Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy											Date: April 2022	
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 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
Total Program Element	26.451	4.053	4.082	3.766	-	3.766	4.860	4.758	4.604	4.695	Continuing	Continuing
1857: *Calibration Standards*	26.451	4.053	4.082	3.766	-	3.766	4.860	4.758	4.604	4.695	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:
FY 2022 Base Plans
($1.632) Continue development of (1) calibration hardware standard in electrical/electronic measurement technology to support combat/operational readiness for submarine periscopes magnetic locks and aircraft tail hook non-destructive testing. Continue development of (1) Coaxial Microcalorimeter Power calibration standards in support of Navy's ability to detect adversarial threats and to counteract adversarial electronic countermeasures.
($.551) Continue development of (2) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS).
($.260) Begin development of (1) calibration hardware standard in Microwave/millimeter-wave technology in support of Vector Network Analyzers to test and repair Weapon Replaceable Assemblies (WRAs) for F-18/P-3/EP-3-E2C/D, EA-6B and P8 aircraft.
($.215) Continue development (1) calibration standard in physical mechanical measurement technology to support submarine shipboard safety and sea-based operations.
($.842) Continue development of (1) Multi-mode calibration hardware standards in electro optical (Multi-mode) measurement technology to support shipboard readiness of weapon system communication to missile launch systems, combat Flight operations and ground combat operations. Continue development of (1) Low Level Pulsed

standard to support laser designators and rangefinders equipment remain in a ready and operational state. Continue development of (1) High Energy Laser (HEL) Beam Profiler to support deployment and operational readiness of shipboard HEL weapon systems.
($.581) Begin development of (1) calibration standards in analytical and benchtop metrology focusing in support of metrology benchtop automated physical mechanical calibration methods support equipment operational readiness for both for shore, air and sea-based operations. Continue development of (1) measurement Uncertainty Automation phase III in support of Component Equipment Operational Readiness.

JUSTIFICATION FOR BUDGET ACTIVITY:
FY2023 base plans
($.394) Continue development of Fiber Optic Return Loss Standards Phase II of (1) Multi-mode calibration hardware standards in electro optical (Multi-mode) measurement technology to support shipboard readiness of weapon system communication to missile launch systems, combat Flight operations and ground combat operations.
($1.555) Continue development of (1) calibration hardware standard in electrical/electronic measurement technology to support combat/operational readiness for submarine periscopes magnetic locks and aircraft tail hook non-destructive testing. Continue development of (1) Coaxial Microcalorimeter Power calibration standards in support of Navy's ability to detect adversarial threats and to counteract adversarial electronic countermeasures.
($.375) Continue development of (1) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS).
($.978) Continue development of (1) Measurement Uncertainty Automation (Phase III) measurement in support of Component Equipment Operational Readiness. Continue development of (1) calibration standards in analytical and benchtop metrology focusing in support of metrology benchtop automated physical mechanical calibration methods support equipment operational readiness for both for shore, air and sea-based operations.
($.464) Continue development of VNA Verification Kit Uncertainty Reduction of (1) calibration hardware standard in Microwave/millimeter-wave technology in support of Vector Network Analyzers to test and repair Weapon Replaceable Assemblies (WRAs) for F-18/P-3/EP-3-E2C/D, EA-6B and P8 aircraft.

The FY 2023 funding decrease will push out the start of Two project capabilities from FY 2023 into FY 2024 as well as affect out-year planning. Night Vision Telescope Auto Focus Capability in electro optical measurement technology in support Night Vision Telescope Auto Focus Capability to maintain Safety of Flight and combat operations ($.272); and Biodetection (bio-aerosol detector) Calibration standard in support of Combat and shipboard operational readiness for bio threat detection ($.367).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy		Date: April 2022
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*	

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	4.218	4.082	0.000	-	0.000
Current President's Budget	4.053	4.082	3.766	-	3.766
Total Adjustments	-0.165	0.000	3.766	-	3.766
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.165	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	3.766	-	3.766

Change Summary Explanation

1857:
FY2023 funding request was reduced by $0.617 million to account for the availability of prior year execution balances.

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).

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
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*

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

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.

FY 2023 funding increase reflects the fact that the FY 2022 President’s Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy			Date: April 2022
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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
1857: *Calibration Standards*	26.451	4.053	4.082	3.766	-	3.766	4.860	4.758	4.604	4.695	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.

JUSTIFICATION FOR BUDGET ACTIVITY:
FY 2022 Base Plans
($1.632) Continue development of (1) calibration hardware standard in electrical/electronic measurement technology to support combat/operational readiness for submarine periscopes magnetic locks and aircraft tail hook non-destructive testing. Continue development of (1) Coaxial Microcalorimeter Power calibration standards in support of Navy's ability to detect adversarial threats and to counteract adversarial electronic countermeasures.
($.551) Continue development of (2) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS).
($.260) Begin development of (1) calibration hardware standard in Microwave/millimeter-wave technology in support of Vector Network Analyzers to test and repair Weapon Replaceable Assemblies (WRAs) for F-18/P-3/EP-3-E2C/D, EA-6B and P8 aircraft.
($.215) Continue development (1) calibration standard in physical mechanical measurement technology to support submarine shipboard safety and sea-based operations.
($.842) Continue development of (1) Multi-mode calibration hardware standards in electro optical (Multi-mode) measurement technology to support shipboard readiness of weapon system communication to missile launch systems, combat Flight operations and ground combat operations. Continue development of (1) Low Level Pulsed standard to support laser designators and rangefinders equipment remain in a ready and operational state. Continue development of (1) High Energy Laser (HEL) Beam Profiler to support deployment and operational readiness of shipboard HEL weapon systems.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

($.581) Begin development of (1) calibration standards in analytical and benchtop metrology focusing in support of metrology benchtop automated physical mechanical calibration methods support equipment operational readiness for both for shore, air and sea-based operations. Continue development of (1) measurement Uncertainty Automation phase III in support of Component Equipment Operational Readiness.

JUSTIFICATION FOR BUDGET ACTIVITY:
FY2023 base plans
($.394) Continue development of Fiber Optic Return Loss Standards Phase II of (1) Multi-mode calibration hardware standards in electro optical (Multi-mode) measurement technology to support shipboard readiness of weapon system communication to missile launch systems, combat Flight operations and ground combat operations.
($1.555) Continue development of (1) calibration hardware standard in electrical/electronic measurement technology to support combat/operational readiness for submarine periscopes magnetic locks and aircraft tail hook non-destructive testing. Continue development of (1) Coaxial Microcalorimeter Power calibration standards in support of Navy's ability to detect adversarial threats and to counteract adversarial electronic countermeasures.
($.375) Continue development of (1) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS).
($.978) Continue development of (1) Measurement Uncertainty Automation (Phase III) measurement in support of Component Equipment Operational Readiness. Continue development of (1) calibration standards in analytical and benchtop metrology focusing in support of metrology benchtop automated physical mechanical calibration methods support equipment operational readiness for both for shore, air and sea-based operations.
($.464) Continue development of VNA Verification Kit Uncertainty Reduction of (1) calibration hardware standard in Microwave/millimeter-wave technology in support of Vector Network Analyzers to test and repair Weapon Replaceable Assemblies (WRAs) for F-18/P-3/EP-3-E2C/D, EA-6B and P8 aircraft.

The FY 2023 funding decrease will push out the start of Two project capabilities from FY 2023 into FY 2024 as well as affect out-year planning. Night Vision Telescope Auto Focus Capability in electro optical measurement technology in support Night Vision Telescope Auto Focus Capability to maintain Safety of Flight and combat operations ($.272); and Biodetection (bio-aerosol detector) Calibration standard in support of Combat and shipboard operational readiness for bio threat detection ($.367).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Calibration Standards	4.053	4.082	3.766	0.000	3.766
Articles:	-	-	-	-	-
FY 2022 Plans: ($1.632) 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. Continue development of (1) Coaxial Microcalorimeter Power calibration					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
standards in support of Navy's ability to detect adversarial threats and to counteract adversarial electronic countermeasures. ($.551) Continue development of (2) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS). ($.260) Begin development of (1) calibration hardware standard in Microwave/millimeter-wave technology in support of Vector Network Analyzers to test and repair Weapon Replaceable Assemblies (WRAs) for F-18/P-3/ EP-3-E2C/D, EA-6B and P8 aircraft. ($.215) Continue development (1) calibration standard in physical mechanical measurement technology to support submarine shipboard safety and sea-based operations. ($.842) Continue development of (1) Multi-mode calibration hardware standards in electro optical (Multi-mode) measurement technology to support shipboard readiness of weapon system communication to missile launch systems, combat Flight operations and ground combat operations. Continue development of (1) Low Level Pulsed standard to support laser designators and rangefinders equipment remain in a ready and operational state. Continue development of (1) High Energy Laser (HEL) Beam Profiler to support deployment and operational readiness of shipboard HEL weapon systems. ($.581) Begin development of (1) calibration standards in analytical and benchtop metrology focusing in support of metrology benchtop automated physical mechanical calibration methods support equipment operational readiness for both for shore, air and sea-based operations. Continue development of (1) measurement Uncertainty Automation phase III in support of Component Equipment Operational Readiness.					
FY 2023 Base Plans: ($.394) Continue development of Fiber Optic Return Loss Standards Phase II of (1) Multi-mode calibration hardware standards in electro optical (Multi-mode) measurement technology to support shipboard readiness of weapon system communication to missile launch systems, combat Flight operations and ground combat operations. ($1.555) 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. Continue development of (1) Coaxial Microcalorimeter Power calibration					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
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 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
standards in support of Navy's ability to detect adversarial threats and to counteract adversarial electronic countermeasures. ($.375) Continue development of (1) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS). ($.978) Continue development of (1) Measurement Uncertainty Automation (Phase III) measurement in support of Component Equipment Operational Readiness. Continue development of (1) calibration standards in analytical and benchtop metrology focusing in support of metrology benchtop automated physical mechanical calibration methods support equipment operational readiness for both for shore, air and sea-based operations. ($.464) Continue development of VNA Verification Kit Uncertainty Reduction of (1) calibration hardware standard in Microwave/millimeter-wave technology in support of Vector Network Analyzers to test and repair Weapon Replaceable Assemblies (WRAs) for F-18/P-3/EP-3-E2C/D, EA-6B and P8 aircraft. ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** The decrease will push out the start of Two project capabilities from FY 2023 into FY 2024 as well as affect out-year planning. Night Vision Telescope Auto Focus Capability in electro optical measurement technology in support Night Vision Telescope Auto Focus Capability to maintain Safety of Flight and combat operations ($.272); and Biodetection (bio-aerosol detector) Calibration standard in support of Combat and shipboard operational readiness for bio threat detection ($.367).					
Accomplishments/Planned Programs Subtotals	4.053	4.082	3.766	0.000	3.766

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, Microwave/Millimeter wave. These standards will ensure measurement accuracy in advanced and emerging combat weapon systems and associated test equipment.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy			Date: April 2022
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 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	NSWC Corona : Corona, CA	6.165	0.326	Mar 2021	0.074	Mar 2022	0.074	Mar 2023	-		0.074	Continuing	Continuing	Continuing
		Subtotal	6.165	0.326		0.074		0.074		-		0.074	Continuing	Continuing	N/A

Management Services ($ in Millions)

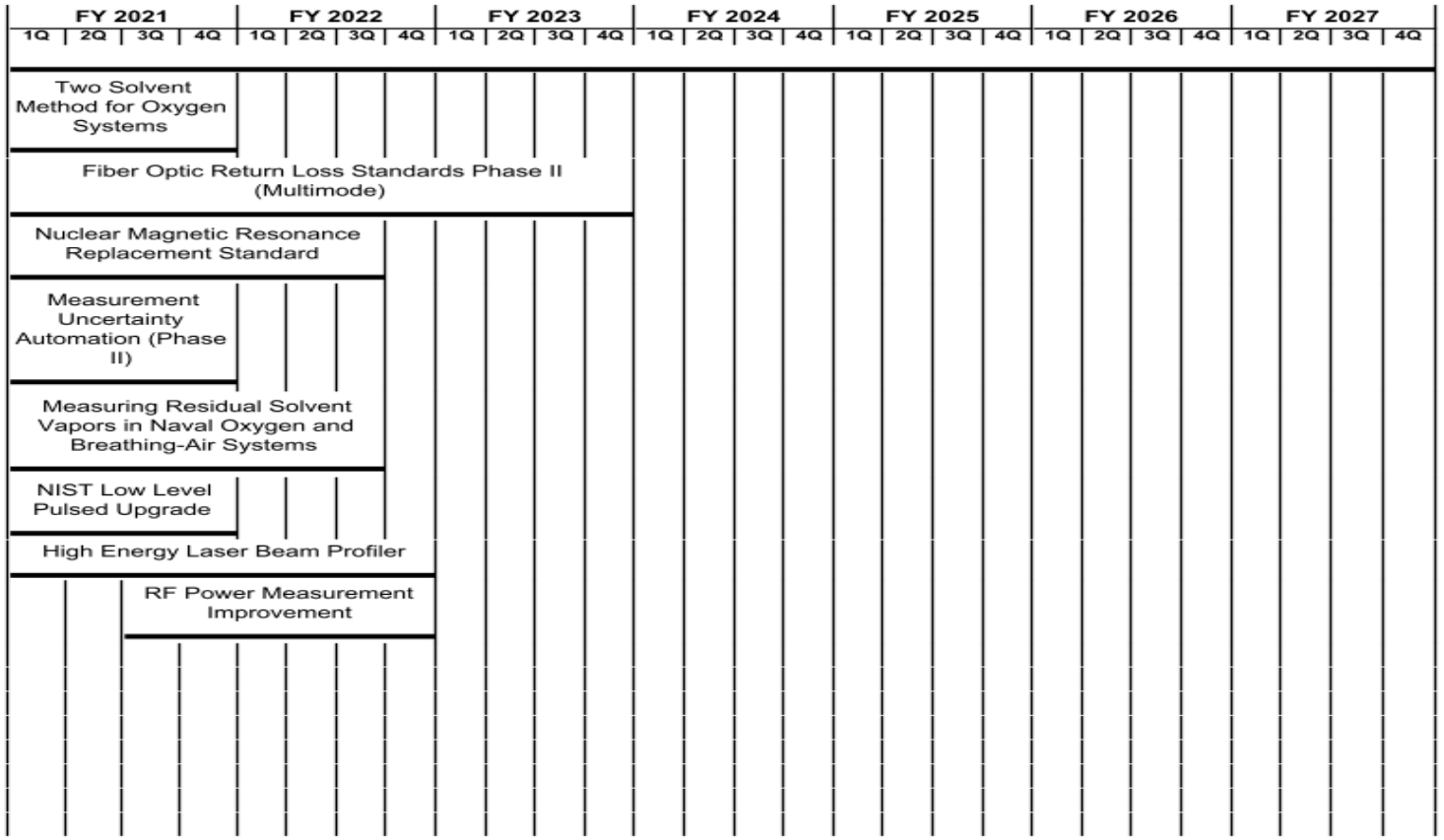
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	WR	NSWC Corona : Corona, CA	4.961	1.334	Mar 2021	0.700	Mar 2022	0.700	Mar 2023	-		0.700	0.000	7.695	-
Government Engineering Support	WR	NSWC Corona : Corona, CA	14.199	2.358	Mar 2021	3.273	Mar 2022	2.957	Mar 2023	-		2.957	0.000	22.787	-
Travel	WR	NSWC Corona : Corona, CA	1.126	0.035	Mar 2021	0.035	Mar 2022	0.035	Mar 2023	-		0.035	0.000	1.231	-
Need Item Text	C/BA	Not Specified : Not Specified	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	20.286	3.727		4.008		3.692		-		3.692	0.000	31.713	N/A

	Prior Years	FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	26.451	4.053		4.082		3.766		-		3.766	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

Proj 1857



2023DON - 0604215N - 1857

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
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				
Management and Coordination	1	2021	4	2027
Chemical/Biological standard (hardware) Two Solvent Method for Oxygen Systems	1	2021	4	2021
Electro-Optical standard (hardware) Fiber Optic Return Loss Standards Phase II (Multimode)	1	2021	4	2023
Electrical/Electronic standard (hardware) Nuclear Magnetic Resonance Replacement Standard	1	2021	3	2022
Analytical Metrology standard Measurement Uncertainty Automation (Phase II)	1	2021	4	2021
Chemical/Biological standard (hardware) Measuring Residual Solvent Vapors in Naval Oxygen and Breathing-Air Systems	1	2021	3	2022
Electro-Optical standard (hardware) NIST Low Level Pulsed Upgrade	1	2021	4	2021
Electro-Optical standard (hardware) High Energy Laser Beam Profiler	1	2021	4	2022
Electrical/Electronic standard (hardware) RF Power Measurement Improvement	3	2021	4	2022
Physical/Mechanical standard (hardware) Cost Effective Calibration of Analox SUB MKIIP	1	2021	4	2022
Analytical Metrology standard Measurement Uncertainty Automation (Phase III)	1	2022	4	2023
Microwave/Millimeter-wave standard (hardware) VNA Verification Kit Uncertainty Reduction	1	2022	4	2023
Analytical Metrology standard Metrology Bench Top (METBENCH) - RACE Phase IV (Development of Physical Mechanical Automated Calibration Methods)	1	2022	4	2023
Electro-Optical standard (hardware) Night Vision Telescope Auto Focus Capability	1	2022	4	2023
Chemical/Biological standard (hardware) Biodetector (bio-aerosol detector) Calibration	1	2022	4	2024
Electrical/Electronic standard (hardware) Zero Chain Traceability	1	2022	4	2026
Chemical/Biological standard (hardware) Plasma Cleaning for Oxygen Systems	1	2023	4	2026

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Analytical Metrology standard METBENCH - RACE Phase V (Extend Calibration Spectrum and Optical Character and Scale Recognition Capabilities)	1	2024	4	2025
Electrical/Electronic standard (hardware) Navy NIST On A Chip (NOAC)	1	2024	4	2026
Analytical Metrology standard Multivariable Calibration Intervals	1	2024	4	2026
Analytical Metrology standard Bayesian Binomial Methods for Calibration Interval Estimation	1	2024	4	2024
Electrical/Electronic standard (hardware) FDM/TDM/WDM Interrogator/Demodulator Calibration Unit	1	2024	4	2026
Physical/Mechanical standard (hardware) Standards for Underwater Acoustic Vector Sensor Characterization	1	2025	4	2026
Analytical Metrology standard Joint Calibration Interval Analysis Methodology	1	2026	4	2027
Analytical Metrology standard Identification of Relevant Error Distributions	1	2026	4	2027
Physical/Mechanical standard (hardware) Transfer Standards for High-Vacuum Metrology	1	2026	4	2027
Physical/Mechanical standard (hardware) Acoustic Pressure Tank Facility (APTF) Upgrade	1	2027	4	2027
Physical/Mechanical standard (hardware) Accurate Speed-of-Sound Determination for Reference Fluids	1	2027	4	2027
Physical/Mechanical standard (hardware) Aluminum Sensitization Testing Improvement	1	2027	4	2027
Physical/Mechanical standard (hardware) Robotic Calibration of Gage Blocks	1	2027	4	2027
Physical/Mechanical standard (hardware) Laser Manometer	1	2027	4	2027
Physical/Mechanical standard (hardware) Resonant SI Gages (Alt. to Laser Manometer)	1	2027	4	2027