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 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604215N *I Standards Development*							
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	17.099	2.711	3.771	3.642	-	3.642	4.160	4.275	4.361	4.449	Continuing	Continuing
1857: *Calibration Standards*	17.099	2.711	3.771	3.642	-	3.642	4.160	4.275	4.361	4.449	Continuing	Continuing

Note

Starting in FY17 the Common Helicopters (PU 2312) and Stores Planning and Weaponeering Module (PU 2311) moved to Mission Planning PE (0605215N).
Starting in FY17 the JT Service/NV Std Avionics CP/SB (PU 0572) PE (0604215N) moved to a new Common Avionics PE (0605217N).

A. Mission Description and Budget Item Justification

This project provides for the identification, study, design, development, demonstration, test, evaluation, and qualification of standard avionics capabilities for Navy use, and wherever practicable, use across all Services and Foreign Military Sales. Such air combat electronics developments include communications and airborne networking, navigation and sensors, flight avionics, safety systems, and flight mission information systems for both forward fit and retrofit aircraft. These efforts continue to maintain federated systems while encouraging transition of procurements to support a modular system for enhanced performance and affordability. Consideration is given up front to reduce acquisition costs through larger procurement quantities that satisfy multi-aircraft customer requirements and that reduce life cycle costs in the areas of reliability, maintainability, and training. This project also provides a Navy-wide program to develop required calibration standards (hardware) in all major measurement technology areas in support of Navy Hull, Mechanical and Electrical (HM&E) systems as well as Navy Weapons systems, ground and air, throughout the Fleet. It funds Navy lead-service responsibilities in the Department of Defense and Joint Services Metrology Research and Development program. This project supports the military requirement to verify the performance of all test systems used to validate the operation of HM&E as well as Navy Weapon Systems with calibration standards traceable to the National Institute of Standards and Technology.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under SYSTEM DEVELOPMENT AND DEMONSTRATION because it includes those projects that have passed Milestone B approval and are conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full-rate production decision.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy					Date: March 2019
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy* / BA 5: *System Development & Demonstration (SDD)*		R-1 Program Element (Number/Name) PE 0604215N / *Standards Development*			
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	2.722	3.771	3.704	-	3.704
Current President's Budget	2.711	3.771	3.642	-	3.642
Total Adjustments	-0.011	0.000	-0.062	-	-0.062
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.011	0.000			
• Program Adjustments	0.000	0.000	-0.057	-	-0.057
• Rate/Misc Adjustments	0.000	0.000	-0.005	-	-0.005

Change Summary Explanation

Technical: Change of 0.062 in FY20 due to program adjustment in the amount 0.057 and rate adjustment of 0.005.

0572:
Tactical Communications: Title corrected from Joint Precision Approach Landing System Software (S/W) Integration to Operation Flight Plan S/W Integration.

Ground Proximity Warning Systems/Terrain Awareness Warning System (GPWS/TAWS II): H-60 TAWS II Software Development extended duration from 4Q/15 through 4Q/16 based on projected platform integration schedule.

Military Flight Quality Assurance: Test and Evaluation, MH-53R/S, M/CH-53E, AH-1Z, UH-1Y, Phase 2 Test extended from 3Q/15 to 4Q/15 due to longer testing required for a number of defects found. Phase 2 Test Readiness Review moved from 1Q/15 to 3Q/15 due to integration test took longer than planned due to number of defects found. Deliveries for H-60R/S, CH-53E, AH-1Z and UH-1Y reflect new date of 2Q/15 to align with F/A-18 procurement order.

Mid Air Collision Avoidance Capability: Re-planned FY16-FY21 program as a result of the Business Case Analysis to properly aligned program. Material Development Decision/Acquisition Strategy Review (MDD/ASR) moved from 2Q/16 to 1Q/17. Added Capability Development Document (CDD) Draft added in 4Q16. Added Requirements Development from 1Q/16 to 4Q/16.

Starting in FY17 the JT Service/NV Std Avionics CP/SB (PU 0572) PE (0604215N) moved to a new Common Avionics PE (0605217N).

2311:
WASP V4.0 Systems Development start was delayed from 4Q16 to 2017 and will be displayed under PE 0605215N.

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 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604215N *I Standards Development*

WASP V3.2 IOC was delayed from 1Q16 to 3Q16 due to the asynchronous release process and requirement for a new build prior to IOC.

FY17 and out schedule is included in the Mission Planning PE 0605215N.

2312:
Common Helicopters schedule FY17 and out is included in Mission Planning PE 0605215N.

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 0604215N / *Standards Development*	Project (Number/Name) 1857 / *Calibration Standards*	

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
1857: *Calibration Standards*	17.099	2.711	3.771	3.642	-	3.642	4.160	4.275	4.361	4.449	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Navy-wide program which addresses Metrology related RDT&E issues for navy weapon systems, shipboard platforms, Naval Air, and Fleet Ground Marines. It supports development of calibration standards (equipment, procedures and technical data) required to resolve Metcal related safety, obsolescence, new and emerging technology support and cost reduction issues. It funds Navy unique and lead service responsibilities in DoD and Joint Services Metrology Research Programs to develop calibration solutions. The line supports development of measurement requirements to verify performance of all test systems used to validate the operation of Navy Weapon Systems with calibration standards traceable to the National Institute of Standards and Technology to calibrate, sustain and ensure performance accuracy.

This program also provides benefits and efficiencies in a joint collaborative environment within the Tri-Services. Projects are identified and defined so that they will meet the universal requirement. Development efforts are integrated in order to achieve the common capabilities required at minimum cost. This is also a regular and common business practice within the Navy Metrology Community where R&D efforts are communicated and integrated into the multiple testing and Monitoring Systems. This is done in support of Program Managers, Sponsors, and Principle Executive officers. As a result, common requirements are established, duplication of efforts are eliminated, and best value, high quality Metcal products are produced for the Navy.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Calibration Standards	2.711	3.771	3.642	0.000	3.642
Articles:	-	-	-	-	-
FY 2019 Plans: ($1.414) Continue development of (1) calibration hardware standard in electrical/electronic measurement technology to support combat/operational readiness for submarine periscopes magnetic locks and aircraft tail hook non-destructive testing. ($.995) Begin development of (1) calibration hardware standards in electro optical (multimode) measurement and (1) high energy measurement technology standard to support shipboard readiness of weapon system communication to missile launch systems, combat Flight operations and ground combat operations. ($.660) Finish development and transition of (1) calibration hardware standard development in support of chemical and biological detection systems (chemical warfare agent detection systems) and begin development of (1) calibration hardware standard in support of laboratories that calibrate DLSS and SCBA pressure gauges.					

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 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
($.625) Finish development and transition (1) and continue development of (1) calibration standard in analytical and metrology benchtop technology to support equipment operational readiness for both air and sea-based operations. ***FY 2020 Base Plans:*** ($1.375) Continue development of (1) calibration hardware standard in electrical/electronic measurement technology to support combat/operational readiness for submarine periscopes magnetic locks and aircraft tail hook non-destructive testing. ($1.153) Continue development of (2) calibration hardware standards in electro optical (Multi-mode) measurement technology and (1) high energy measurement technology standard to support shipboard readiness of weapon system communication to missile launch systems, combat Flight operations and ground combat operations. ($.494) Finish development and transition of (1) calibration hardware standard for Chemical/Biological technology to support shipboard and flight safety, and Divers Life Support Systems (DLSS). ($.620) Finish development and transition of (1) calibration standard in analytical and metrology benchtop technology to support equipment operational readiness for both air and sea-based operations. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** There was a decrease from FY2019 to FY 2020 of 0.129M in support of ship support balancer and rate/ miscellaneous adjustments.					
Accomplishments/Planned Programs Subtotals	2.711	3.771	3.642	0.000	3.642

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Funds provide for in-service engineering initiation of metrology research and developmental efforts of unique non-commercial hardware standards in the development of six key thrust technological areas which correspond to Physical Mechanical, Electro-Optical, Analytical Metrology, Electrical/Electronic systems, Chembio Defense,

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 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

Microwave/Millimeter wave. These standards will ensure measurement accuracy in advanced and emerging combat weapon systems and associated test equipment. These hardware test standards will also provide for cost effective and efficient system maintenance and calibration measurements that reduce wrong test decisions and will result in lower maintenance cost and higher system performance reliability.

E. Performance Metrics

The U.S. Navy Metrology RDT&E Program will transition and continue the research and development of 9 projects in progress of Electro Optical, Chemical/Biological, Physical Mechanical, Analytical Metrology, Electrical/Electronic, and technology areas for the purpose of ensuring measurement accuracy in new emerging technology measurement requirements of Navy weapon systems. Success measures will be articulated through program goals and a balance score card strategy system.

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 0604215N / *Standards Development*	Project (Number/Name) 1857 / *Calibration Standards*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	NSWC Corona : Corona, CA	5.462	0.048	Mar 2018	0.281	Mar 2019	0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	5.462	0.048		0.281		0.000		-		0.000	Continuing	Continuing	N/A

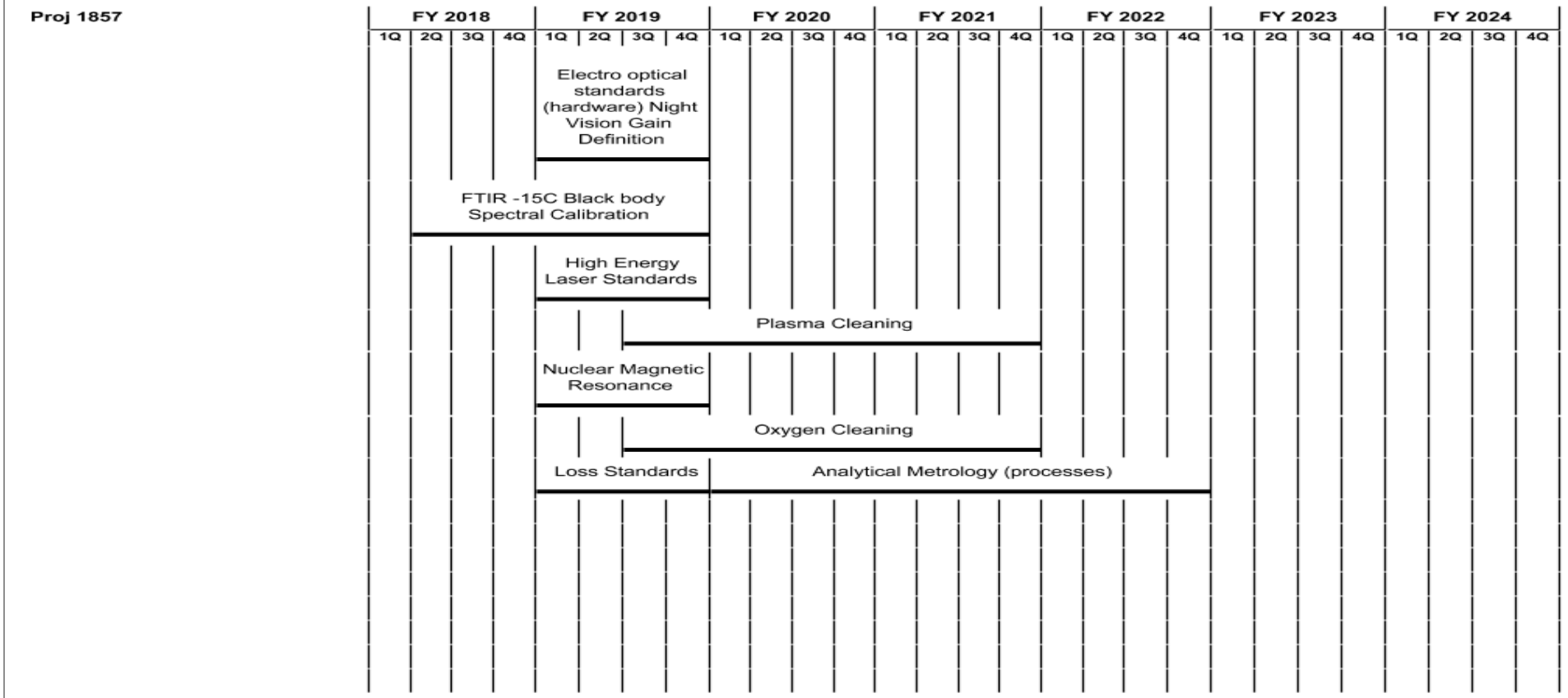
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	WR	NSWC Corona : Corona, CA	2.514	0.571	Mar 2018	0.353	Mar 2019	1.375	Mar 2020	-		1.375	0.000	4.813	-
Government Engineering Support	WR	NSWC Corona : Corona, CA	8.891	0.776	Mar 2018	3.102	Mar 2019	1.153	Mar 2020	-		1.153	0.000	13.922	-
Defense Acquisition Workforce	Various	Various : Various	0.007	0.475	Oct 2017	0.000	Mar 2019	0.494	Mar 2020	-		0.494	0.000	0.976	-
Travel	WR	NSWC Corona : Corona, CA	0.225	0.841	Mar 2018	0.035	Mar 2019	0.620	Mar 2020	-		0.620	0.000	1.721	-
		Subtotal	11.637	2.663		3.490		3.642		-		3.642	0.000	21.432	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	17.099	2.711		3.771		3.642		-		3.642	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*



2020DON - 0604215N - 1857

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 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1857				
Electro optical standards (hardware) Night Vision Gain Definition	1	2019	4	2019
Electro optical standards (hardware) FTIR -15C Black body Spectral Calibration	2	2018	4	2019
Electro optical Standards (hardware) development in High Energy Laser Standards	1	2019	4	2019
Physical Mechanical standards (hardware) development in Plasma Cleaning	3	2019	4	2021
Physical Mechanical standards (hardware) development in Nuclear Magnetic Resonance	1	2019	4	2019
Physical Mechanical standards (hardware) development in Oxygen Cleaning	3	2019	4	2021
Fiber Optic Return Loss Standards	1	2019	4	2019
Analytical Metrology (processes) Reliability Engineering Process Development for Initial Intervals	1	2020	4	2022
Schedule Detail	1	2019	4	2023