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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Navy										Date: February 2018		
Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0603506N / Surface Ship Torpedo Defense							
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	679.666	69.872	14.974	8.570	-	8.570	0.000	0.000	0.000	0.000	0.000	773.082
0225: Surface Ship Torpedo Defense (SSTD)	679.666	69.872	14.974	8.570	-	8.570	0.000	0.000	0.000	0.000	0.000	773.082

## A. Mission Description and Budget Item Justification

The Surface Ship Torpedo Defense (SSTD) program provides a detect-to-engage layered torpedo defense capability. The four major efforts that comprise SSTD are the AN/SLQ-25 (NIXIE) system, Torpedo Warning System (TWS), the Countermeasure Anti-Torpedo (CAT) and Acoustic Device Countermeasure (Surface ADC MK2). CAT and TWS are development programs. The CAT program develops a canisterized Anti-Torpedo Torpedo (ATT). The TWS program develops the required torpedo detection, classification and localization (TDCL) ship systems to employ CAT. The TWS and CAT systems make up the Anti-Torpedo Torpedo Defense System (ATTDS).

The ATTDS provides a hard kill torpedo defense capability on High Value Units (HVV's). The program has developed and fielded five ATTDS Engineering Design Model (EDM) systems on CVNs. Each EDM system is one TWS with a CAT load out of a maximum of eight CATs. The program delivered its first prototype system in FY13 and has delivered and installed its fifth and final system in FY17. Along with delivering and installing systems on CVN's the ATTDS Program completed system salvo software development and a Quick Reaction Assessment (QRA) test in 1QFY18. The AN/SLQ-25 (NIXIE) is a towed acoustic and non-acoustic countermeasure system. The AN/SLQ-25 program develops countermeasure technologies and capabilities to improve ship survivability against future torpedo threats.

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

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Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 Program Element (Number/Name) PE 0603506N / Surface Ship Torpedo Defense			
B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	87.066	14.974	8.570	-	8.570
Current President's Budget	69.872	14.974	8.570	-	8.570
Total Adjustments	-17.194	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.681	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Congressional Directed Reductions Adjustments	-15.513	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy										Date: February 2018		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603506N / Surface Ship Torpedo Defense				Project (Number/Name) 0225 / Surface Ship Torpedo Defense (SSTD)			
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
0225: Surface Ship Torpedo Defense (SSTD)	679.666	69.872	14.974	8.570	-	8.570	0.000	0.000	0.000	0.000	0.000	773.082
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

**A. Mission Description and Budget Item Justification**

The Countermeasure Anti- Torpedo (CAT) program developed a canisterized Anti-Torpedo Torpedo (ATT). The Torpedo Warning System (TWS) developed the required torpedo detection, classification and localization (TDCL) systems. The Countermeasure TWS and CAT systems make up the Anti-Torpedo Torpedo Defense System (ATTDS).

The ATTDS provides a hard kill torpedo defense capability on High Value Units (HVV's). The program has developed and fielded five ATTDS Engineering Design Model (EDM) systems on CVNs. Each EDM system is one TWS with a CAT load out of a maximum of eight CATs. The program delivered its first prototype system in FY13 and has delivered and installed its fifth and final system in FY17. Along with delivering and installing systems on CVN's the ATTDS Program completed system salvo software development and a Quick Reaction Assessment (QRA) test in 1QFY18.

In FY18, no program of record acquisition milestones were pursued. In FY19, software support, material engineering changes, and system reliability will remain the programs top priorities to ensure the highest operational availability and performance of the systems.

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

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

	<b>FY 2017</b>	<b>FY 2018</b>	<b>FY 2019 Base</b>	<b>FY 2019 OCO</b>	<b>FY 2019 Total</b>
<b>Title:</b> Countermeasure Anti-Torpedo (CAT)	23.452	7.000	3.600	0.000	3.600
<b>Articles:</b>	24	-	-	-	-
<b>FY 2018 Plans:</b> Continue land based reliability testing on returning deployed ATTs. Continue engineering changes on CAT materials and CAT software upgrades. Perform Safety Certifications prior to two FY18 CVN deployments. Deliver Ready for Issue CATs for two FY18 CVN deployments. Support software resolution through Program Trouble Reports (PTRs).					

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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603506N / Surface Ship Torpedo Defense	Project (Number/Name) 0225 / Surface Ship Torpedo Defense (SSTD)				
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Conduct Quick Reaction Assessment (QRA) of salvo software. Conduct CT-5 contractor test. <b>FY 2019 Base Plans:</b> Continue land based reliability testing on returning deployed ATTs. Continue engineering changes on CAT materials and CAT software upgrades. Support software resolution through Program Trouble Reports (PTRs). <b>FY 2019 OCO Plans:</b> N/A <b>FY 2018 to FY 2019 Increase/Decrease Statement:</b> FY 18 to FY 19 decrease due to planned phasing of testing and support events.						
<b>Title:</b> Torpedo Warning System (TWS)  <b>Articles:</b>		46.420 -	7.974 -	4.970 -	0.000 -	4.970 -
<b>FY 2018 Plans:</b> Continue land based reliability testing on returning deployed TWS systems. Continue engineering changes on TWS software upgrades. Perform Safety Certifications prior to two FY18 CVN deployments. Perform system operational verification testing prior to two FY18 CVN deployments. Support software resolution through Program Trouble Reports (PTRs). Complete RORO to EDM conversion on CVN69. <b>FY 2019 Base Plans:</b> Continue land based reliability testing on returning deployed TWS systems. Continue engineering changes on TWS software upgrades. Support software resolution through Program Trouble Reports (PTRs). <b>FY 2019 OCO Plans:</b> N/A <b>FY 2018 to FY 2019 Increase/Decrease Statement:</b> FY 18 to FY 19 decrease due to planned phasing of testing and support events.						
Accomplishments/Planned Programs Subtotals		69.872	14.974	8.570	0.000	8.570

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Navy									Date: February 2018		
Appropriation/Budget Activity 1319 / 4				R-1 Program Element (Number/Name) PE 0603506N / Surface Ship Torpedo Defense				Project (Number/Name) 0225 / Surface Ship Torpedo Defense (SSTD)			
C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• OPN/2213: SSTD	6.893	12.867	11.277	-	11.277	12.831	13.104	13.349	13.636	Continuing	Continuing
• WPN/3113: SSTD	5.910	5.240	6.353	-	6.353	5.712	5.766	5.673	5.550	Continuing	Continuing
Remarks											
D. Acquisition Strategy											
CAT Program: The Program completed a Systems Requirements Review (SRR) and Preliminary Design Review (PDR) on the Engineering Development Model (EDM) design. ARL Penn State (ARL/PSU) has completed a Technical Data Package (TDP) that can be used in the future system builds. Funding in FY18 was used to complete QRA of salvo software and conduct CT-5 contract test, update and refine the CATs to ensure they were ready for fleet use. Funding in FY19 is for EDM support and ATT post deployment EDM maintenance.											
TWS Program: Development and production of the new sensors was conducted by ULTRA/3Phoenix. Five complete sensor sets have been delivered. Ready-stowage racks, and fire control systems have been developed by Pacific Engineering Incorporated (PEI) and In-Depth Engineering, respectively. System integration supported fabrication and fielding of the five complete systems. Funding in FY18 was used to update and refine TWS to ensure the five systems were ready for Fleet deployment. Funding in FY19 is for EDM support and TWS post deployment software and hardware engineering review.											
E. Performance Metrics											
Torpedo Effectiveness for the CAT											
Torpedo Reliability and Availability for the CAT											
Torpedo Detection Classification and Localization (TDCL)											
False Alert Rate TDCL probability of correct classification											
TWS System Reliability and Availability											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Navy												Date: February 2018			
Appropriation/Budget Activity 1319 / 4						R-1 Program Element (Number/Name) PE 0603506N / Surface Ship Torpedo Defense				Project (Number/Name) 0225 / Surface Ship Torpedo Defense (SSTD)					
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
Systems Engineering	WR	NUWC : Newport, RI	44.311	3.620	Nov 2016	2.400	Nov 2017	1.100	Nov 2018	-		1.100	0.000	51.431	-
Systems Engineering ATT Dev.	C/CPFF	PSU/ARL : State College, PA	281.016	21.227	Dec 2016	4.000	Dec 2017	2.000	Dec 2018	-		2.000	0.000	308.243	-
Systems Engineering	C/CPFF	JHU/APL : Baltimore , MD	1.740	0.000		0.000		0.000		-		0.000	0.000	1.740	-
Systems Engineering Warhead Dev.	WR	NSWC : Indian Head, MD	73.700	5.490	Nov 2016	1.100	Nov 2017	1.100	Nov 2018	-		1.100	0.000	81.390	-
Systems Engineering	WR	NUWC : Keyport,WA	53.982	5.649	Nov 2016	1.000	Nov 2017	1.200	Nov 2018	-		1.200	0.000	61.831	-
Systems Engineering TDCL	C/CPFF	Ultra : Braintree, MA	11.640	0.000		0.000		0.000		-		0.000	0.000	11.640	Continuing
Systems Engineering ATT	WR	ONR : Arlington, VA	1.680	0.000		0.000		0.000		-		0.000	0.000	1.680	-
Systems Engineering TDCL	C/CPFF	AAC : Hauppauge, NY	4.480	0.000		0.000		0.000		-		0.000	0.000	4.480	Continuing
Systems Engineering	WR	OPTEVFOR : Norfolk, VA	2.090	0.340	Feb 2017	0.000		0.000		-		0.000	0.000	2.430	-
Systems Engineering	C/CPFF	ArgonST : Manassas, VA	0.800	0.000		0.000		0.000		-		0.000	0.000	0.800	Continuing
Systems Engineering TDCL	WR	NSWC : Dahlgren, VA	9.865	0.167	Nov 2016	0.000		0.000		-		0.000	0.000	10.032	Continuing
Systems Engineering TDCL	WR	SPAWAR : San Diego, CA	10.148	0.970	Dec 2016	0.000		0.000		-		0.000	0.000	11.118	Continuing
Systems Engineering	C/CPFF	UT/ARL : Arlington, TX	0.600	0.000		0.000		0.000		-		0.000	0.000	0.600	Continuing
Systems Engineering	C/CPFF	Alion : Bridgeport, CT	14.858	0.000		0.000		0.000		-		0.000	0.000	14.858	Continuing
Systems Engineering	WR	NUWC DET : Norfolk, VA	33.181	8.600	Dec 2016	0.000		0.000		-		0.000	0.000	41.781	-
Systems Development	C/CPFF	3 Phoenix : Fairfax, VA	103.545	19.000	Dec 2016	3.974	Dec 2017	1.100	Dec 2018	-		1.100	0.000	127.619	Continuing
Integrated Logistic Spt	WR	NSWC Crane : Crane, IN	1.064	0.049	Dec 2016	0.000		0.000		-		0.000	0.000	1.113	Continuing
Systems Engineering	C/CPFF	PEI : Roca, NE	3.745	1.000	Dec 2016	0.000		0.000		-		0.000	0.000	4.745	-

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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
Systems Engineering	WR	CARDEROCK : Bethesda, MD	1.335	0.295	Dec 2016	0.000		0.000		-		0.000	0.000	1.630	-
Systems Engineering	C/CPFF	CGI : Washington, DC	0.200	0.000		0.000		0.000		-		0.000	0.000	0.200	-
Systems Engineering	C/BA	Dam Neck : Virginia Beach, VA	0.022	0.000		0.000		0.000		-		0.000	0.000	0.022	-
Systems Engineering	C/BA	NSWC Panama City : Panama City, FL	0.255	0.000		0.000		0.000		-		0.000	0.000	0.255	-
Systems Engineering	C/BA	Devron 26 : Not Specified	0.139	0.000		0.000		0.000		-		0.000	0.000	0.139	-
Systems Engineering	WR	Puget Sounds : Norfolk, VA	0.200	0.000		0.000		0.000		-		0.000	0.000	0.200	-
Systems Engineering	WR	NAVAIR (NAWC WD) : Patuxent River, MD	0.000	0.140	Dec 2016	0.000		0.000		-		0.000	0.000	0.140	-
Systems Engineering	WR	NORFOLK SHIPYARD : Norfolk, VA	0.000	0.150	Dec 2016	0.000		0.000		-		0.000	0.000	0.150	-
Systems Engineering	WR	NORFOLK PLANNING YARD : Norfolk, VA	0.000	0.090	Dec 2016	0.000		0.000		-		0.000	0.000	0.090	-
Subtotal			654.596	66.787		12.474		6.500		-		6.500	0.000	740.357	N/A
Management Services (\$ 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
Earned Value Mgmt Spt	C/CPAF	Pioneer : Virigina	0.050	0.000		0.000		0.000		-		0.000	0.000	0.050	-
Program Management Support	C/FFP	EG&G : Gaithersburg, Md.	2.846	0.000		0.000		0.000		-		0.000	0.000	2.846	Continuing

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Management Services (\$ 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
DAWDF	Various	Not Specified : Not Specified	0.237	0.000		0.000		0.000		-		0.000	0.000	0.237	Continuing
Program Management Support	C/CPAF	Tech-Marine : Washington, DC	9.930	0.000		0.000		0.000		-		0.000	0.000	9.930	Continuing
Travel	Various	PMS 415 : Not Specified	1.044	0.100	Nov 2016	0.100	Nov 2017	0.100	Nov 2018	-		0.100	0.000	1.344	Continuing
Program Management Support	C/CPFF	SPA : Alexandria, VA	0.575	0.000		0.000		0.000		-		0.000	0.000	0.575	Continuing
Program Management Support	C/CPAF	Booz Allen : Washington, DC	9.988	2.985	Feb 2017	2.400	Feb 2018	1.970	Feb 2019	-		1.970	0.000	17.343	-
Program Management Support	C/CPAF	Alion : Washington, DC	0.400	0.000		0.000		0.000		-		0.000	0.000	0.400	-
Subtotal			25.070	3.085		2.500		2.070		-		2.070	0.000	32.725	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			679.666	69.872		14.974		8.570		-		8.570	0.000	773.082	N/A
Remarks															



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PE 0603506N: *Surface Ship Torpedo Defense*  
Navy

R-1 Line #38

**R-1 Program Element (Number/Name)**  
PE 0603506N / *Surface Ship Torpedo Defense*

**Project (Number/Name)**  
0225 / Surface Ship Torpedo Defense  
(SSTD)

[illegible]

2019PB - 0603506N - 0225

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2019 Navy			<b>Date:</b> February 2018
<b>Appropriation/Budget Activity</b> 1319 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603506N / <i>Surface Ship Torpedo Defense</i>	<b>Project (Number/Name)</b> 0225 / <i>Surface Ship Torpedo Defense (SSTD)</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<b>Proj 0225</b>				
EX-819 CONTAINER	2	2017	4	2017
RORO to EDM USS CVN 69	4	2017	3	2018
TWS - TAAS In Water Test	1	2017	1	2017
CAT - SALVO At-Sea Integration Test 2	1	2018	2	2018
CAT - Integration ECP	1	2018	4	2019
CAT - PCA	2	2017	4	2017
TWS - Integration ECP	1	2018	4	2019