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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603506N / <i>Surface Ship Torpedo Defense</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	764.061	6.822	7.242	12.816	-	12.816	1.942	0.638	0.000	0.000	0.000	793.521
0225: <i>Surface Ship Torpedo Defense (SSTD)</i>	764.061	6.822	7.242	12.816	-	12.816	1.942	0.638	0.000	0.000	0.000	793.521

A. Mission Description and Budget Item Justification

The Surface Ship Torpedo Defense (SSTD) program provides a detect-to-engage layered torpedo defense capability. The funding supports mission readiness for Anti-Torpedo Torpedo Defense System (ATTDS) equipped ships and the sundown effort of ATTDS. The sundown of ATTDS returns the platform back to its original NIXIE configuration during a scheduled availability. In FY21, funding supports four (4) CVNs during their deployment cycles prior to CVN system sundown. The four (4) 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). 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 ATTDS.

The ATTDS provides a hard kill torpedo defensive 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 load out of a maximum of eight CATs. Starting in FY20, the ATTDS Program commenced sundown effort to return the five CVNs to their original configuration. 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 are evaluated to determine their effectiveness and impact on improving ship survivability. Evaluations of new and emerging hardware and software in representative acoustic environments, against projected threats using both digital and hardware-in-the-loop simulations. Incorporation of the technology into the appropriate product line upon successful evaluation.

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Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603506N / <i>Surface Ship Torpedo Defense</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	7.100	15.800	14.400	-	14.400
Current President's Budget	6.822	7.242	12.816	-	12.816
Total Adjustments	-0.278	-8.558	-1.584	-	-1.584
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-8.558			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.278	0.000			
• Program Adjustments	0.000	0.000	-1.840	-	-1.840
• Rate/Misc Adjustments	0.000	0.000	0.256	-	0.256

Change Summary Explanation

The FY 2021 funding request was reduced by \$1.840 million to account for the availability of prior year execution balances.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy										Date: February 2020		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603506N / <i>Surface Ship Torpedo Defense</i>				Project (Number/Name) 0225 / <i>Surface Ship Torpedo Defense (SSTD)</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
0225: <i>Surface Ship Torpedo Defense (SSTD)</i>	764.061	6.822	7.242	12.816	-	12.816	1.942	0.638	0.000	0.000	0.000	793.521
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 funding supports mission readiness for Anti-Torpedo Torpedo Defense System (ATTDS) equipped ships and the sundown effort of ATTDS. The sundown of ATTDS returns the platform back to its original NIXIE configuration during a scheduled availability.. In FY21, funding supports four (4) CVNs during their deployment cycles prior to their CVN system sundown.

The ATTDS provides a hard kill torpedo defensive 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 consists one TWS with a 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 developed system salvo software through five test events and executed three Quick Reaction Assessment (QRA) tests. CVN Installation and/or removal will occur in FY20 through FY24 during scheduled availabilities.

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 are evaluated to determine their effectiveness and impact on improving ship survivability. Evaluations of new and emerging hardware and software in representative acoustic environments, against projected threats using both digital and hardware-in-the-loop simulations. Incorporation of the technology into the appropriate product line upon successful evaluation.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Countermeasure Anti-Torpedo (CAT)	1.852	2.242	4.769	0.000	4.769
Articles:	-	-	-	-	-
FY 2020 Plans:					
Start CVN System Sundown plan, with long lead materials and planning.					
Continued engineering changes on CAT materials and CAT software.					
Continue fleet support with CAT system loadout prior to CVN development.					
FY 2021 Base Plans:					
Continue CVN system sundown plan, with NIXIE System Restoration.					

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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603506N / <i>Surface Ship Torpedo Defense</i>	Project (Number/Name) 0225 / <i>Surface Ship Torpedo Defense (SSTD)</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Support of deployments for the five (5) CVNs prior to their sundown. Continue fleet support with CAT system loadout for each CVN prior to deployment. Develop future mission capabilities for the ATT. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Decrease is due to supporting four (4) CVNs instead of five (5) during their deployment cycles.					
Title: Torpedo Warning System (TWS) Articles:	4.970 -	5.000 -	8.047 -	0.000 -	8.047 -
FY 2020 Plans: Start CVN System Sundown plan according to sponsor direction, with long lead materials and planning Continued engineering changes on TWS software where and when required. FY 2021 Base Plans: Continue CVN system sundown plan, with NIXIE System Restoration. Support of deployments for the five (5) CVNs prior to their sundown. Develop future mission capabilities for the TWS system with the AN/SLQ-25, NIXIE System. FY 2021 OCO Plans: N/A FY 2020 to FY 2021 Increase/Decrease Statement: Increase is due to starting CVN availability work on two CVNs.					
Accomplishments/Planned Programs Subtotals	6.822	7.242	12.816	0.000	12.816

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPN/2213: <i>Surface Ship Torpedo Def (SSTD)</i>	4.777	12.439	13.241	-	13.241	13.275	13.438	13.588	5.893	Continuing	Continuing
• WPN/3113: <i>Surface Ship Torpedo Def (SSTD)</i>	6.353	5.561	5.811	-	5.811	5.573	5.403	5.498	5.601	Continuing	Continuing

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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603506N / <i>Surface Ship Torpedo Defense</i>	Project (Number/Name) 0225 / <i>Surface Ship Torpedo Defense (SSTD)</i>

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

OPN/2213 funds the AN/SLQ-25 System. No ATTDS OPN funding in FY18 and out.
 WPN/3113 funds the Surface Acoustic Device Countermeasure, ADC MK2 Mod 6 and Surface ADC Ready Stowage Lockers. No WPN ATTDS funding in FY18 and out.

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) to support the future system builds. CAT system SALVO Software operational and is currently in fleet use.

TWS Program: ULTRA/3Phoenix developed and produced of five complete sensor sets. Pacific Engineering Incorporated (PEI) and In-Depth Engineering Ready developed the stowage racks and fire control systems respectively. System integration supported fabrication and fielding of the five complete systems. Testing of TWS SALVO software is complete and is currently in fleet use. It is anticipated that ULTRA/3 Phoenix will continue to support the program until sun setting of the systems is complete.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
1319 / 4				PE 0603506N / Surface Ship Torpedo Defense				0225 / Surface Ship Torpedo Defense (SSTD)							
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	50.331	1.100	Nov 2018	1.500	Nov 2019	6.578	Nov 2020	-		6.578	0.000	59.509	-
Systems Engineering ATT Dev.	C/CPFF	PSU/ARL : State College, PA	305.792	0.822	Dec 2018	0.500	Dec 2019	0.000	Dec 2020	-		0.000	0.000	307.114	-
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	80.290	0.900	Nov 2018	0.500	Nov 2019	1.500	Nov 2020	-		1.500	0.000	83.190	-
Systems Engineering	WR	NUWC : Keyport, WA	60.631	0.900	Nov 2018	1.242	Nov 2019	2.000	Nov 2020	-		2.000	0.000	64.773	-
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	2.430	0.000		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	10.032	0.000		0.000		0.000		-		0.000	0.000	10.032	Continuing
Systems Engineering TDCL	WR	SPAWAR : San Diego, CA	11.118	0.000		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	41.781	0.000		0.000		0.000		-		0.000	0.000	41.781	-
Systems Development	C/CPFF	3 Phoenix : Fairfax, VA	126.519	1.500	Dec 2018	1.500	Dec 2019	2.000	Nov 2020	-		2.000	0.000	131.519	Continuing
Integrated Logistic Spt	WR	NSWC Crane : Crane, IN	1.113	0.000		0.000		0.000		-		0.000	0.000	1.113	Continuing
Systems Engineering	C/CPFF	PEI : Roca, NE	4.745	0.000		0.000		0.000		-		0.000	0.000	4.745	-

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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	CARDEROCK : Bethesda, MD	1.630	0.000		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	0.140	0.000		0.000		0.000		-		0.000	0.000	0.140	-
Systems Engineering	WR	NORFOLK SHIPYARD : Norfolk, VA	0.150	0.000		0.000		0.000		-		0.000	0.000	0.150	-
Systems Engineering	WR	NORFOLK PLANNING YARD : Norfolk, VA	0.090	0.000		0.000		0.000		-		0.000	0.000	0.090	-
Subtotal			733.406	5.222		5.242		12.078		-		12.078	0.000	755.948	N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
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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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy															Date: February 2020				
Appropriation/Budget Activity 1319 / 4										R-1 Program Element (Number/Name) PE 0603506N / <i>Surface Ship Torpedo Defense</i>					Project (Number/Name) 0225 / <i>Surface Ship Torpedo Defense (SSTD)</i>				

Proj 0225	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
	EX-819 CONTAINER																											
	CAT - Integration ECP																											
	TWS - Integration ECP																											
	SUNDOWN																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603506N / <i>Surface Ship Torpedo Defense</i>	Project (Number/Name) 0225 / <i>Surface Ship Torpedo Defense (SSTD)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 0225				
CAT - Integration ECP	1	2019	4	2023
TWS - Integration ECP	1	2019	4	2023
SUNDOWN	1	2020	4	2023