Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy										Date: March 2019	

Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy I BA 4: Advanced Component Development & Prototypes (ACD&P)						R-1 Program Element (Number/Name) PE 0603553N I Surface ASW					

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	186.900	1.092	1.122	1.137	-	1.137	1.157	1.184	1.209	1.233	Continuing	Continuing
1704: Undersea Warfare	186.900	1.092	1.122	1.137	-	1.137	1.157	1.184	1.209	1.233	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Rest-of-the-World (ROW) continues to produce quieter, more lethal submarine technologies. Adaptable commercial technologies are readily available to the ROW navies. These trends increase the threats to U.S. surface combatants, thus requiring a focused effort to identify the most promising Anti-Submarine Warfare (ASW) technologies through a process of discovery, assessment, experimentation, and analysis.

The objective of this Program Element (PE) is to pursue the development of technologies with the goal of improving ASW effectiveness to the point of rendering the enemy submarine irrelevant against US and coalition forces. Studies, experiments and/or technology developments under this PE will seek to improve the ability of surface combatants to detect, classify, localize, and track submerged contacts and detect and defend against modern torpedoes. To achieve these objectives, it is essential to develop new ASW technologies. The product of these efforts will be provided to the Advanced Capability Build (ACB) program supporting the continuing improvement of the AN/SQQ-89(V) Surface Ship Undersea Warfare (USW) Combat System.

B. Program Change Summary ($ in Millions)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	1.136	1.122	1.145	-	1.145
Current President's Budget	1.092	1.122	1.137	-	1.137
Total Adjustments	-0.044	0.000	-0.008	-	-0.008
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.044	0.000			
• Program Adjustments	0.000	0.000	-0.008	-	-0.008
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

Change Summary Explanation
FUNDING:
- FY 2018 decrease of $-0.044M reflects a Small Business Innovative Research (SBIR) transfer.
- FY 2020 decrease of $-0.008M reflects Contractor Services Reform reduction.

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2020 Navy		**Date:** March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603553N *I Surface ASW*	

    - FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 ($1.122M) to FY 2020 ($1.137M) increase ($+0.015M) is in line with inflation associated with the RDT&EN appropriation.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy										Date: March 2019	

Appropriation/Budget Activity
1319 / 4

R-1 Program Element (Number/Name)
PE 0603553N / *Surface ASW*

Project (Number/Name)
1704 / *Undersea Warfare*

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
1704: *Undersea Warfare*	186.900	1.092	1.122	1.137	-	1.137	1.157	1.184	1.209	1.233	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Rest-of-the-World (ROW) continues to produce quieter, more lethal submarine technologies. Adaptable commercial technologies are readily available to the ROW navies. These trends increase the threats to U.S. surface combatants, thus requiring a focused effort to identify the most promising Anti-Submarine Warfare (ASW) technologies through a process of discovery, assessment, experimentation, and analysis.

This Project will pursue the development of technologies with the goal of improving ASW effectiveness to the point of rendering the enemy submarine irrelevant against U.S. and coalition forces. Studies, experiments and/or technology developments under this project will seek to improve the ability of surface combatants to detect, classify, localize, and track submerged contacts and detect and defend against modern torpedoes. To achieve these objectives, it is essential to develop new ASW technologies. The product of these efforts will be provided to the ACB program supporting the continuing improvement of the AN/SQQ-89(V) Surface Ship USW Combat System.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: ASW Concept Development/Studies	1.092	1.122	1.137	0.000	1.137
Articles:	-	-	-	-	-

FY 2019 Plans:
- Award new development contract via BAA solicitation process in support of AN/SQQ-89(V) Surface Ship USW Combat System Fleet requirements.
- Initiate capability development and submit to the AN/SQQ-89(V) Surface Ship USW ACB program from Step 1 (algorithm/technology assessment by peer review panel of Subject Matter Experts (SME)) and Step 2 (algorithm/technology testing with open and closed data sets to refine capabilities prior to integration) testing. Capabilities will support color-map improvements for Torpedo Defense (TD) and ASW, and development of a statistical model of Continuous Active Sonar (CAS) as compared to Pulsed Active Sonar (PAS) waveform performance to provide testable hypotheses for any data collection. The model will inform updates to Concept of Employment (CONEMP)for the operator and theoretical basis to compare different proposed CAS waveform modifications. Effort also includes developing Passive Augmented Doppler Matched Active Processing (DMAP) which associates active TD clusters with passive tracks to provide earlier and single-ping classifications.

FY 2020 Base Plans:

Exhibit R-2A, **RDT&E Project Justification:** PB 2020 Navy		**Date:** March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603553N / *Surface ASW*	**Project (Number/Name)** 1704 / *Undersea Warfare*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
- Continue development efforts supporting color-map improvements for TD and ASW, and development of a statistical model of CAS as compared to PAS waveform performance to provide testable hypotheses for any data collection. - Continue developing Passive Augmented DMAP, which associates active TD clusters with passive tracks to provide earlier and single-ping classifications. - Submit technology to Step 3 for laboratory testing and eventual delivery to operational use via ACB-21. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase from FY 2019 to FY 2020 ($+0.015M) is in line with inflation associated with the RDT&EN appropriation.					
Accomplishments/Planned Programs Subtotals	1.092	1.122	1.137	0.000	1.137

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
• RDTEN/0205620N/1916: *Surface ASW System Improvement*	28.410	26.321	29.572	-	29.572	29.323	29.876	30.474	31.080	Continuing	Continuing
• OPN/2136: *AN/SQQ-89 Surf ASW Cmbt Sys*	100.222	114.344	125.237	-	125.237	127.182	132.416	135.022	137.721	Continuing	Continuing

Remarks

D. Acquisition Strategy
 Use competitively awarded contracts from Broad Agency Announcement (BAA) solicitations.

E. Performance Metrics
 Investigate promising ASW technologies via the four step ACB spiral development/improvement process.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy													Date: March 2019	
Appropriation/Budget Activity 1319 / 4						**R-1 Program Element (Number/Name)** PE 0603553N / Surface ASW						**Project (Number/Name)** 1704 / Undersea Warfare		

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
Technology Development	C/CPFF	AAC : NY	1.134	0.000		0.000		0.000		-		0.000	0.000	1.134	-
Technology Development	C/CPFF	Adaptive Methods : VA	3.788	0.000		0.000		0.000		-		0.000	0.000	3.788	-
Technology Development	C/CPFF	Alion Sciences : VA	8.000	0.000		0.000		0.000		-		0.000	0.000	8.000	-
Technology Development	C/CPAF	EG&G : VA	2.050	0.000		0.000		0.000		-		0.000	0.000	2.050	-
Technology Development	C/CPFF	In-Depth Engineering : VA	3.635	0.000		0.000		0.000		-		0.000	0.000	3.635	-
Technology Development	C/CPFF	JHU/APL : MD	25.333	0.000		0.000		0.000		-		0.000	0.000	25.333	-
Technology Development	C/CPFF	L-3 Communications : VA	3.000	0.000		0.000		0.000		-		0.000	0.000	3.000	-
Technology Development	C/CPFF	Lockheed Martin - ISS : NY	7.110	0.000		0.000		0.000		-		0.000	0.000	7.110	-
Technology Development	WR	NSWC/Carderock : MD	3.201	0.000		0.000		0.000		-		0.000	0.000	3.201	-
Technology Development	WR	NUWC/Keyport : WA	0.790	0.000		0.000		0.000		-		0.000	0.000	0.790	-
Technology Development	WR	NUWC/Newport : RI	33.260	0.000		0.000		0.000		-		0.000	0.000	33.260	-
Technology Development	C/CPFF	Northrop Grumman : VA	4.684	0.000		0.000		0.000		-		0.000	0.000	4.684	-
Technology Development	C/CPFF	UT/ARL : TX	4.908	0.000		0.000		0.000		-		0.000	0.000	4.908	-
Technology Development	C/CPFF	VAR : VAR*	4.694	0.000		0.000		0.000		-		0.000	0.000	4.694	-
Technology Development	WR	NFESC/PH : CA	5.350	0.000		0.000		0.000		-		0.000	0.000	5.350	-
Technology Development	MIPR	SSGC : MS	3.253	0.000		0.000		0.000		-		0.000	0.000	3.253	-
Detection/Classification Algorithms (LRS)	WR	NAWC/Pax River : MD	2.400	0.000		0.000		0.000		-		0.000	0.000	2.400	-
Detection/Classification Algorithms (LRS)	C/CPFF	VAR : VAR*	8.600	0.000		0.000		0.000		-		0.000	0.000	8.600	-
Technology Development (LRS)	WR	NRL : DC	2.500	0.000		0.000		0.000		-		0.000	0.000	2.500	-
Technology Development (LRS)	C/CPFF	VAR : VAR*	14.950	0.000		0.000		0.000		-		0.000	0.000	14.950	-
		Subtotal	142.640	0.000		0.000		0.000		-		0.000	0.000	142.640	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy													Date: March 2019	
Appropriation/Budget Activity 1319 / 4						**R-1 Program Element (Number/Name)** PE 0603553N / *Surface ASW*						**Project (Number/Name)** 1704 / *Undersea Warfare*		

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**

Remarks
 *Consists of multiple performing activities with funding for each not greater than $1M per year.

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**
At-Sea Test/Experiment	WR	ONR : VA	5.500	0.000		0.000		0.000		-		0.000	0.000	5.500	-
Developmental Test & Evaluation	C/CPFF	AAC : NY	1.067	0.000		0.000		0.000		-		0.000	0.000	1.067	-
Developmental Test & Evaluation	C/CPFF	ALION : IL	0.749	0.000		0.000		0.000		-		0.000	0.000	0.749	-
Developmental Test & Evaluation	C/CPFF	Applied Physical Sciences : CT	0.749	0.401	Jan 2018	0.301	Dec 2018	0.307	Dec 2019	-		0.307	Continuing	Continuing	Continuing
Developmental Test & Evaluation	C/CPFF	JHU/APL : MD	2.735	0.000		0.000		0.000		-		0.000	0.000	2.735	-
Developmental Test & Evaluation	WR	NRL : DC	0.537	0.000		0.000		0.000		-		0.000	0.000	0.537	-
Developmental Test & Evaluation	WR	NSMA : VA	0.907	0.000		0.000		0.000		-		0.000	0.000	0.907	-
Developmental Test & Evaluation	WR	NSWC/Carderock : MD	1.172	0.000		0.000		0.000		-		0.000	0.000	1.172	-
Developmental Test & Evaluation	WR	NUWC/Newport : RI	11.453	0.157	Jan 2018	0.045	Jan 2019	0.045	Nov 2019	-		0.045	Continuing	Continuing	Continuing
Developmental Test & Evaluation	WR	SPAWAR : CA	0.277	0.000		0.000		0.000		-		0.000	0.000	0.277	-
Developmental Test & Evaluation	C/CPFF	UT/ARL : TX	1.844	0.000		0.000		0.000		-		0.000	0.000	1.844	-
Developmental Test & Evaluation	C/CPFF	VAR : VAR*	5.394	0.033	Feb 2018	0.276	Dec 2018	0.275	Dec 2019	-		0.275	Continuing	Continuing	Continuing
Enhanced Data Collection	C/CPFF	JHU/APL : MD	4.462	0.000		0.000		0.000		-		0.000	0.000	4.462	-
Enhanced Data Collection	C/CPFF	UT/ARL : TX	2.000	0.000		0.000		0.000		-		0.000	0.000	2.000	-

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

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603553N / Surface ASW	Project (Number/Name) 1704 / Undersea Warfare

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			38.846	0.591		0.622		0.627		-		0.627	Continuing	Continuing	N/A

Remarks

*Consists of multiple performing activities with funding for each not greater than $1M per year.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support	C/CPAF	BAE Systems : MD	4.824	0.000		0.000		0.000		-		0.000	0.000	4.824	-
Program Management Support	C/CPIF	CGI Federal : VA	0.240	0.501	Jan 2018	0.500	Dec 2018	0.510	Dec 2019	-		0.510	Continuing	Continuing	Continuing
Travel	Allot	NAVSEA PEO IWS 5 : DC	0.300	0.000		0.000		0.000		-		0.000	0.000	0.300	-
Travel (LRS)	Allot	ONR : DC	0.050	0.000		0.000		0.000		-		0.000	0.000	0.050	-
Subtotal			5.414	0.501		0.500		0.510		-		0.510	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	186.900	1.092	1.122	1.137	-	1.137	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603553N / Surface ASW	**Project (Number/Name)** 1704 / Undersea Warfare

Project 1704	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Broad Agency Announcement (BAA) Awards						▲ BAA Award								▲ BAA Award								▲ BAA Award						
Technology Development and Analysis									Technology Development and Analysis																			

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603553N / Surface ASW	**Project (Number/Name)** 1704 / Undersea Warfare

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1704.L24				
Broad Agency Announcement (BAA) Awards: BAA Award - 2019	2	2019	2	2019
Broad Agency Announcement (BAA) Awards: BAA Award - 2021	2	2021	2	2021
Broad Agency Announcement (BAA) Awards: BAA Award - 2023	2	2023	2	2023
Technology Development and Analysis: Technology Development and Analysis	1	2018	4	2024