Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy	Date: March 2023
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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	30.504	4.066	3.766	4.039	-	4.039	4.765	4.611	4.703	4.797	Continuing	Continuing
1857: *Calibration Standards*	30.504	4.066	3.766	4.039	-	4.039	4.765	4.611	4.703	4.797	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

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:
FY2023 base plans
($1.019) 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. Continue development of (1) calibration standard for LiDAR 3D Scanners to support shipboard operational readiness while reducing cost and turnaround time for critical ship building areas; such as installation, design, planning, maintenance and damage assessments. Continue development on (1) for National Low Level Laser Radiometer Calibration Facility, in support of Operational Readiness for Laser rangefinders and designators. Continue development on (2) the RPPM Transfer Training and the High Energy Laser (HEL) Beam Profiler in support HEL testing and operational evaluations assessment.
($0.870) 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy	Date: March 2023
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*

($1.063) Continue development of (3) calibration hardware standards in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS). Begin development of (1) Chemical/Biological Biodetector (bio-aerosol detector) Calibration Standard in support of Navy shipboard and shore activities Joint Biological Technical Detection System (JBTDS) for real-time bioaerosols monitoring to defend against biological agent threats.
($0.502) 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.
($0.312) Continue development of NIST Traceable PNA E-Cal Calibrations for NPSL 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 2024 Base Plans:
($0.771) Continue the 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.
($0.958) Continue development (1) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS). Continue development of (1) Chemical/Biological Biodetector (bio-aerosol detector) Calibration Standard in support of Navy shipboard and shore activities Joint Biological Technical Detection System (JBTDS) for real-time bioaerosols monitoring to defend against biological agent threats.
($1.449) Continue development and transition 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. Begin development of (1) RACE Phase V (Extend Calibration Spectrum and Optical Character and Scale Recognition Capabilities) in support of Shipboard operational Readiness.
($0.478) Continue the development and transition of NIST Traceable PNA E-Cal Calibrations for NPSL of (1) Microwave/millimeter-wave calibration hardware standard 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.
($0.383) Begin Development of (1) Electro/Optical calibration standard focusing on Night Vision Telescope Auto Focus Capability in support of aircraft Safety of Flight night operations.

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	4.082	3.766	4.860	-	4.860
Current President's Budget	4.066	3.766	4.039	-	4.039
Total Adjustments	-0.016	0.000	-0.821	-	-0.821
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.016	0.000			
• Program Adjustments	0.000	0.000	-0.834	-	-0.834
• Rate/Misc Adjustments	0.000	0.000	0.013	-	0.013

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy	Date: March 2023
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*

Change Summary Explanation

1857:

This affects manpower resources and the ability to move the work effort forward to meet Fleet capability expectations. New capability from projects will be pushed beyond FY24 making it difficult to support urgent emerging operational initiatives that are significantly changing in the Fleet Support environment. The Quantum Based Measurement Standards project in support of Temperature Metrology systems will be delayed and pushed into another year of development and transition. The Analytical Metrology Analytical Metrology standard Analytical Metrology Capabilities for Interval Analysis using Multivariable Calibration Intervals project will be delayed and start in FY25 vice FY24. In addition, both the Electro Optics for Advanced Military Technology Measurement Standards Requirements and the Analytical standard for Joint Interval Analysis will be affected in the out year planning. This will cause a backlog of standards requirements development capabilities essential to meet critical Navy service requirements and sustainment, which can no longer be commercially supported. Reduction in Project capability transition will affect Fleet operational and combat readiness capability, safety of flight operations, shipboard operational readiness, and Treaty Compliance. All of which impacts initiatives to maintain technical superiority.

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.

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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy	Date: March 2023
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*

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

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy											Date: March 2023	
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 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
1857: *Calibration Standards*	30.504	4.066	3.766	4.039	-	4.039	4.765	4.611	4.703	4.797	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:
FY2023 base plans
($.585) 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. Continue development of (1) calibration standard for LiDAR 3D Scanners to support shipboard operational readiness while reducing cost and turnaround time for critical ship building areas; such as installation, design, planning, maintenance and damage assessments.
($1.366) Continue development of (1) calibration hardware standard in electrical/electronic measurement technology to support combat/operational readiness for submarine periscopes magnetic locks and aircraft tail hook non-destructive testing. Continue development of (1) Coaxial Microcalorimeter Power calibration standards in support of Navy's ability to detect adversarial threats and to counteract adversarial electronic countermeasures.
($.635) Continue development of (2) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS).
($.770) Continue development of (1) Measurement Uncertainty Automation (Phase III) measurement in support of component equipment operational readiness. Continue development of (1) calibration standards in analytical and benchtop metrology focusing in support of metrology benchtop automated physical mechanical calibration methods support equipment operational readiness for both for shore, air and sea-based operations.
($.410) 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.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

The funding decrease from FY22 to FY23 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 ($.257); and Biodetection (bio-aerosol detector) Calibration standard in support of Combat and shipboard operational readiness for bio threat detection ($.357).

FY 2024 Base Plans:
($.831) Continue and transition the development of (1) calibration hardware standard in electrical/electronic measurement technology to support combat/operational readiness for submarine periscopes magnetic locks and aircraft tail hook non-destructive testing. Begin development of (1) Quantum Based measurement standard in support of DC Voltage TMDE Inventory systems.
($.719) Continue development and transition (1) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS). Begin development of (1) Chemical/Biological Biodetector (bio-aerosol detector) Calibration Standard in support of Navy shipboard and shore activities Joint Biological Technical Detection System (JBTDS) for real-time bioaerosols monitoring to defend against biological agent threats.
($1.310) Continue development and transition of (1) calibration standards in analytical and benchtop metrology focusing in support of metrology benchtop automated physical mechanical calibration methods support equipment operational readiness for both for shore, air, and sea-based operations. Begin development of (1) Analytical Metrology METBENCH - RACE Phase V Calibration standard in support of Optical Character and Scale Recognition Capabilities.
($.409) Continue the development and transition of VNA Verification Kit Uncertainty Reduction of (1) Microwave/millimeter-wave calibration hardware standard 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.
($.313) Begin Development of (1) Electro/Optical calibration standard focusing on Night Vision Telescope Auto Focus Capability in support of aircraft Safety of Flight night operations
($.268) Begin development of (1) Physical/Mechanical Quantum Based Measurement Standards in support of Temperature Metrology systems referenced thermometer based on dual TCVCO architecture

FY2024 Budget Line Decrease:
Budget line reduction of $0.827 reduces funding to all nine projects in FY24. This affects manpower resources and the ability to move the work effort forward to meet Fleet capability expectations. New capability from projects will be pushed beyond FY24 making it difficult to support urgent emerging operational initiatives that are significantly changing in the Fleet Support environment. The Quantum Based Measurement Standards project in support of Temperature Metrology systems will be delayed and pushed into another year of development and transition. The Analytical Metrology Analytical Metrology standard Analytical Metrology Capabilities for Interval Analysis using Multivariable Calibration Intervals project will be delayed and start in FY25 vice FY24. In addition, both the Electro Optics for Advanced Military Technology Measurement Standards Requirements and the Analytical standard for Joint Interval Analysis will be affected in the out year planning. This will cause a backlog of standards requirements development capabilities essential to meet critical Navy service requirements and sustainment, which can no longer be commercially supported. Reduction in Project capability transition will affect Fleet operational and combat readiness capability, safety of flight operations, shipboard operational readiness, and Treaty Compliance. All of which impacts initiatives to maintain technical superiority.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Calibration Standards	4.066	3.766	4.039	0.000	4.039

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Articles:	-	-	-	-	-
FY 2023 Plans: ($1.019) 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. Continue development of (1) calibration standard for LiDAR 3D Scanners to support shipboard operational readiness while reducing cost and turnaround time for critical ship building areas; such as installation, design, planning, maintenance and damage assessments. Continue development on (1) for National Low Level Laser Radiometer Calibration Facility, in support of Operational Readiness for Laser rangefinders and designators. Continue development on (2) the RPPM Transfer Training and the High Energy Laser (HEL) Beam Profiler in support HEL testing and operational evaluations assessment. ($0.870) 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. ($1.063) Continue development of (3) calibration hardware standards in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS). Begin development of (1) Chemical/Biological Biodetector (bio-aerosol detector) Calibration Standard in support of Navy shipboard and shore activities Joint Biological Technical Detection System (JBTDS) for real-time bioaerosols monitoring to defend against biological agent threats. ($0.502) 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. ($0.312) Continue development of NIST Traceable PNA E-Cal Calibrations for NPSL 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 2024 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
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 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
($0.766) Continue the 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. ($0.958) Continue development (1) calibration hardware standard in Chemical/Biological technology for measuring Residual Solvent Vapors in support of Divers Life Support Systems (DLSS). Continue development of (1) Chemical/Biological Biodetector (bio-aerosol detector) Calibration Standard in support of Navy shipboard and shore activities Joint Biological Technical Detection System (JBTDS) for real-time bioaerosols monitoring to defend against biological agent threats. ($1.448) Continue development and transition 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. Begin development of (1) RACE Phase V (Extend Calibration Spectrum and Optical Character and Scale Recognition Capabilities) in support of Shipboard operational Readiness. ($0.478) Continue the development and transition of NIST Traceable PNA E-Cal Calibrations for NPSL of (1) Microwave/millimeter-wave calibration hardware standard 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. ($0.383) Begin Development of (1) Electro/Optical calibration standard focusing on Night Vision Telescope Auto Focus Capability in support of aircraft Safety of Flight night operations. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding increase from FY2023-FY2024 will be used for in house engineering labor.					
Accomplishments/Planned Programs Subtotals	4.066	3.766	4.039	0.000	4.039

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

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. 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 2024 Navy		Date: March 2023
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 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	NSWC Corona : Corona, CA	6.491	0.184	Sep 2022	0.325	Jul 2023	0.140	Jun 2024	-		0.140	Continuing	Continuing	Continuing
		Subtotal	6.491	0.184		0.325		0.140		-		0.140	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	WR	NSWC Corona : Corona, CA	6.295	1.248	Sep 2022	1.302	Apr 2023	0.560	Mar 2024	-		0.560	0.000	9.405	-
Government Engineering Support	WR	NSWC Corona : Corona, CA	16.557	2.619	Mar 2022	2.124	Mar 2023	3.324	Mar 2024	-		3.324	0.000	24.624	-
Travel	WR	NSWC Corona : Corona, CA	1.161	0.015	Mar 2022	0.015	Mar 2023	0.015	Mar 2024	-		0.015	0.000	1.206	-
		Subtotal	24.013	3.882		3.441		3.899		-		3.899	0.000	35.235	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	30.504	4.066		3.766		4.039		-		4.039	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604215N / *Standards Development*	**Project (Number/Name)** 1857 / *Calibration Standards*

	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
Proj 1857	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Management and Coordination	<	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	>
Cybersecurity	<								<	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	>
Chemical/Biological standard (hardware) Two Solvent Method for Oxygen Systems	<	—	—	—	—	—	—	▼																				
Electro-Optical standard (hardware) Fiber Optic Return Loss Standards Phase II (Multimode)	<	—	—	—	—	—	—	▼																				
Electrical/Electronic standard (hardware) Nuclear Magnetic Resonance Replacement Standard	<	—	—	—	—	—	—	—	—	—	—	▼																
Analytical Metrology standard Arc Fault Detection System	<																											
Electro-Optical standard (hardware) Beam Box/Next Generation RPPM	<																											
Analytical Metrology standard Measurement Uncertainty Automation (Phase II)	<																											
Analytical Metrology standard TAR/Reliability Exemption Analysis Based on Risk	<																											
Chemical/Biological standard (hardware) Verification of Solvent Removal of Critical Applications Instruments	<	—	—	—	—	—	—	—	—	—	—	▼																
Electro-Optical standard (hardware) National Low Level Laser Radiometer Calibration Facility	<	—	—	—	—	—	—	▼																				
Electro-Optical standard (hardware) RPPM Transfer Training	<		▲	—	—	—	▼																					
Electro-Optical standard (hardware) High Energy Laser Beam Profiler	<	—	—	—	—	—	—	▼																				
Electrical/Electronic standard (hardware) Coaxial Microcalorimeter Power Standards	<	—	—	—	—	—	—	—	—	—	—	▼																
Physical/Mechanical standard (hardware) Cost Effective Calibration of Analox SUB MKIIP	<	—	—	▼																								
Analytical Metrology standard Measurement Uncertainty Automation (Phase III)	<	—	—	—	—	—	—	▼																				
Microwave/Millimeter-wave standard (hardware) NIST Traceable PNA E-Cal Calibrations for NPSL	<	—	—	—	—	—	—	—	—	—	—	▼																
Analytical Metrology standard Metrology Bench Top (METBENCH) - RACE Phase IV	<	—	—	—	—	—	—	—	—	—	—	▼																
Chemical/Biological standard (hardware) JCAD calibrator and install	<		▲	—	—	—	▼																					
Electro-Optical standard (hardware) LiDAR 3D Scanner Calibration Support	<		▲	—	—	—	—	▼																				
Chemical/Biological standard (hardware) Biodetector (bio-aerosol detector) Calibration	<				▲	—	—	—	—	—	—	—	—	—	—	▼												
Electro-Optical standard (hardware) Night Vision Telescope Auto Focus Capability	<								▲	—	—	—	—	—	—	▼												
Analytical Metrology standard METBENCH - RACE Phase V	<								▲	—	—	—	—	—	—	▼												
Electrical/Electronic standard (hardware) Quantum Based Measurement Standards: Voltage Metrology	<												▲	—	—	—	—	—	—	▼								
Physical/Mechanical standard (hardware) Quantum Based Measurement Standards: Temperature Metrology	<												▲	—	—	—	—	—	—	—	—	—	—	—	—	—	—	▼
Microwave/Millimeter-wave standard (hardware) RF Power Transfer Standards	<												▲	—	—	—	—	—	—	—	—	—	—	—	—	—	▼	
Analytical Metrology standard Analytical Metrology Capabilities for Interval Analysis using Multivariable Calibration Intervals	<												▲	—	—	—	—	—	—	▼								
Analytical Metrology standard Analytical Metrology Capabilities for Interval Analysis Estimation using Bayesian Binomial Methods	<												▲	—	—	▼												
Microwave/Millimeter-wave standard (hardware) High Power Microwave/High Power RF (HPM/HPRF)	<												▲	—	—	—	—	—	—	—	—	—	—	▼				
Physical/Mechanical standard (hardware) Hypersonic System Measurement Standards	<												▲	—	—	—	—	—	—	▼								
Electro-Optical standard (hardware) 3D Printer Measurement Standards and Processes for Automated Parts Qualification	<												▲	—	—	—	—	—	—	—	—	—	—	▼				
Chemical/Biological standard (hardware) Environmental Safe and Cost Effective Cleaning of Oxygen Gauges	<																▲	—	—	—	—	—	—	—	—	—	—	—
Electro-Optical standard (hardware) Advanced Military Technology Measurement Standards Requirements	<																▲	—	—	—	—	—	—	—	—	—	—	—
Physical/Mechanical standard (hardware) Transfer Standards for High-Vacuum Metrology	<																				▲	—	—	—	—	—	—	—
Analytical Metrology standard Identification of Relevant Error Distributions	<																				▲	—	—	—	—	—	—	—
Analytical Metrology standard Joint Calibration Interval Analysis Methodology	<																				▲	—	—	—	—	—	—	—
Physical/Mechanical standard (hardware) Quantum Based Measurement Standards: Pressure Metrology	<																								▲	—	—	—
Physical/Mechanical standard (hardware) Resonant Silicon Gages as a Precision Pressure Standard	<																								▲	—	—	—

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
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	2022	4	2028
Cybersecurity	1	2024	1	2028
Chemical/Biological standard (hardware) Two Solvent Method for Oxygen Systems	1	2022	4	2023
Electro-Optical standard (hardware) Fiber Optic Return Loss Standards Phase II (Multimode)	1	2022	4	2023
Electrical/Electronic standard (hardware) Nuclear Magnetic Resonance Replacement Standard	1	2022	4	2024
Analytical Metrology standard Measurement Uncertainty Automation (Phase II)	1	2022	3	2023
Chemical/Biological standard (hardware) Measuring Residual Solvent Vapors in Naval Oxygen and Breathing-Air Systems	1	2022	3	2024
Electro-Optical standard (hardware) NIST Low Level Pulsed Upgrade	1	2022	4	2022
Electro-Optical standard (hardware) High Energy Laser Beam Profiler	1	2022	4	2022
Electrical/Electronic standard (hardware) RF Power Measurement Improvement	3	2022	4	2022
Physical/Mechanical standard (hardware) Cost Effective Calibration of Analox SUB MKIIP	1	2022	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

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
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**
Chemical/Biological standard (hardware) Plasma Cleaning for Oxygen Systems	1	2023	4	2026
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