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 0603542N *I Radiological Control*							
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	5.118	0.716	0.740	0.689	-	0.689	0.778	0.788	0.785	0.800	Continuing	Continuing
1830: *RADIAC Development*	5.118	0.716	0.740	0.689	-	0.689	0.778	0.788	0.785	0.800	Continuing	Continuing

A. Mission Description and Budget Item Justification

The FY 2020 funding request was reduced by $0.044M to account for the availability of prior year execution balances.

Mission Description: The Radiation Detection, Indication and Computation (RADIAC) Program is responsible for providing radiation monitoring instruments that detect and measure ionizing radiation. These instruments are used on all Navy, Coast Guard and Military Sealift Command vessels, and at every Navy shore installation, in order to ensure the safety of personnel, continuity of operations in radiological contingencies, and protection of the environment.

Justification: Title 10 of the Code of Federal Regulations, Part 20 (10 CFR 20) requires RADIAC instruments be used to ensure the safety of personnel who work with or who are exposed to radioactive materials in their jobs. Additionally, the Navy's mission requires personnel and ships to have the ability to operate in radiological environments and the ability to identify and interdict radiological Weapons of Mass Destruction (WMD). Navy programs that require RADIAC instruments for Occupational Safety & Health (OSH) under the provisions of 10 CFR 20 include Naval Nuclear Propulsion, Nuclear Weapons, Medical, and Radiological Affairs Support. Non-OSH programs include Radiological Defense, Consequence Management, Training, Technical (RADIAC calibration, shielding evaluation, research, etc.) and Radiological Search (maritime interdiction and radiological search missions to locate or intercept WMD).

This budget item develops, tests and evaluates new, highly reliable, more easily calibrated, easy to care and maintain, light weight and modern RADIAC instruments in order to improve the effectiveness of radiation safety, to make instruments simpler to use, and to reduce life cycle costs. The ultimate goal is to replace old, bulky, costly to maintain and repair, unreliable and obsolete instrumentation with multifunction equipment that can be automatically calibrated at greatly reduced cost.

This budget item also provides for improvement to nuclear weapons intrinsic radiation (gamma and neutron) shielding calculations, mixed field (neutron and gamma) dosimetry, and in neutron measurement. The objective is to develop less costly and more effective integral shielding for better personnel protection and safety. Improvement in personnel dosimetry and neutron measurement is also a major emphasis.

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 0603542N *I Radiological Control*			
B. Program Change Summary ($ in Millions)	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**
Previous President's Budget	0.745	0.740	0.746	-	0.746
Current President's Budget	0.716	0.740	0.689	-	0.689
Total Adjustments	-0.029	0.000	-0.057	-	-0.057
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.029	0.000			
• Program Adjustments	0.000	0.000	-0.044	-	-0.044
• Rate/Misc Adjustments	0.000	0.000	-0.013	-	-0.013

Change Summary Explanation

The FY 2020 funding request was reduced by $0.044M to account for the availability of prior year execution balances and reduced by 0.013M for Navy Working Capital Fund rate changes.

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 0603542N / *Radiological Control*	Project (Number/Name) 1830 / *RADIAC 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
1830: *RADIAC Development*	5.118	0.716	0.740	0.689	-	0.689	0.778	0.788	0.785	0.800	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Mission: The Radiation Detection, Indication and Computation (RADIAC) Program is responsible for providing radiation monitoring instruments that detect and measure radiation in accordance with the provisions of Title 10 of the Code of Federal Regulations (10 CFR). These instruments are used on all vessels afloat and at every shore installation in order to ensure the safety of personnel and the environment. RADIACs are also required after an act of terrorism or war that involves nuclear material in order to enable continuation of warfighting ability.

Justification: Many RADIAC instruments and dosimetry systems are decades old and approaching the end of their useful lives. In some cases the equipment and replacement parts are no longer manufactured, making the equipment logistically unsupportable. In other cases increasing failure rates due to age make replacements an economic efficiency
improvement. In all cases a technology refresh will make both economic sense in terms of lowering the total ownership costs, and will also provide increased operational capabilities.

Naval Nuclear Propulsion Program (NNPP): Instruments are developed to support the safe operation and maintenance of nuclear powered vessels and at nuclear maintenance facilities.

Non-NNPP: Instruments are developed to support other than NNPP end users, such as Explosive Ordnance Disposal, Nuclear Weapons, Medical, Industrial Radiography, Radiological Defense and Training.

Visit, Board, Search & Seizure (VBSS): The Navy has been tasked to intercept and board vessels at sea to search for nuclear or radiological materials that could be used for terrorist attacks. These instruments would have different characteristics than those used for NNPP and non-NNPP purposes and prototypes must be developed and/or tested and evaluated.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Primary Dosimetry	0.070	0.015	0.070	0.000	0.070
Articles:	2	50	-	-	-
Description: The need for primary dosimetry is inherent due to the Navy's operation of nuclear reactors and their emission of ionizing radiation. Title 10 of the Code of Federal Regulations, Part 20.1502, states "Each licensee shall monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits." A primary dosimeter must pass accreditation proficiency testing,					

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 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
allowing the reading obtained to become a part of an individual's permanent health record. This permanent record is used to protect the individual radiation worker's health, and also the Navy from future liability. The Navy's current primary device is the DT-702/PD, a Thermo Luminescence Dosimeter (TLD). Existing TLD and newer technologies, such as Optically Stimulated Luminescence (OSL), must be continually researched to determine on-going performance parameters, cost to field and cost to maintain, since the current system is approaching the end of its useful life and will soon need to be replaced. ***FY 2019 Plans:*** NSWCCD submitted a requirements letter for the new dosimetry system and provided a Test Plan to Naval Sea Systems Command (NAVSEA 04ND) to perform ANSI N13.11 standard proficiency testing, including neutron radiation tests, on the passive-active systems and neutron-capable Beryllium Oxide (BeO) Optically-Stimulated Luminescence (OSL) dosimeters. NSWCCD will submit the results from the radiological testing to NAVSEA 04ND in a Technical Memorandum. NSWCCD established a Cooperative Research And Development Agreement (CRADA) with Landauer to further develop the new passive-active system, Verifii, as a candidate for the replacement of the DT-702/PD system. ***FY 2020 Base Plans:*** NSWCCD, in conjunction with Naval Dosimetry Center (NDC), will submit a Test Plan to Naval Sea Systems Command (NAVSEA 04ND) and perform testing on the neutron Beryllium Oxide (BeO) Optically-Stimulated Luminescence (OSL) dosimeters under normal environmental conditions, in accordance with the American ANSI N13.11 guidance. NSWCCD will submit the results from the environmental testing to NAVSEA 04ND in a Technical Memorandum. NSWCCD will continue market research for test and evaluation of new or improved technology applicable to primary dosimetry. CRADA actions will proceed to develop a dosimetry system that is competitive for procurement and suitable for US Navy deployment. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:***					

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 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
In FY19 OSL dosimeters were procured but not evaluated due to a diversion of funds to capital improvements of lab equipment. The increase FY19 to FY20 is for the labor to perform the testing and evaluation of the dosimeters.					
Title: Secondary Dosimetry	0.416	0.275	0.131	0.000	0.131
Articles:	-	1	1	-	1
Description: A secondary dosimeter provides an accurate, real-time readout of the radiation exposure being obtained in operational environments, and is utilized in conjunction with a primary dosimeter. The primary dosimeter does not provide real-time exposure information, so the secondary dosimeter is worn for that purpose. The Navy's secondary dosimeter is the Mk2 Electronic Personal Dosimeter (EPD). Research is required to find a secondary dosimeter that can measure the type of radiation encountered with pulsed X-ray machines, and to see if this new capability can be incorporated into one device.					
FY 2019 Plans: NSWCCD completed the first year of the procurement action to acquire a Maintenance and Calibration (MAC) cabinet irradiator system for the IM-276/PD and IM-276A/PD. NSWCCD will oversee the development of the design of the MAC.					
NSWCCD completed investigation into the logistics infrastructure capabilities of new systems and provided an assessment in a Technical Memorandum to Naval Sea Systems Command (NAVSEA 04ND) detailing the areas of improvement possible for the Navy's current system.					
FY 2020 Base Plans: NSWCCD will perform acceptance testing of the MAC procured in FY2019. NSWCCD will procure the second Maintenance and calibration (MAC) cabinet irradiator system for the IM-276/PD and IM-276A/PD. NSWCCD will finalize development and testing of the two MACs and provide a Technical Memorandum to Naval Sea Systems Command (NAVSEA 04ND) on its findings and the capability of the systems to provide					

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 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
maintenance and calibration productivity for the planned procurement of 95,000 of the IM-276/PD and IM-276A/PD. NSWCCD will complete investigation into the logistics infrastructure capabilities of new systems and provide an assessment detailing the possible areas of improvement for the Navy's system in a Technical Memorandum to Naval Sea Systems Command (NAVSEA 04ND). ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Article procurements in FY18 and FY19, none in FY20. FY20 is labor for the testing and evaluation of the procured Articles.					
Title: Visit, Board, Search & Seizure	0.080	0.015	0.063	0.000	0.063
Articles:	6	-	5	-	5
Description: The Visit, Board, Search & Seizure (VBSS) mission of the Navy is the requirement to be able to board ships and be able to detect and identify potential radiological or nuclear Weapons of Mass Destruction (WMD). Such a sensitive mission requires leading edge technology and capabilities to ensure success. The AN/PDX-1 RADIAC Set was fielded in response to a Joint Urgent Operational Needs Statement to meet this requirement. It contains three instruments that serve different purposes: (1) a Handheld Radiation Monitor (HRM)that searches for radiological materials; (2) a Radioisotope Identifier (RID) that identifies the type of radiological material located; and (3) a Personal Radiation Detector (PRD) that displays the radiological dose the VBSS team members may be receiving so that they can be aware if they are being exposed to dangerous levels of radioactivity during the mission. Current technology dictates that the sensitivity of the detectors is directly proportional to the size of the detector element; i.e., the larger the detector, the more sensitive and capable it is. However, in VBSS there must be a tradeoff between size/weight and capability, since it is difficult and hazardous for boarding parties to carry a backpack-sized detector, along with their weapons and other gear, up a rope ladder to board a vessel on the high seas. This will be a continuing effort to find smaller, lighter instruments with enhanced sensitivity, reach-back capability, and other enhancements to provide the Navy the best and most cost effective equipment possible for this mission. ***FY 2019 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 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
NSWCCD continued evaluation of the HRMs for manufacture specifications to evaluate their capabilities. NSWCCD will complete test and evaluation of the commercial units, summarize the results and submit the findings in a Technical Memorandum to NAVSEA 04ND. ***FY 2020 Base Plans:*** NSWCCD will continue market and technical research on commercially available RIDs. Any new or updated information will be appended to the latest Technical Report. NSWCCD will perform a comprehensive review of all VBSS test and evaluation findings to date and continue to request feedback from end-users of the AN/PDX-1 kit regarding performance of the components. Outstanding issues will be cross-referenced with updated information from industry and other technical contacts in order to assess new commercial solutions. NSWCCD will submit a Technical Memorandum to Naval Sea Systems Command (NAVSEA 04ND), summarizing all test and evaluation efforts, as well as any recommendations for incorporating newly developed commercial solutions into the AN/PDX-1 kits. Information from the summary will be used to guide plans for further testing of commercial equipment that would meet VBSS requirements. A specification and procurement package will be developed to solicit a combination of new RIDs, as well as PRDs and HRMs. NSWCCD will solicit and award contracts to buy three new commercial RIDs. The Test Plan will be developed and submitted to Naval Sea Systems Command (NAVSEA 04ND) in order that evaluation of the new RIDs can begin upon delivery. NSWCCD will complete test and evaluation of the RIDs, summarize the results and submit the findings in a Technical Report to NAVSEA 04ND. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** The increase in FY20 from FY19 is to procure test Articles for components of the AN/PDX-1 RADIAC Set to test and evaluate newer technology as potential replacements of equipment used for the Navy's VBSS mission.					
Title: Radiological Detection System	0.150	0.270	0.150	0.000	0.150
Articles:	-	10	-	-	-
Description: The Radiological Detection System (RDS) is a survey meter and its associated probes (alpha, beta, gamma, and neutron) used in a wide variety of applications, and the necessary ancillary equipment such as cases, cables and technical manuals. This type of survey meter system is the single most prevalent RADIAC instrument in the Navy inventory, utilized for every Navy end use but predominantly in the Naval Nuclear					

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 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Propulsion Program (NNPP) and Radiological Defense (RD) end uses. The Joint Product Leader in Radiological Nuclear Defense(JPdl-RND) is currently developing the RDS for use by all the Services. This joint effort will lower the procurement cost for all and just as significantly, for the first time enable joint interoperability in the Radiological Defense arena. The Navy's current version of this instrument is the IM-260/PD Multi-Function RADIAC (MFR), which is 30 years old and nearing the end of its useful life. Army and Marine Corps use the AN/ PDR-75 system and the Air Force the ADM-300, which are both also decades old and obsolescent. The NNPP end use is unique amongst the Services, since only the Navy operates nuclear reactors, and while the RDS solution should prove to be sufficient for all the Services for most of their respective applications, Navy must test and evaluate the proposed RDS to ensure the performance and specifications of a Joint solution will be sufficient to meet the requirements of the NNPP application. ***FY 2019 Plans:*** NSWCCD tested the system to accuracy, energy response, response time and angular response requirements using organic capabilities that test across the necessary photon energy range using both machine (X-ray) and material (radioactive material) sources of radiation. Data from the testing will be provided to JPdL-RND as objective quality evidence of the system's ability to meet the requirements of the technical specification. ***FY 2020 Base Plans:*** NSWCCD will continue to remain abreast of the latest advances in the RDS system. NSWCCD will complete investigation into the logistics infrastructure capabilities of the new systems and provide an assessment in a Technical Memorandum to Naval Sea Systems Command (NAVSEA 04ND) as the Navy prepares to move into the procurement phase. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Procured Low Rate Initial Production units for test and evaluation in FY19. The decrease in FY19 to FY20 is because no further Articles will be procured in FY20; remaining funding is labor for testing and evaluation of the products to ensure they meet Naval Nuclear Propulsion Program requirements.					
Title: Laboratory Test Equipment	0.000	0.165	0.275	0.000	0.275
Articles:	-	1	2	-	2

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 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Laboratory Test Equipment (Lab TE) will be used to test and evaluate radiation detectors and dosimetry devices. The primary end user will be the Naval Surface Warfare Center Carderock Division (NSWCCD) and the Naval Dosimetry Center (NDC). The beta irradiators will be used throughout the development and procurement of the Navy's new primary dosimetry system to evaluate system performance. Handheld radiation detection equipment from the Radiological Detection System (RDS) can also be evaluated using the beta irradiators. The upgraded Ortec equipment will be used to analyze the new accident dosimeter after exposure to a criticality event. The upgraded Ortec will be used during the product evaluation phase of the accident dosimeter program. ***FY 2019 Plans:*** NSWCCD will initiate a procurement action for the upgrade of an existing BSS-Beta Irradiator to be utilized in the testing of primary and secondary dosimetry. ***FY 2020 Base Plans:*** NSWCCD initiated procurement of a beta irradiator to support existing requirements for primary and secondary dosimetry. NSWCCD will also upgrade an existing ORTEC Spectroscopy system along with associated software to be utilized in testing and evaluating Accident Dosimetry. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** Procurement of laboratory equipment with widely varying costs in FY19 and FY20.					
Accomplishments/Planned Programs Subtotals	0.716	0.740	0.689	0.000	0.689

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
• OPN 2920: *RADIAC*	10.718	8.175	6.482	-	6.482	8.272	8.158	7.856	8.015	Continuing	Continuing

Remarks

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 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

D. Acquisition Strategy

Development efforts are focused on evaluation, modification (as required to meet operational requirements) and adaptation of commercial-off-the-shelf (COTS) technology in order to minimize total ownership costs. To the maximum extent possible new contracts are targeted for fixed price efforts to control development cost.

E. Performance Metrics

Program Reviews

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 0603542N / *Radiological Control*	Project (Number/Name) 1830 / *RADIAC Development*	

Test and Evaluation ($ 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
Test & Evaluation	WR	NSWCCD : West Bethesda, MD	4.551	0.364	Nov 2017	0.087	Jan 2019	0.420	Nov 2019	-		0.420	Continuing	Continuing	Continuing
Primary Dosimetry	C/FFP	NSWCCD : West Bethesda, MD	0.285	0.030	Jul 2018	0.003	Mar 2019	0.000		-		0.000	0.000	0.318	0.288
Secondary Dosimetry	C/FFP	NSWCCD : West Bethesda, MD	0.162	0.276	Feb 2019	0.250	Nov 2019	0.000		-		0.000	0.000	0.688	0.162
VBSS	C/FFP	NSWCCD : West Bethesda, MD	0.120	0.046	Aug 2018	0.000		0.067	Aug 2020	-		0.067	0.000	0.233	0.246
Radiological Detection System	C/FFP	NSWCCD : West Bethesda, MD	0.000	0.000		0.235	Sep 2019	0.000		-		0.000	0.000	0.235	0.063
Laboratory Test Equipment	C/FFP	NSWCCD : West Bethesda, MD	0.000	0.000		0.165	Mar 2019	0.202	Mar 2020	-		0.202	0.000	0.367	-
		Subtotal	5.118	0.716		0.740		0.689		-		0.689	Continuing	Continuing	N/A

	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
Project Cost Totals	5.118	0.716		0.740		0.689		-		0.689	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 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

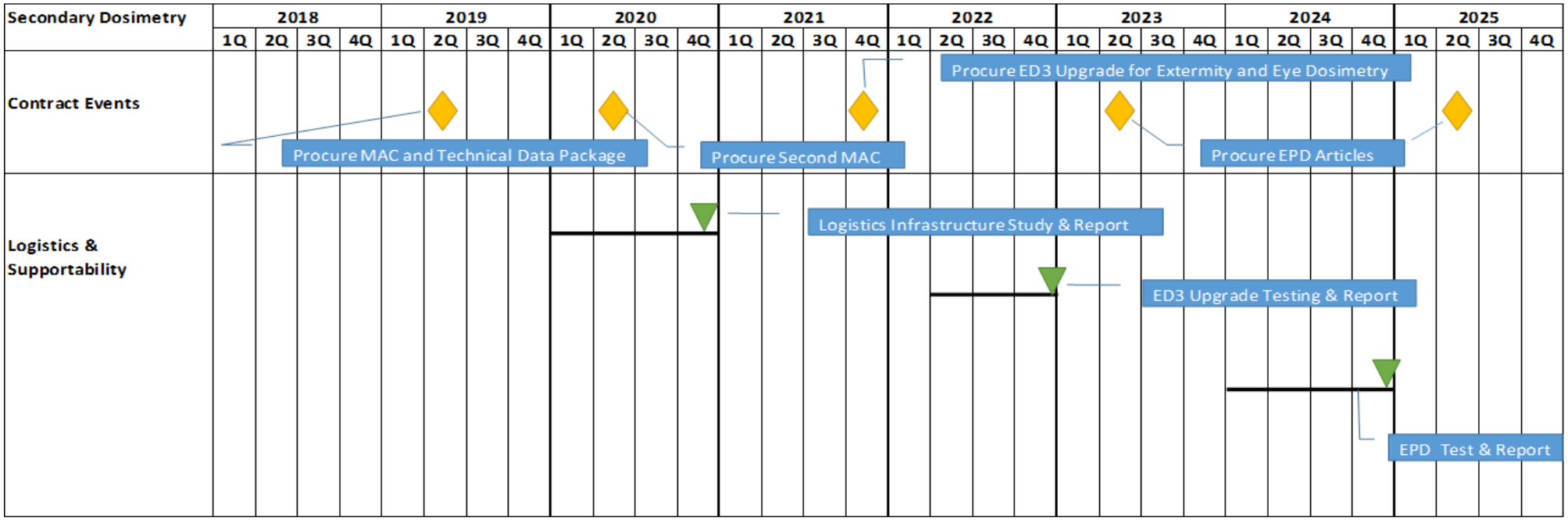

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

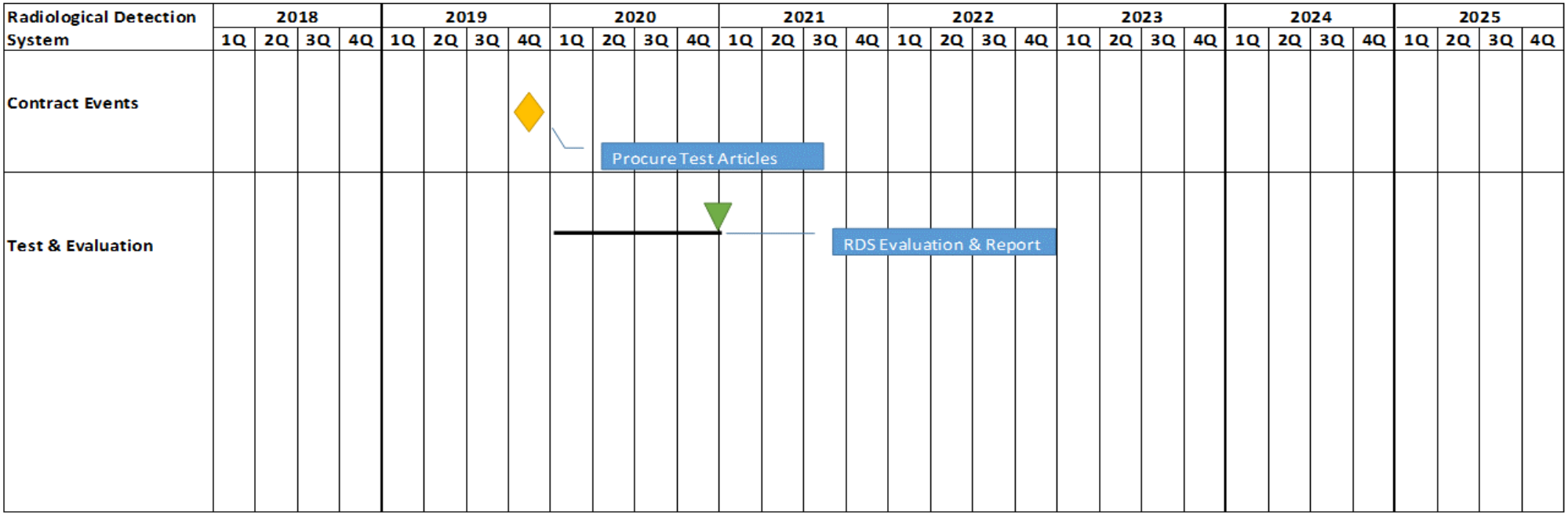

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

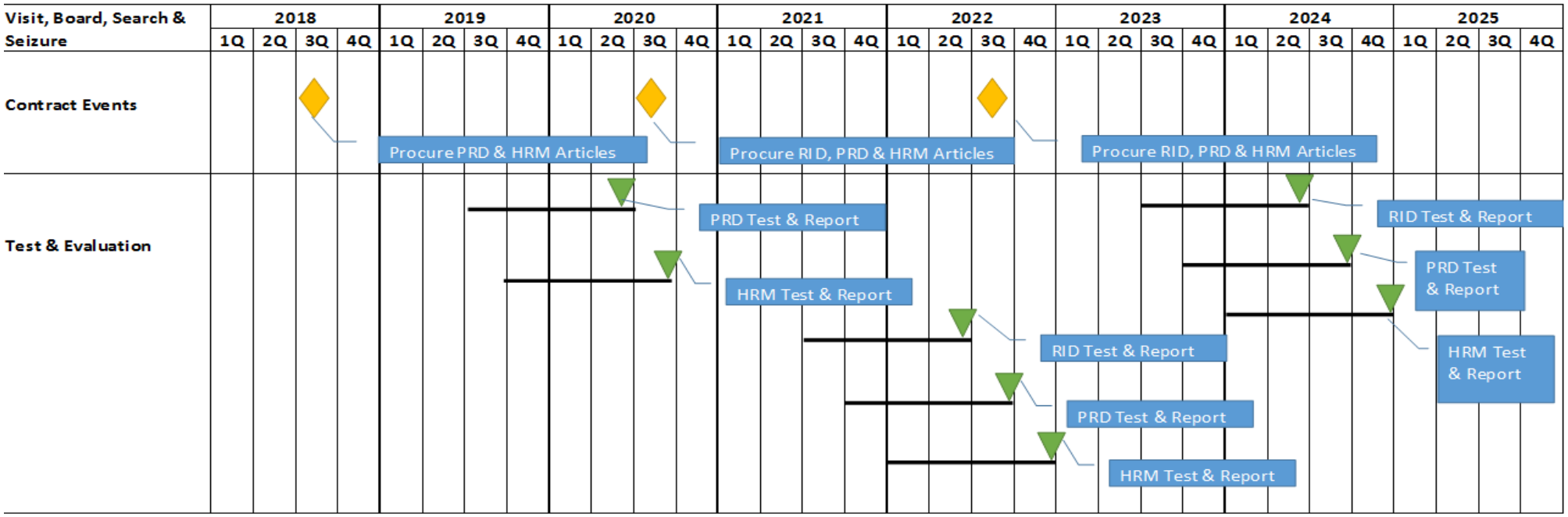

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

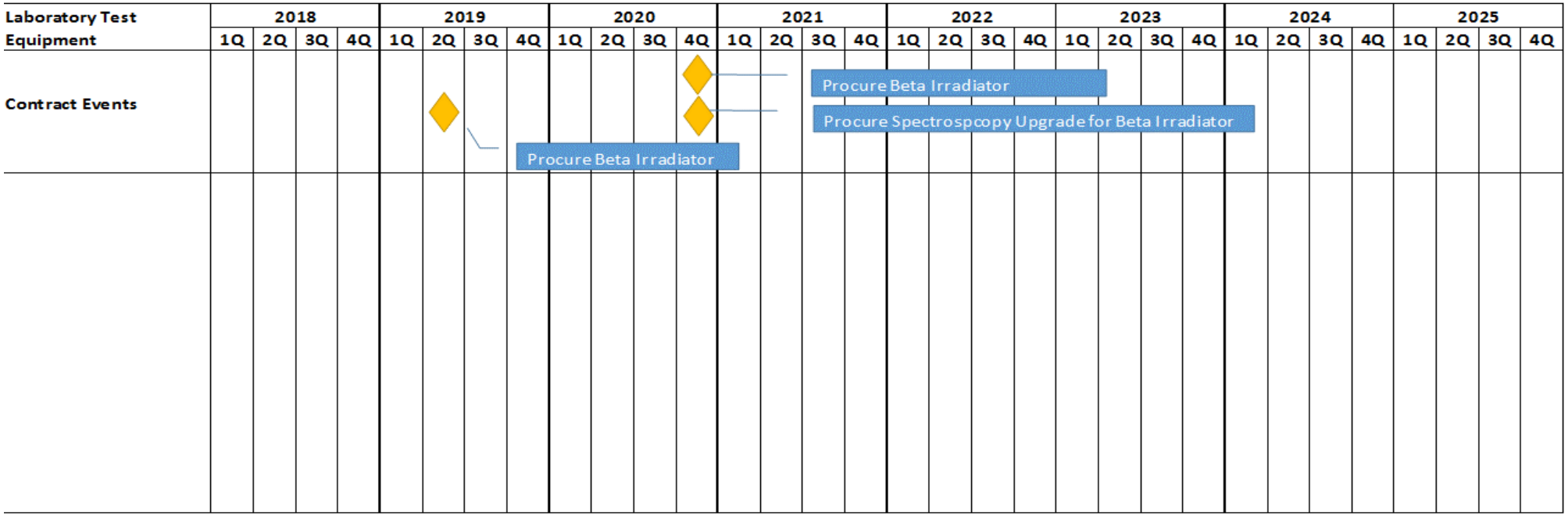

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

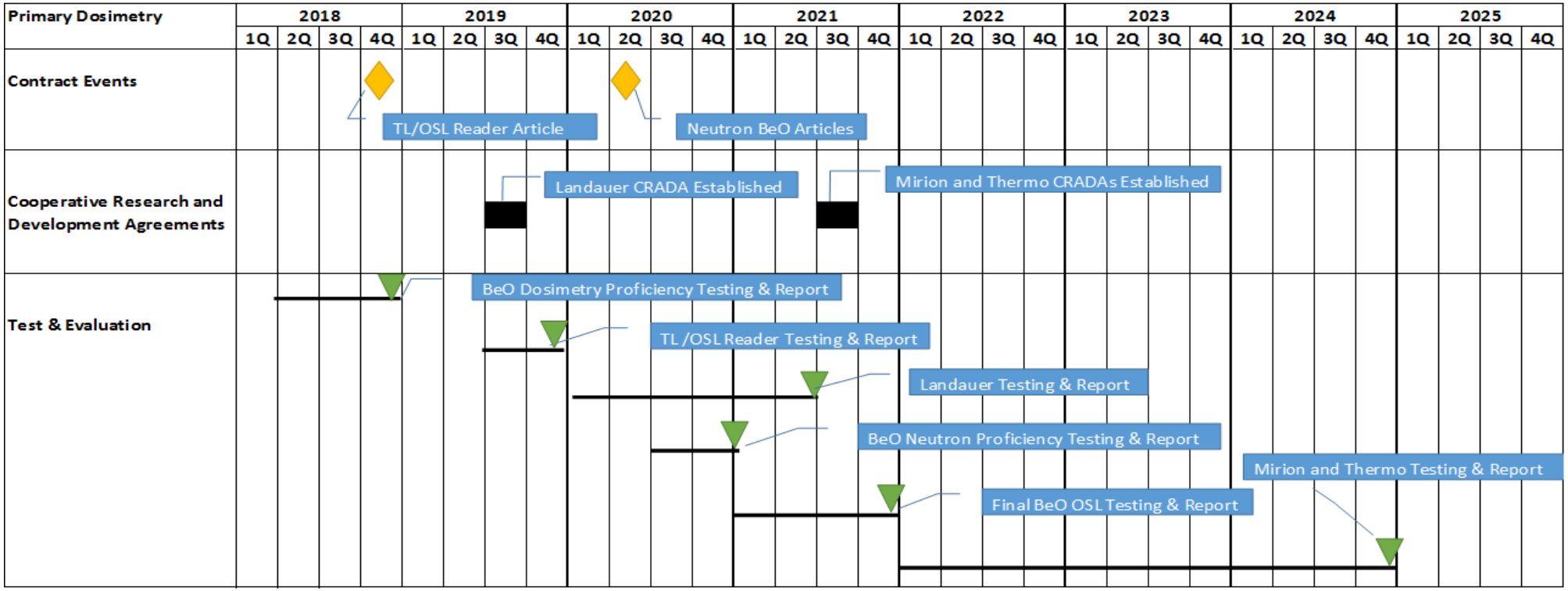

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Primary Dosimetry				
Test & Evaluation: Beryllium Oxide (BeO) Dosimetry Proficiency Test & Report	2	2018	4	2018
Test & Evaluation: Thermoluminescent Optically Stimulated Luminescence Dosimetery Reader Test & Report	3	2019	4	2019
Test & Evaluation: BeO Neutron Proficiency Test & Report	3	2020	4	2020
Test & Evaluation: Compilation Test & Report of BeO Reader and Neutron Dosimeter	1	2021	4	2021
Test & Evaluation: Cooperative Research and Development Agreements: Establish CRADA With Landauer	3	2019	3	2019
Test & Evaluation: Cooperative Research and Development Agreements: Establish CRADA With Mirion and Thermo	3	2021	3	2021
Contract Events: Procure Thermoluminescent Optically Stimulated Luminesence Dosimeter Reader Article	4	2018	4	2018
Contract Events: Procure Neutron Beryllium Oxide Dosimeter Articles	2	2020	2	2020
Secondary Dosimetry				
Test & Evaluation: Logistics Infrastructure Study and Report	1	2020	4	2020
Test & Evaluation: ED3 Test & Report	2	2022	4	2022
Test & Evaluation: EPD Test & Report	1	2024	4	2024
Contract Events: Procure Maintenance & Calibration System (MAC) 1 and Technical Data Package	2	2019	2	2019
Contract Events: Procure Maintenance & Calibration System (MAC) 2	2	2020	2	2020
Contract Events: Procure Extremity Dosimeter (ED3) Articles	4	2021	4	2021
Contract Events: Procure Electronic Personal Dosimeter (EPD) Articles Batch 1	2	2023	2	2023
Radiological Detection System				
Test & Evaluation: Test to Meet Navy Specifications	1	2020	4	2020

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Contract Events: Procure LRIP Units	4	2019	4	2019
Visit, Board, Search & Seizure				
Test & Evaluation: Test & Report on PRD Batch 1	3	2019	2	2020
Test & Evaluation: Test & Report on HRM Batch 1	4	2019	3	2020
Test & Evaluation: Test & Report on RID Batch 2	3	2021	2	2022
Test & Evaluation: Test & Report on PRD Batch 2	4	2021	3	2022
Test & Evaluation: Test & Report on HRM Batch 2	1	2022	4	2022
Test & Evaluation: Test & Report on RID Batch 3	3	2023	2	2024
Test & Evaluation: Test & Report on PRD Batch 3	4	2023	3	2024
Test & Evaluation: Test & Report on HRM Batch 3	1	2024	4	2024
Contract Events: Procure PRD & HRM Articles Batch 1	3	2018	3	2018
Contract Events: Procure RID, PRD & HRM Articles Batch 2	3	2020	3	2020
Contract Events: Procure RID, PRD & HRM Articles Batch 3	3	2022	3	2022
Laboratory Test Equipment				
Procure Beta Irradiator	2	2019	2	2019
Procure Beta Irradiator Upgrade	4	2020	4	2020
Procure Ortec Spectroscopy Upgrade	4	2020	4	2020