-		0.100	0.000	1.676	-
System Test and Evaluation - MK 54 MOD 1	C/CPIF	ARL/PSU : Philadephia, PA	0.068	0.000		0.000		0.000		-		0.000	0.000	0.068	-
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	0.750	0.250	Oct 2016	0.416	Nov 2017	0.500	Nov 2018	-		0.500	0.000	1.916	-
System Test and Evaluation - PRIOR YEAR	WR	OPTEVFOR : Not Specified	3.490	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
System Test and Evaluation - HAAWC	WR	OPTEVFOR : Not Specified	0.250	0.500	Oct 2016	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	0.152	0.466	Oct 2016	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	0.026	0.027	Oct 2016	0.028	Oct 2017	0.000		-		0.000	0.000	0.081	-
System Test and Evaluation - ADV LWT	WR	NUWC : Newport	0.000	0.000		0.138	Oct 2017	0.000		-		0.000	0.000	0.138	-
System Test and Evaluation - ADV LWT	WR	NUWC : Keyport	0.000	0.000		0.038	Oct 2017	0.000		-		0.000	0.000	0.038	-
System Test and Evaluation - ADV LWT	WR	NSWC : Indian Head, MD	0.000	0.000		0.075	Oct 2017	0.000		-		0.000	0.000	0.075	-
Subtotal			43.009	5.195		6.065		17.443		-		17.443	Continuing	Continuing	N/A

Remarks
FY 2019: An increase of \$11.3M is required for additional in-water runs, additional targets, and Fleet assets for Integrated Test (IT) events required to move IOC from FY23 to FY21.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy **Date:** February 2018

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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Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	0.459	0.028	Oct 2016	0.029	Jan 2018	0.028	Feb 2019	-		0.028	Continuing	Continuing	Continuing
Program Management Support	C/FPIF	EWCSS : Washington, DC	4.034	0.462	Oct 2016	0.701	Mar 2018	0.462	Feb 2019	-		0.462	Continuing	Continuing	Continuing
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			5.400	0.490		0.730		0.490		-		0.490	Continuing	Continuing	N/A

Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals	325.605	19.896	19.560	22.831	-	22.831	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy **Date:** February 2018

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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	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	
Proj 2234																													
APB 5 /TI-1	DT/IT												OT				IOC ◆												
APB 6													SW Development																

2019PB - 0604610N - 2234

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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				
APB 5 /TI-1: Continue Tech Insertion 1 (TI-1) APB 5 / New Array DT to MK54 MOD 1	1	2017	4	2019
APB 5 /TI-1: Tech Insertion 1 (TI-1) APB 5 / New Array OT to MK54 MOD 1	1	2020	3	2021
APB 5 /TI-1: Tech Insertion 1 (TI-1) APB 5 / IOC	4	2021	4	2021
APB 6: APB 6 Development	2	2020	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy										Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
3418: <i>Advanced Anti-Submarine Lightweight Torpedo</i>	0.000	0.000	0.000	68.400	-	68.400	134.495	128.969	84.403	77.803	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 2018, the continuation of acquisition program start and planning work will continue from a MK54 follow on study perspective. This will include specifications and requirements documentation, contract preparation, subsystem development efforts, and testing activities to support program start. FY 2019 will be the first year of funding that will allow for more detailed design and development work (HW/SW) to commence. Program has been re-phased adjusting the amounts over the FYDP.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: ALWT Development	0.000	0.000	68.400	0.000	68.400
Articles:	-	-	-	-	-
FY 2018 Plans: N/A					
FY 2019 Base Plans: Conduct and closeout System Requirements Review (SRR). Start Software and Hardware prototype design and development. Conduct Engineering Testing Conduct System Functional Review (SFR).					
FY 2019 OCO Plans: N/A					
FY 2018 to FY 2019 Increase/Decrease Statement: Increase funding for award and support for ALWT development and award hardware and software development contracts.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	68.400	0.000	68.400

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy **Date:** February 2018

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

<u>Line Item</u>	<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u> <u>Base</u>	<u>FY 2019</u> <u>OCO</u>	<u>FY 2019</u> <u>Total</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• WPN/3215: <i>MK-54 Torpedo Mods</i>	97.092	104.044	105.946	-	105.946	120.309	136.539	148.498	199.439	0.000	1,905.943

Remarks

D. Acquisition Strategy

The Acquisition Strategy is to use UARCs, Warfare Centers, and OTAs to develop the new Advanced Lightweight Torpedo. The program will also pursue accelerated acquisition opportunities that may serve as the contract award but still take into account competition.

E. Performance Metrics

Milestone reviews
System engineering technical review

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy **Date:** February 2018

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 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 NPT : Newport, RI	0.000	0.000		0.000		13.200	Nov 2018	-		13.200	Continuing	Continuing	Continuing
Hardware Development	WR	NUWC KPT : Keyport, WA	0.000	0.000		0.000		5.550	Nov 2018	-		5.550	0.000	5.550	-
Hardware Development	WR	NSWC, IH : Indian Head, MD	0.000	0.000		0.000		17.050	Nov 2018	-		17.050	0.000	17.050	-
Hardware Development	C/CPIF	OTA : Multiple	0.000	0.000		0.000		14.900	Jun 2019	-		14.900	0.000	14.900	-
Hardware Development	C/CPFF	UARC : Multiple	0.000	0.000		0.000		16.600	Apr 2019	-		16.600	0.000	16.600	-
Subtotal			0.000	0.000		0.000		67.300		-		67.300	Continuing	Continuing	N/A

Remarks
Funds required to award and support ALWT development and award hardware and software development contracts.

Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	0.000	0.000		0.000		0.400	Nov 2018	-		0.400	0.000	0.400	-
Program Management Support	WR	NUWC KPT : Keyport, WA	0.000	0.000		0.000		0.200	Nov 2018	-		0.200	0.000	0.200	-
Subtotal			0.000	0.000		0.000		0.600		-		0.600	0.000	0.600	N/A

Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	0.000	0.000		0.000		0.500	Mar 2019	-		0.500	0.000	0.500	-
Subtotal			0.000	0.000		0.000		0.500		-		0.500	0.000	0.500	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy								Date: February 2018			
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>			
	Prior Years	FY 2017	FY 2018		FY 2019 Base	FY 2019 OCO	FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals	0.000	0.000	0.000		68.400	-	68.400	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy **Date:** February 2018

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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Proj 3418	FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Advanced Lightweight Torpedo (ALWT)								MS-B ◆	Afterbody Development																			
	Warhead Development																											
	G&C Hardware / Software Development																											
																					Engineering Testing							

2019PB - 0604610N - 3418

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
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	4	2018	4	2018
Advanced Lightweight Torpedo (ALWT): ALWT Afterbody Development	1	2019	4	2023
Advanced Lightweight Torpedo (ALWT): ALWT Warhead Development	1	2019	4	2023
Advanced Lightweight Torpedo (ALWT): ALWT G&C Hardware / Software Development	1	2019	4	2023
Advanced Lightweight Torpedo (ALWT): ALWT Engineering Testing	4	2022	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy **Date:** February 2018

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</i>
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COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
9999: <i>Congressional Adds</i>	19.325	9.671	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	28.996
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Congressional Add for Small Business Technology Insertion. This funding will support MK 54 MOD 1 related tasks to include cost reduction efforts, testing related analysis/development, and evaluation/analysis of processor group hardware.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2017	FY 2018
<i>Congressional Add:</i> LWT SBIR (Cong)	9.671	0.000
<i>FY 2017 Accomplishments:</i> Development of a second source MK54 MOD 1 array.		
<i>FY 2018 Plans:</i> N/A		
Congressional Adds Subtotals	9.671	0.000

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Milestone reviews
System engineering technical review

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</i>

FY 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Proj 9999	
Producability Improvement, COTS Modernization, Test Equipment Upgrade	████████████████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Navy		Date: February 2018
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604610N / <i>Lightweight Torpedo Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 9999				
Producability Improvement, COTS Modernization, Test Equipment Upgrade	4	2017	4	2018

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