Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Navy											Date: February 2016	
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 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**Cost To Complete**	**Total Cost**
Total Program Element	15.593	0.667	0.710	0.702	-	0.702	0.737	0.754	0.769	0.786	Continuing	Continuing
1830: *RADIAC Development*	15.593	0.667	0.710	0.702	-	0.702	0.737	0.754	0.769	0.786	Continuing	Continuing

A. Mission Description and Budget Item Justification

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 are exposed to radioactive materials in their work. 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) reasons 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 2017 Navy					Date: February 2016
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 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**
Previous President's Budget	0.669	0.710	0.725	-	0.725
Current President's Budget	0.667	0.710	0.702	-	0.702
Total Adjustments	-0.002	0.000	-0.023	-	-0.023
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.002	0.000			
• Program Adjustments	0.000	0.000	-0.029	-	-0.029
• Rate/Misc Adjustments	0.000	0.000	0.006	-	0.006

Change Summary Explanation

Decrease in Radiological Control RDTE,N by $29K as required for the Department of the Navy to comply with the Bipartisan Budget Act of 2015.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy			Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
1830: *RADIAC Development*	15.593	0.667	0.710	0.702	-	0.702	0.737	0.754	0.769	0.786	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 continuing 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.

The AN/PDR-65 Ship Board Monitoring System is obsolete and will be replaced. The IM-239/WDQ Air Particle Detector (APD) and the HD-732, HD-1150 and HD-1151 Air Particle Samplers (APS) are obsolete and will be replaced.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Title: Naval Academy Midshipman Summer Internship	0.015	0.015	0.015	0.000	0.015
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Description: Every summer a Midshipman is selected to conduct laboratory studies in support of the Naval Dosimetry System to research various responses and issues with thermoluminescent dosimetry. Funds pay for materials and Midshipman's travel expenses to present his/her findings to the annual Health Physics Society conference. ***FY 2015 Accomplishments:*** Accomplish study assigned by Naval Academy instructor. ***FY 2016 Plans:*** Accomplish study assigned by Naval Academy instructor. ***FY 2017 Base Plans:*** Accomplish study assigned by Naval Academy instructor. ***FY 2017 OCO Plans:*** N/A					
Title: Visit, Board, Search & Seizure	0.083	0.032	0.036	0.000	0.036
Articles:	3	-	-	-	-
Description: The Visit, Board, Search & Seizure (VBSS) mission of the Navy includes 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 several instruments that serve different purposes, including the search detector, isotope identifier, and personal dosimeter. Current technology dictates that the sensitivity of the detector 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 and growing 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 critical mission. ***FY 2015 Accomplishments:*** Purchase multiple units for test and evaluation. Evaluate new Radiation Isotope Identifiers (RIID) for gamma and neutron accuracy and precision, gamma and X-ray energy dependence and ability to correctly identify					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
various types and quantities of radioisotopes. The test plan will be similar in size and scope to previous VBSS testing. ***FY 2016 Plans:*** Continue testing of previously purchased units. Continue market research on evolving technology applicable to VBSS, particularly in radioisotope identification. Develop a Technical Report on the latest VBSS technology based on the results from testing and evaluation to keep the Navy abreast of technological evolution in this area. ***FY 2017 Base Plans:*** Issue a technical report on the latest VBSS technology based on the testing and evaluations of the previous two years. ***FY 2017 OCO Plans:*** N/A					
Title: Radiological Shipboard Defense Monitor	0.063	0.069	0.088	0.000	0.088
Articles:	-	-	-	-	-
Description: All surface combatants require an instrument to detect and measure radiological activity in the event of a nuclear detonation in order for the ship to avoid the radiological danger and continue its mission. The AN/PDR-65, at over 40 years of age, was the instrument used for this purpose, but it is obsolete and has been de-fielded. An interim replacement has been fielded while OPNAV finalizes updating the Cold War requirements under which the AN/PDR-65 was designed in order to include radiological (terrorist "dirty bomb") threats. The interim replacement is the IM-265 Survey Meter, which is already in the Navy inventory, but it was not designed for this requirement and cannot measure radiation external to the ship and is therefore not suitable as the permanent replacement. In light of Operation Tomodachi this requirement has taken on more significance. ***FY 2015 Accomplishments:*** NSWCCD will initiate discussions with the Surface Warfare Enterprise to determine the necessary detection capabilities, types of radiation to be detected, locations to be monitored and shipboard networking capabilities. NSWCCD, in conjunction with OPNAV will coordinate ship visits to witness the existing infrastructure and obtain end user input on a new system. Information obtained during the ship visits will be submitted in a letter to NAVSEA 04ND with recommendations for next actions. Market research will be performed as requirements are provided by OPNAV and end users. ***FY 2016 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Based on the information obtained during the discussions with OPNAV and ship visits, NSWCCD will formulate a preliminary system that meets the key requirements and features. The preliminary plan will be circulated to NAVSEA 04ND, OPNAV and end users for feedback. Additional ship visits may be necessary to clarify aspects of the preliminary system. A technical specification and implementation plan will be developed based on comments on the preliminary system. Market research will be performed as requirements are provided by OPNAV and end users. ***FY 2017 Base Plans:*** Based on the information obtained during the discussions with OPNAV and ship visits, NSWCCD will formulate a preliminary system that meets the key requirements and specifications. The preliminary plan will be circulated to NAVSEA 04ND, OPNAV and end users for feedback. Additional ship visits may be necessary to clarify aspects of the preliminary system. A technical specification and implementation plan will be developed based on comments on the preliminary system. Market research will be performed along the way as requirements are provided by OPNAV and end users. ***FY 2017 OCO Plans:*** N/A					
Title: Radiological Detection System	0.076	0.119	0.026	0.000	0.026
Articles:	-	-	-	-	-
Description: The Radiological Detection System (RDS) is a survey meter, its associated probes for detecting the various types of radiation, and ancillary equipment. This type of survey meter system has many applications and is the single most prevalent RADIAC instrument in the Navy inventory, utilized for every Navy end use but predominantly in the Naval Nuclear Propulsion Program (NNPP) and Radiological Defense (RD) end uses. The Joint Program Executive Office for Chemical, Biological and Nuclear Defense (JPEO-CBND) is currently developing an RDS for use by all the Services. If all the components could agree on a single system, it would lower the procurement cost for all the Services, and even more importantly enable Joint interoperability in the warfighter Radiological Defense arena that is currently lacking. However, the NNPP end use is unique amongst the Services, and while the Radiological Defense RDS solution should prove to be sufficient for all the Services, Navy must ensure the performance and specifications of a Joint solution would be sufficient for Naval Reactors and the NNPP application. ***FY 2015 Accomplishments:*** Continue to collaborate with JPEO and assist OPNAV in clarifying technical requirements. As the JPEO acquisition moves forward, NSWCCD will aid in the evaluation of the proposals and initial prototypes. NSWCCD					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
will begin assessing the RDS capabilities in meeting the various end user needs. Product demonstration to the Navy end users will be given to the NNPP, RD and Radiological Affairs Support Office (RASO) end users. Information from NSWCCD evaluations and end user product demonstrations will be submitted in a technical memorandum to NAVSEA 04ND. ***FY 2016 Plans:*** Continue evaluating the RDS for Navy end uses. Additional product demonstrations will be provided as needed. Potential fielding strategies will be investigated for RASO and RD end users provided the RDS is acceptable. Additional research will be performed in assessing the RDS capability in meeting NNPP requirements. Site visits to the Corporate Radiation Health Branch at the Norfolk Naval Shipyard will aid in the NNPP assessment. ***FY 2017 Base Plans:*** Coordinate with the JPEO to ensure Navy requirements are addressed as the JPEO finalizes its procurement. ***FY 2017 OCO Plans:*** N/A					
Title: Air Particle Detector ***Articles:*** ***Description:*** The Surface Warfare Enterprise has requested an air sampling system be developed subsequent to the lessons learned from the Japanese Fukishima nuclear reactor accident. U.S. Navy ships sailed unknowingly into plumes of radioactive material released from the damaged nuclear reactors. The ships were widely contaminated and personnel were exposed to radioactive material. The Air Particle Detector (APD) would continuously monitor for airborne radioactive contaminants and provide a real-time measurement at designated locations on the ship with appropriate alarm indications when safe exposure thresholds have been surpassed. ***FY 2015 Accomplishments:*** Initiate discussions with Surface Warfare Enterprise to determine the necessary air sampling capabilities, locations to be monitored and shipboard networking capabilities. NSWCCD, in conjunction with OPNAV will coordinate ship visits to witness the possible installation locations and obtain end user input on the system. Information obtained during the ship visits will be submitted in a letter to NAVSEA 04ND with recommendations for next actions. Concurrently, NSWCCD will investigate retrofitting an air sampling system into the space where the AN/PDR-65 control unit had been installed on surface ships prior to its de-fielding due to obsolescence. Additional market research will be performed as requirements are provided by OPNAV and end users. ***FY 2016 Plans:***	0.101 1	0.220 1	0.245 1	0.000 -	0.245 1

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Based on the information obtained during the discussions with OPNAV and ship visits, NSWCCD will formulate a preliminary air sampling system that meets the key performance parameters. The preliminary plan, along with retrofitting information, will be circulated to NAVSEA 04ND, OPNAV and end users for feedback. Additional ship visits may be necessary to clarify aspects of the preliminary system. A technical specification and implementation plan will be developed based on comments on the preliminary system. Market research will be performed as requirements are provided by OPNAV and end users. ***FY 2017 Base Plans:*** Continue ship visits and gathering of end user feedback. Funds will be provided to a vendor to develop a more advanced prototype than the previous one. Compile and summarize all evaluation information into a technical report to provide a recommendation for procurement. ***FY 2017 OCO Plans:*** N/A					
Title: Calibrators	0.075	0.043	0.101	0.000	0.101
Articles:	-	-	-	-	-
Description: Calibrators (also called irradiators) are the basic tool used to calibrate all Navy radiological detection equipment. Essentially they consist of a high energy radiological source (Cs-137) in a shielded container that is located in a specially constructed room, or "range." A technician places the instrument to be calibrated at a specific calibration point in the range and remotely operates the calibrator by raising the source out of its container so that it irradiates the object instrument. The instrument's response to the radiation is measured so that it can be calibrated to specific tolerances. The current suite of AN/UDM-1B calibrators is over 20 years old and the natural decay of the strength of the radioactive source over time restricts calibration effectiveness by limiting the scale of calibration points below American National Standards Institute (ANSI) requirements that are followed in accordance with Navy policy. Also due to the age of the calibrators, there are several parts no longer supported by the manufacturer, and a malfunctioning calibrator poses a very high safety risk. COTS equipment will be surveyed to find the best solution with which to equip the Navy's seven RADIAC Calibration Laboratories with modern calibrators. ***FY 2015 Accomplishments:*** Evaluate the Hopewell GC-60 gamma irradiator for possible RADIAC calibration applicability. The NAVSEA 04ND RADIAC Calibrator Standardization Program (RCSP) will make two site visits to NSWCCD for the					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
evaluation. Technical memorandum detailing the results of the evaluation will be submitted to NAVSEA 04ND at the completion of the evaluation. ***FY 2016 Plans:*** In addition to making site visits to NSWCCD, the RCSP will visit Hopewell Designs, Inc. to gain a detailed engineering understanding of the GC-60 irradiator. The information obtained during the site visits will aid in determining the feasibility of the GC-60 as a suitable irradiator for RADIAC calibration purposes. The RCSP will submit a technical memorandum detailing the work performed to date and recommend follow-on actions and/or procurement options. ***FY 2017 Base Plans:*** Finalize evaluation of the Hopewell GC-60 gamma irradiator for possible Navy application. Finalize a technical memorandum summarizing the evaluation effort and provide recommendations. ***FY 2017 OCO Plans:*** N/A					
Title: Primary Dosimetry	0.081	0.089	0.090	0.000	0.090
Articles:	1	20	-	-	-
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, 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. ***FY 2015 Accomplishments:*** Re-initiate tests (Fade Study, Linearity Test, Shallow Dose) of the OSL dosimetry system and compare results to the Navy's DT-702. To do this task correctly, the OSL system (Readers and Annealers) acquired by NSWCCD will have to be conditioned/calibrated by the manufacturer. In addition, NSWCCD will need to stay current on the					

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
latest dosimetry standards and technology. A Technical Memorandum will be developed and will be provided as a deliverable. ***FY 2016 Plans:*** Acquire a minimum 10 Instadose II Dosimeters and Reader. The Instadose II is the newest version of the Direct Ion Storage (DIS) Dosimeter that has the capability of detecting shallow dose and deep dose from photon (possibly neutrons). We would test this system to the ANSI-N13.11 Standard. The Instadose II would go through proficiency-type tests utilizing the sources located at NSWCCD. A Technical Memorandum will be developed and will be provided as a deliverable. In addition, will stay current on the latest dosimetry technology, such as the newly developed OSL crystal Beryllium Oxide. ***FY 2017 Base Plans:*** Finalize testing and reporting on OSL and Beryllium Oxide dosimetry technologies. Develop a recommendation for Navy dosimetry through a technical report. ***FY 2017 OCO Plans:*** N/A					
Title: Secondary Dosimetry ***Articles:*** ***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). Evaluation of the current detector must be accomplished to establish a militarized environmental capability. Also, 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 such as the existing Mk2. ***FY 2015 Accomplishments:*** Initiate and complete testing of new Electronic Personal Dosimeters (EPD) as a precursor to possible replacement of the Navy Mk2 EPD. Use NSWCCD radiological sources to test EPD units with continuous gamma and X-ray radiation along a broad energy range. Report on the energy dependence using the accuracy and precision of dose measurements taken at specific radiation energies. Compare the performance of the different EPDs tested and analyze which detection methods perform better than the others. ***FY 2016 Plans:***	0.087 20	0.074 18	0.101 -	0.000 -	0.101 -

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
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 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Initiate and complete testing of extremity and lens secondary dosimetry. Research applications and end-users of this type of secondary dosimetry within the Navy. Test acquired dosimetry for dose accuracy, precision and energy dependence. Analyze applicability to Navy operations and the potential to militarize this type of dosimetry. ***FY 2017 Base Plans:*** Finalize reporting on Pulsed X-ray and electronic dosimetry. Begin market survey for supplementation or replacement of Navy's Mk2 EPD because the sole-source manufacturer will discontinue its production and replace it with a newer version. ***FY 2017 OCO Plans:*** N/A					
Title: Tritium Monitor ***Articles:*** ***Description:*** The AN/PDR-73 Tritium Monitor is used at nuclear weapons storage facilities and research laboratories to sample the air for the presence of Tritium. The current instrument is 30 years old and cannot be repaired due to obsolete components. At the current loss rate due to normal wear and tear there will be insufficient assets to meet operational requirements, so a replacement must be found. ***FY 2015 Accomplishments:*** Gather end user feedback from field testing. Perform an intercomparison in performance and specifications among the three units. Evaluate the pump design in each unit and determine life expectancy as compared to the existing AN/PDR-73. Continue coordination with the U.S. Air Force to leverage their development efforts for possible Joint procurement. Begin specification development. ***FY 2016 Plans:*** Finish gathering end user feedback and work with NAVSEA engineer staff to continue developing specification for procurement. Submit the specification to NAVSEA 04ND and Strategic Systems Program end user for concurrence. ***FY 2017 Base Plans:*** N/A ***FY 2017 OCO Plans:*** N/A	0.086 -	0.049 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	0.667	0.710	0.702	0.000	0.702

Exhibit R-2A, RDT&E Project Justification: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
• OPN 2920: *RADIAC*	5.153	8.294	9.558	-	9.558	10.177	0.000	0.000	0.000	Continuing	Continuing

Remarks

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 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603542N / *Radiological Control*	Project (Number/Name) 1830 / *RADIAC Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	NSWCCD : West Bethesda, MD	12.840	0.000		0.000		0.000		-		0.000	0.000	12.840	-
		Subtotal	12.840	0.000		0.000		0.000		-		0.000	0.000	12.840	-

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	WR	U.S. Naval Academy : Annapolis, MD	0.090	0.015	Mar 2015	0.015	Mar 2016	0.015	Jan 2017	-		0.015	Continuing	Continuing	Continuing
		Subtotal	0.090	0.015		0.015		0.015		-		0.015	-	-	-

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2015 Cost	FY 2015 Award Date	FY 2016 Cost	FY 2016 Award Date	FY 2017 Base Cost	FY 2017 Base Award Date	FY 2017 OCO Cost	FY 2017 OCO Award Date	FY 2017 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation	WR	NSWCCD : West Bethesda, MD	2.543	0.481	Nov 2014	0.516	Nov 2015	0.555	Nov 2016	-		0.555	Continuing	Continuing	Continuing
VBSS	C/FFP	NSWCCD : West Bethesda, MD	0.000	0.059	Jun 2015	0.000		0.000		-		0.000	0.000	0.059	0.061
Primary Dosimetry	C/FFP	NSWCCD : West Bethesda, MD	0.000	0.003	Mar 2015	0.021	Mar 2016	0.000		-		0.000	0.000	0.024	0.024
Secondary Dosimetry	C/FFP	NSWCCD : West Bethesda, MD	0.002	0.009	Jul 2015	0.008	Jul 2016	0.000		-		0.000	0.000	0.019	0.019
Air Particle Detector	C/FFP	NSWCCD : West Behtesda, MD	0.000	0.100	Jun 2015	0.150	Jun 2016	0.132	Mar 2017	-		0.132	0.000	0.382	0.250
Tritium Monitors	C/FFP	NSWCCD : West Bethesda, MD	0.118	0.000		0.000		0.000		-		0.000	0.000	0.118	0.118
		Subtotal	2.663	0.652		0.695		0.687		-		0.687	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Navy			Date: February 2016
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603542N / *Radiological Control*	Project (Number/Name) 1830 / *RADIAC Development*	

	Prior Years	FY 2015		FY 2016		FY 2017 Base		FY 2017 OCO		FY 2017 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	15.593	0.667		0.710		0.702		-		0.702	-	-	-

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

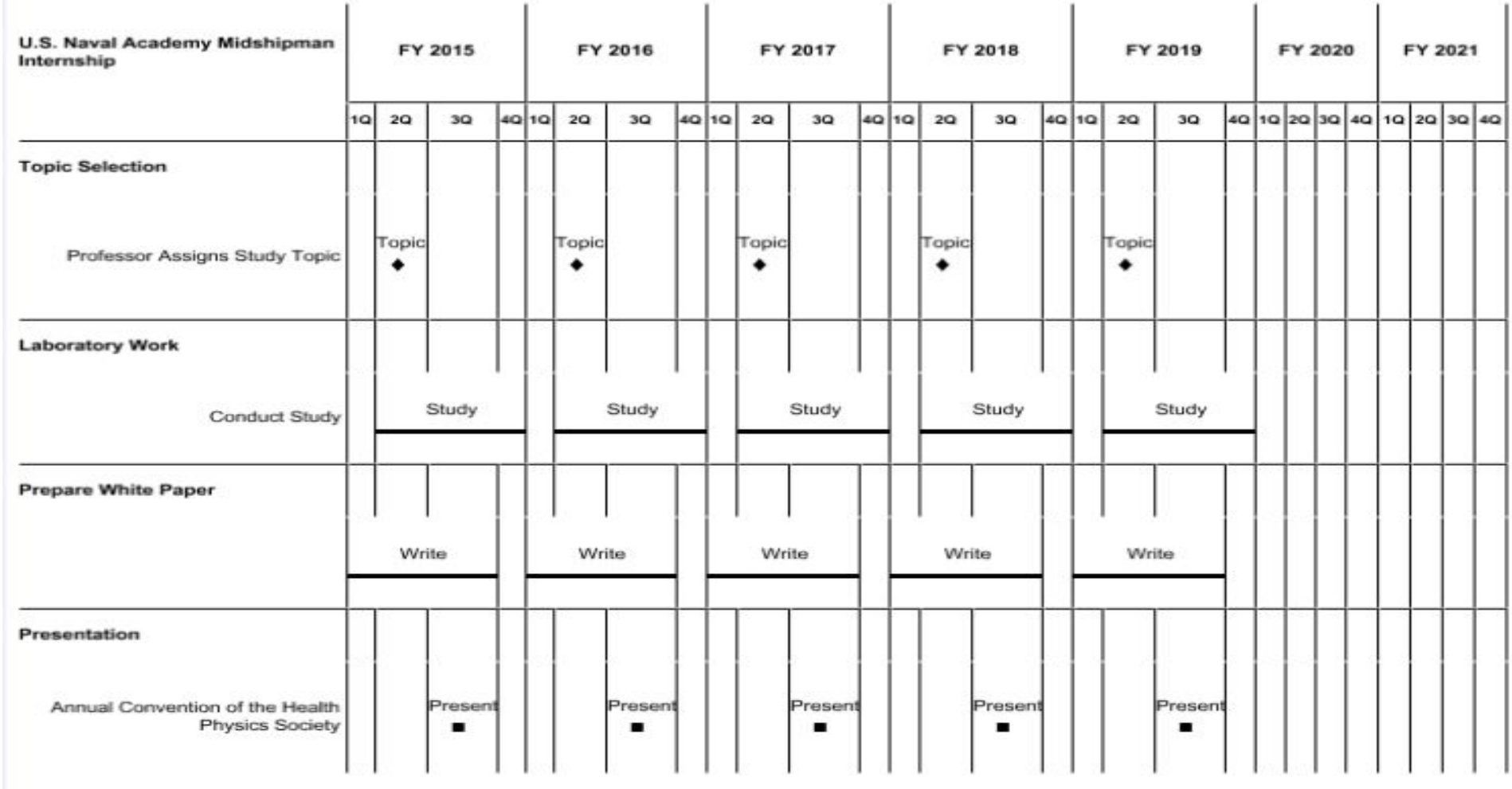

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

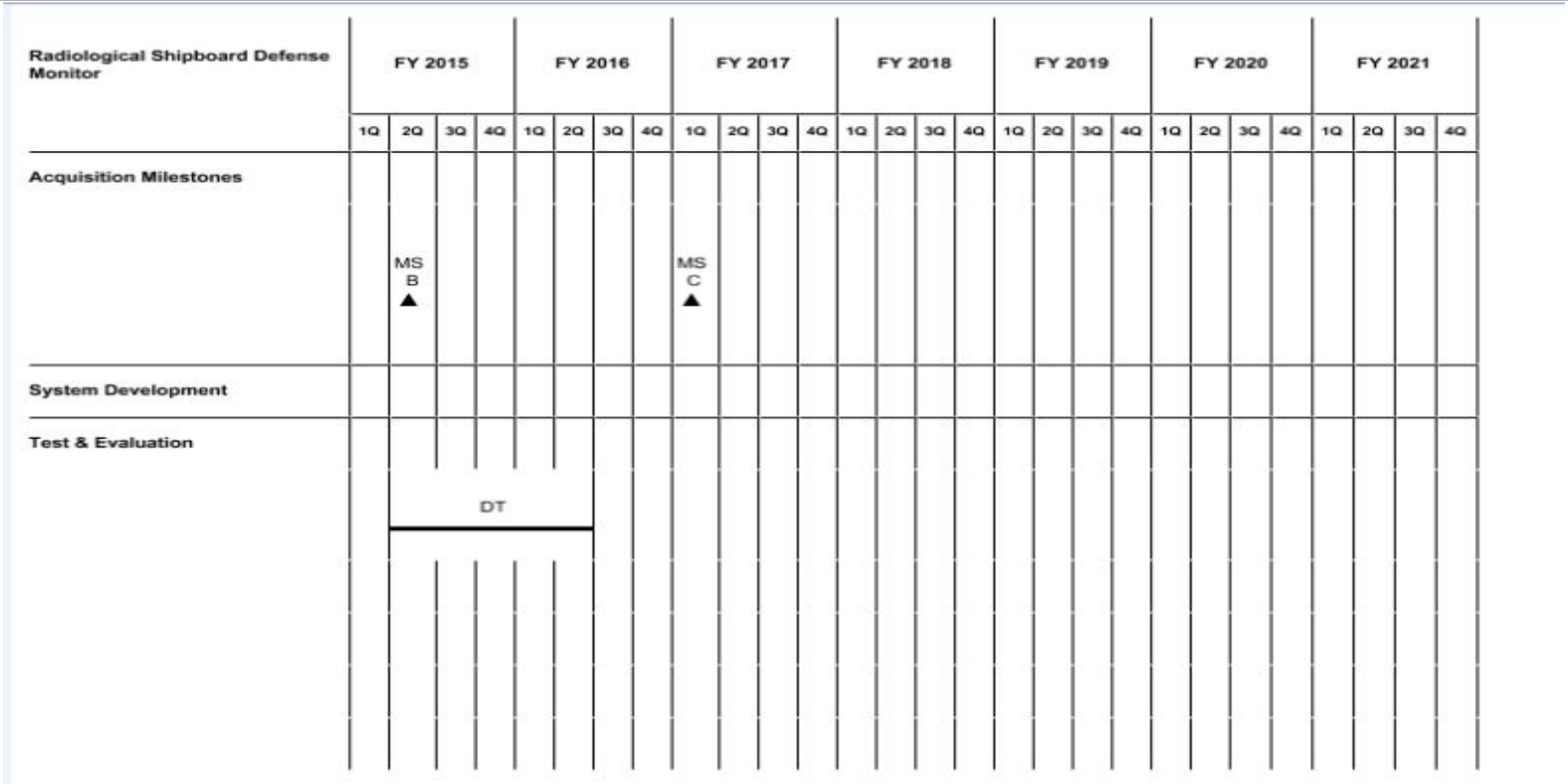

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

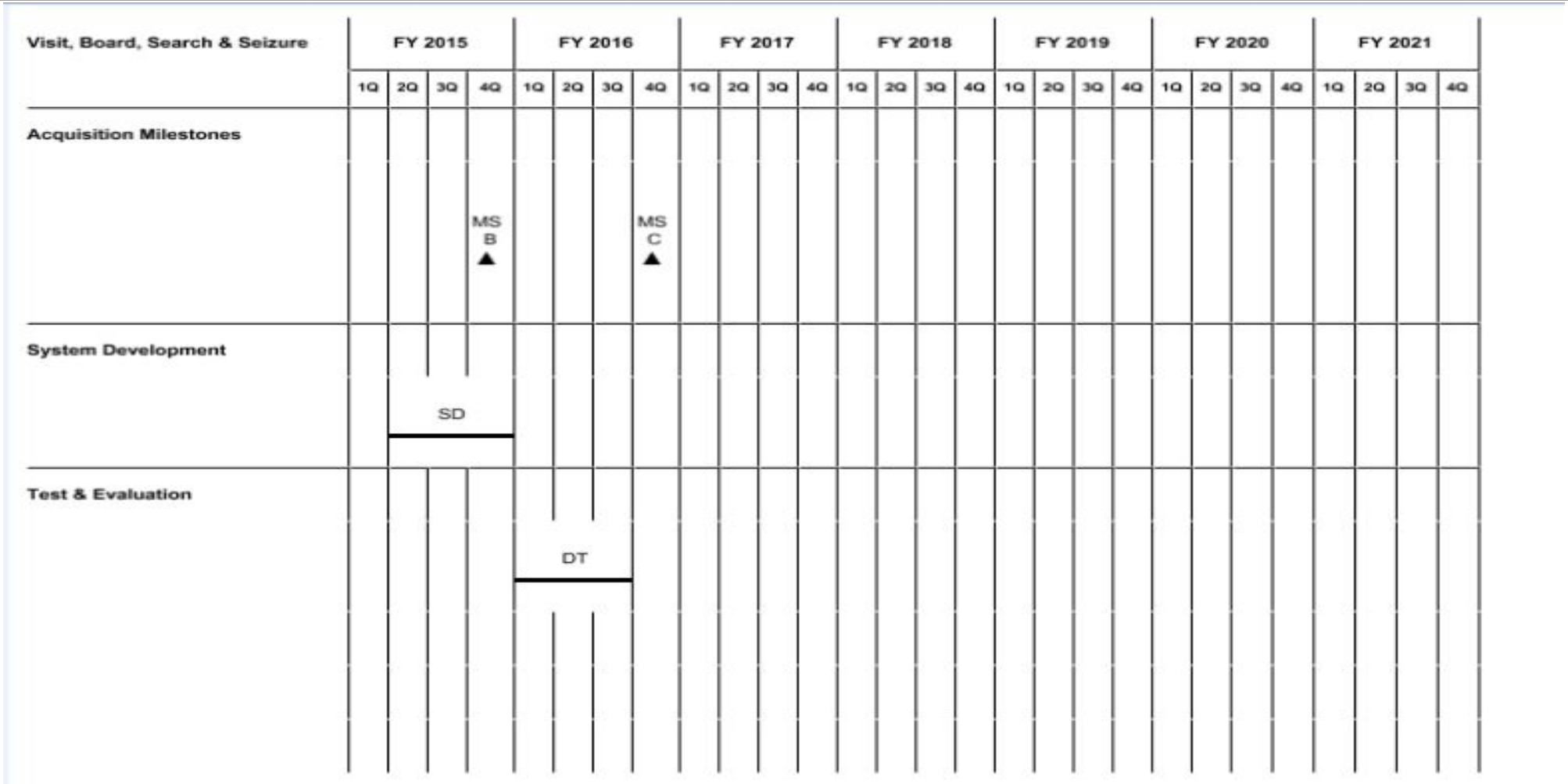

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

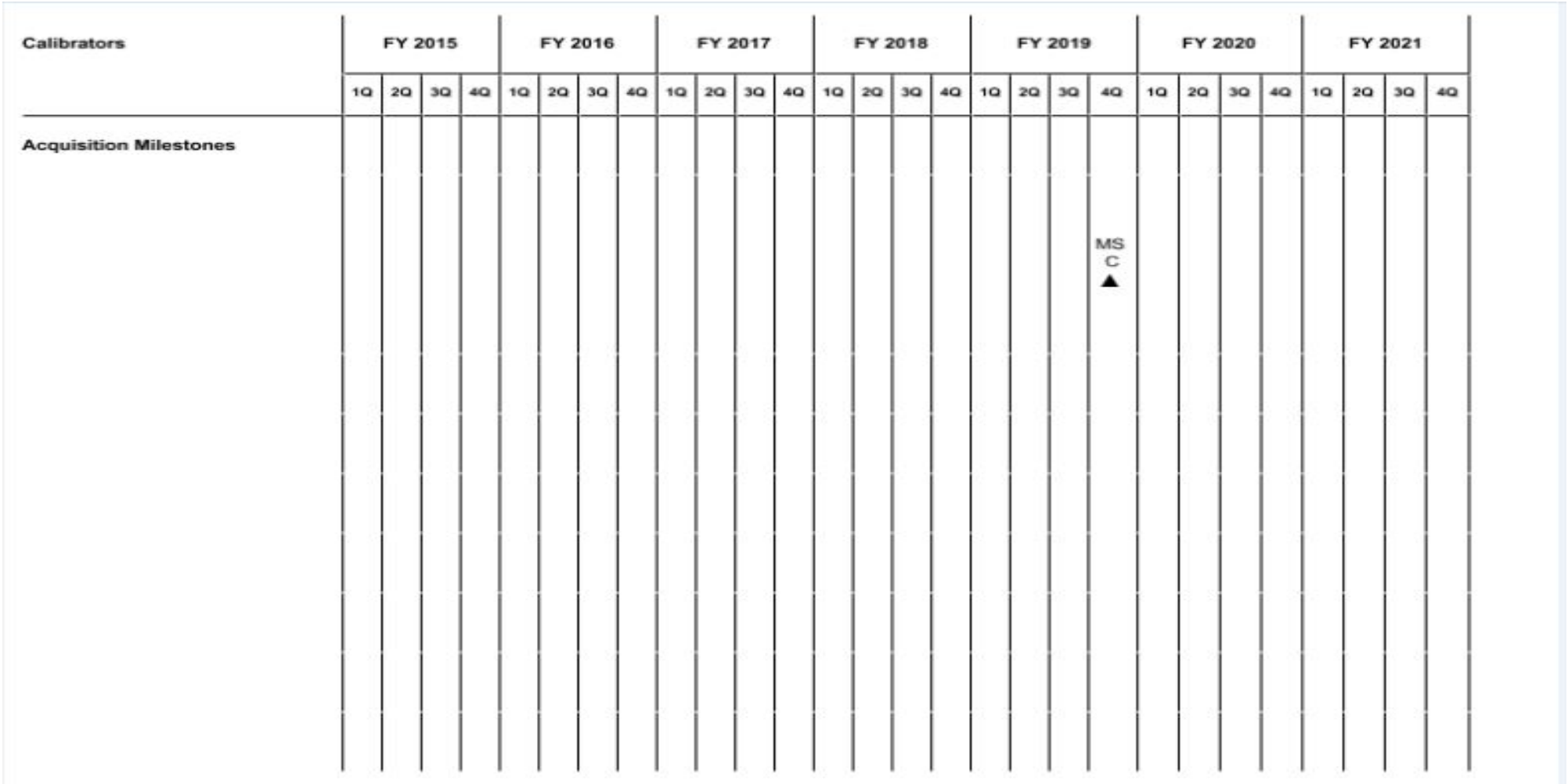

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

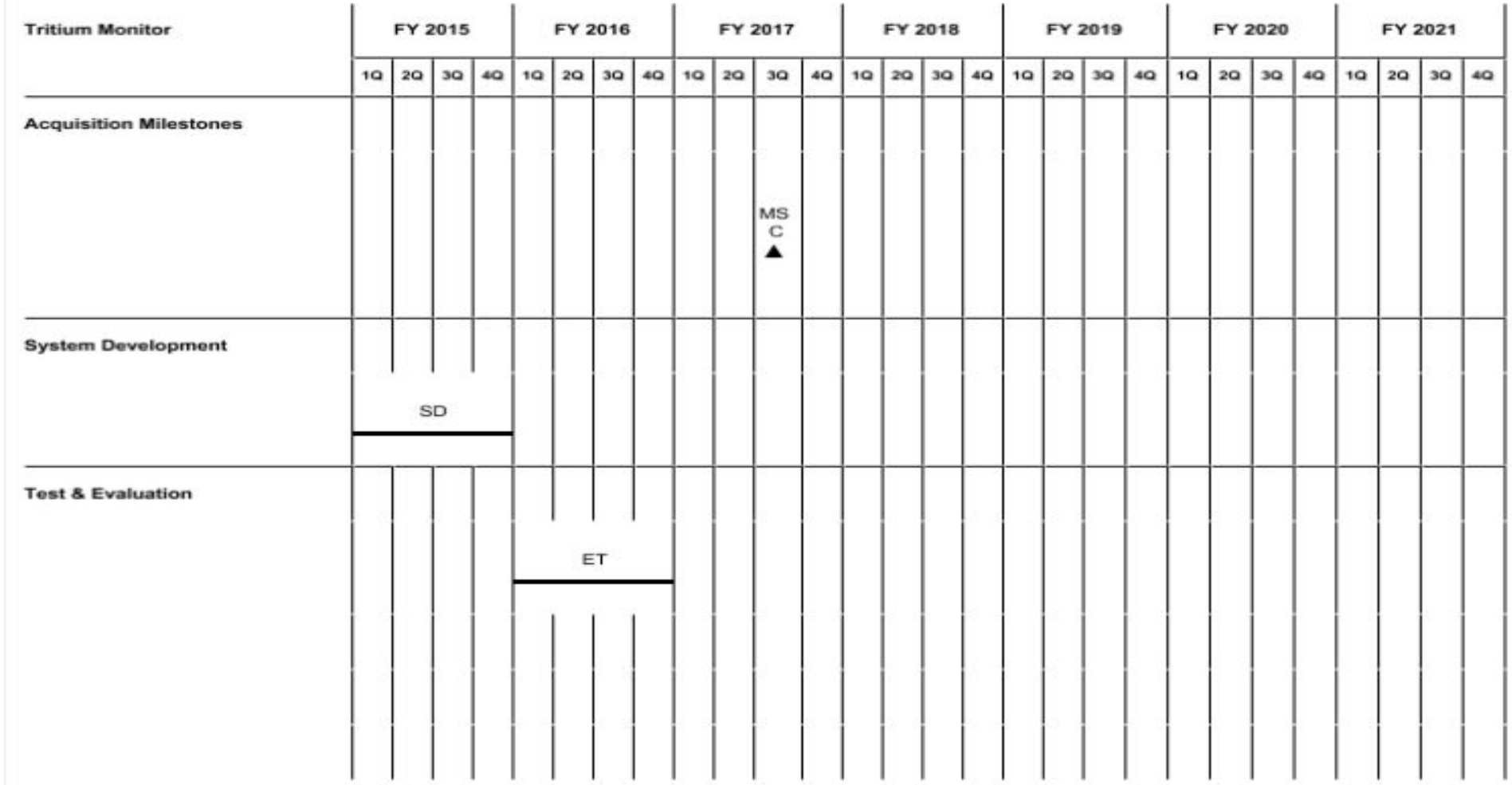

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

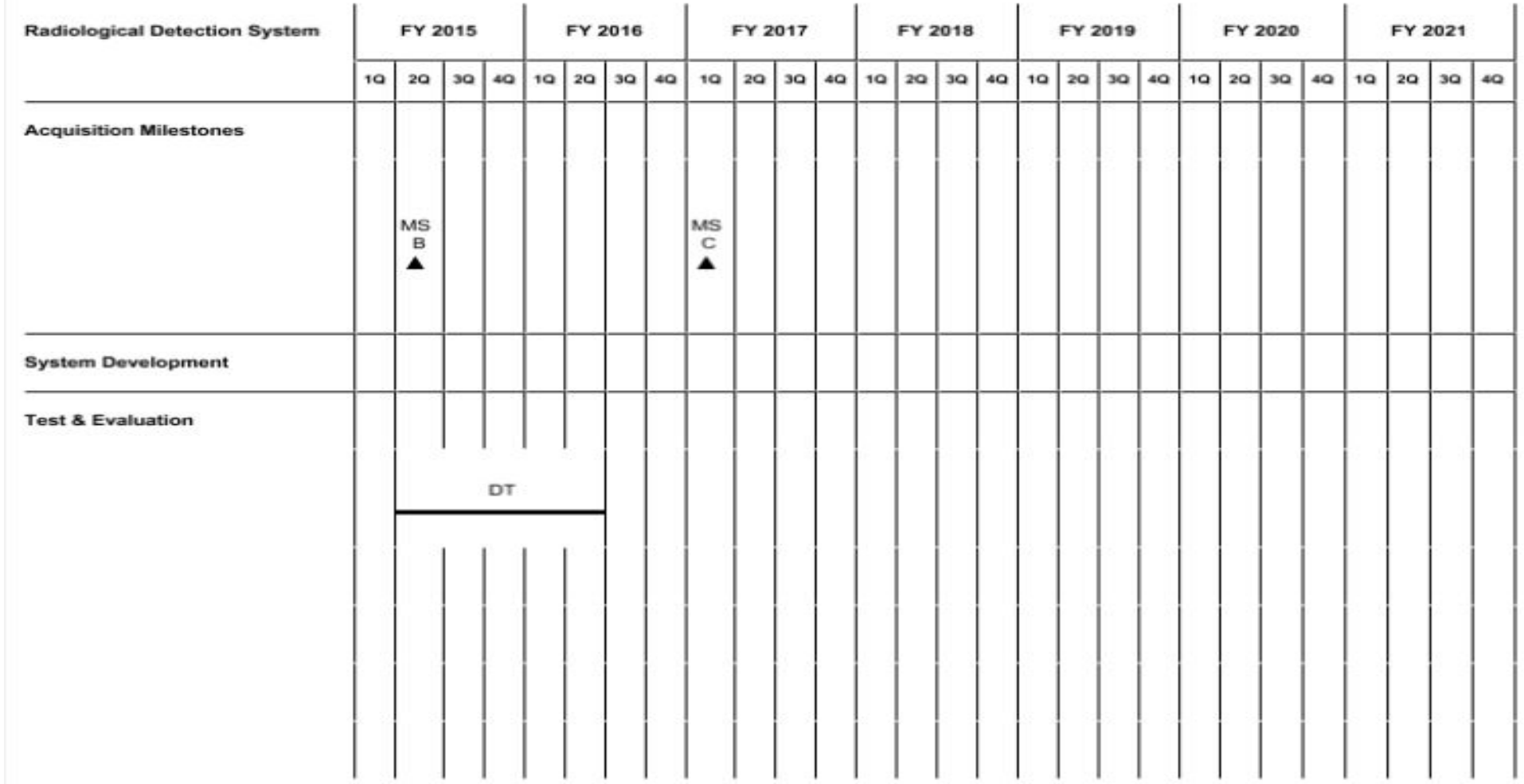

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

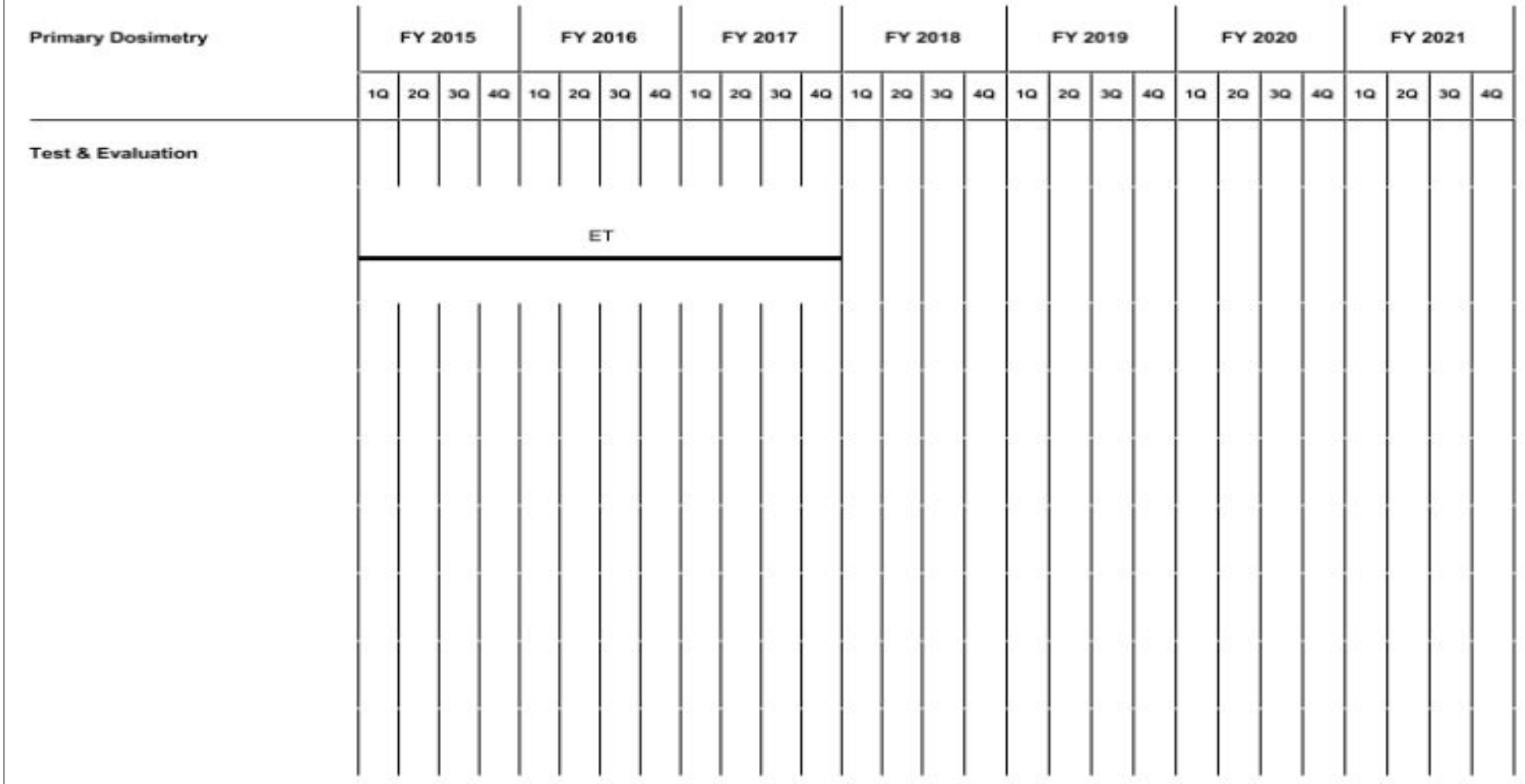

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

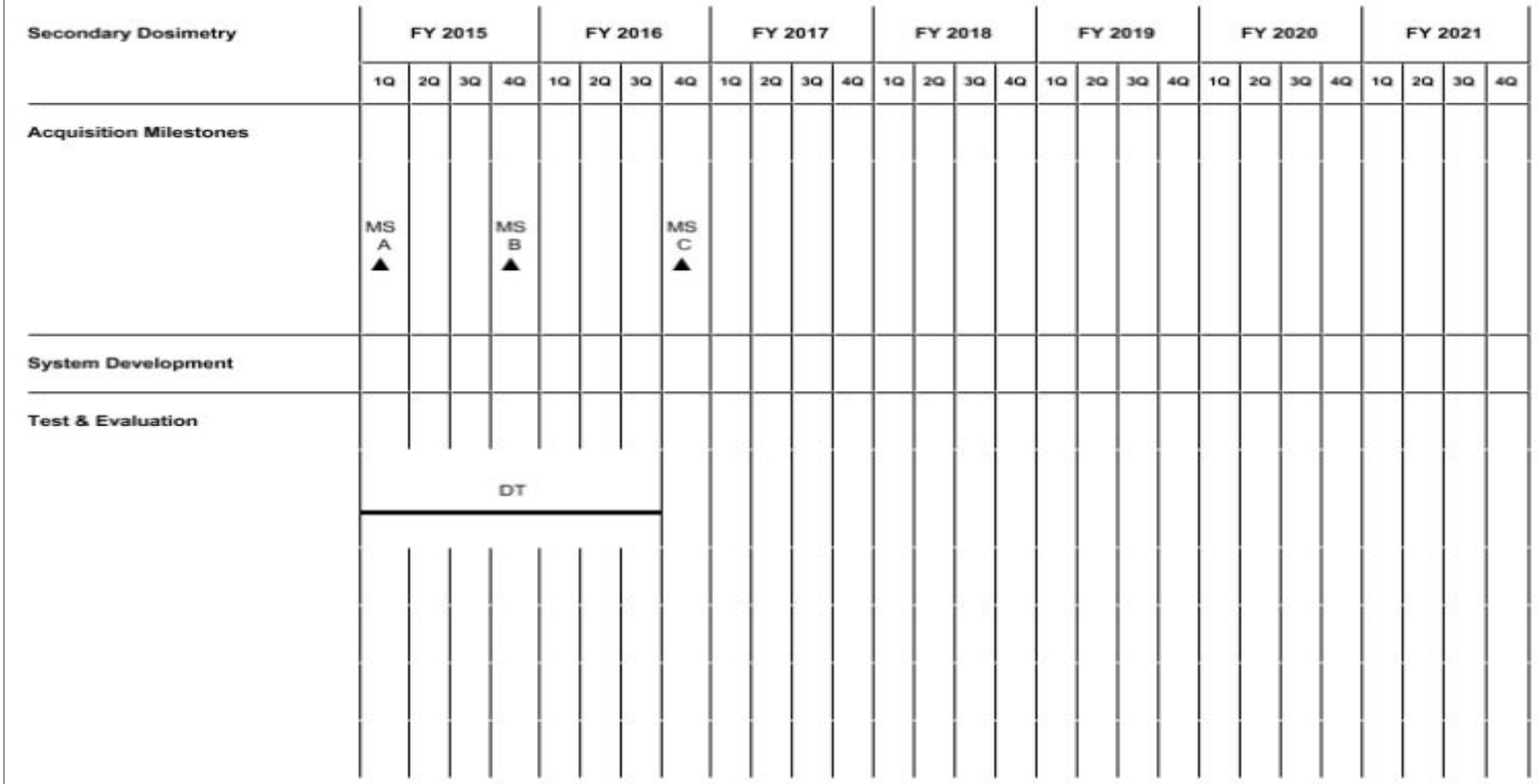

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

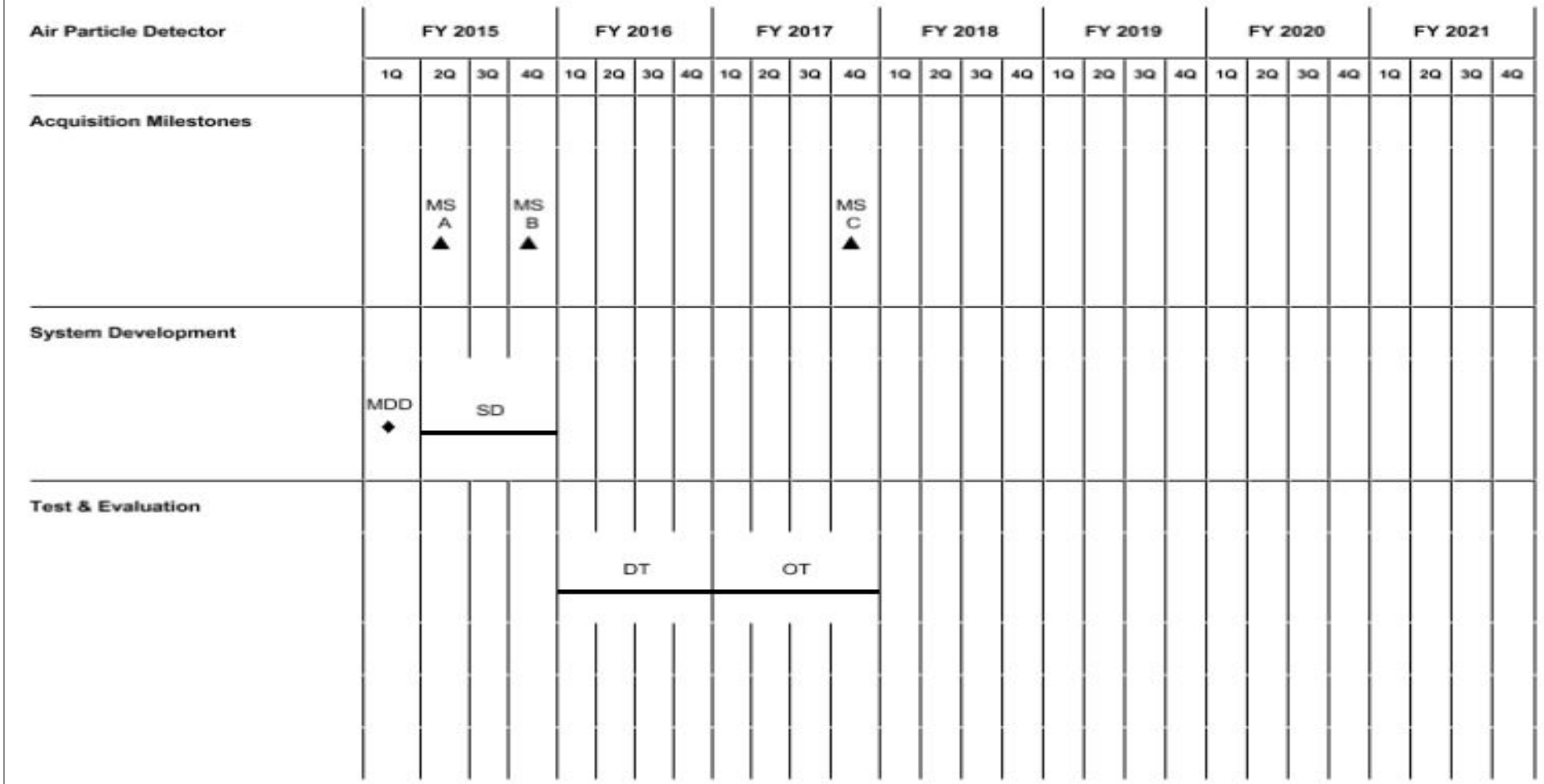

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
U.S. Naval Academy Midshipman Internship				
Topic Selection: Professor Assigns Study Topic: Academic Year 2015-16	2	2015	2	2015
Topic Selection: Professor Assigns Study Topic: Academic Year 2016-17	2	2016	2	2016
Topic Selection: Professor Assigns Study Topic: Academic Year 2017-18	2	2017	2	2017
Topic Selection: Professor Assigns Study Topic: Academic Year 2018-19	2	2018	2	2018
Topic Selection: Professor Assigns Study Topic: Academic Year 2019-20	2	2019	2	2019
Laboratory Work: Conduct Study: Conduct laboratory study 2015	2	2015	4	2015
Laboratory Work: Conduct Study: Conduct laboratory study 2016	2	2016	4	2016
Laboratory Work: Conduct Study: Conduct laboratory study 2017	2	2017	4	2017
Laboratory Work: Conduct Study: Conduct laboratory study 2018	2	2018	4	2018
Laboratory Work: Conduct Study: Conduct laboratory study 2019	2	2019	4	2019
Prepare White Paper: Write up of study results 2014	1	2015	3	2015
Prepare White Paper: Write up of study results 2015	1	2016	3	2016
Prepare White Paper: Write up of study results 2016	1	2017	3	2017
Prepare White Paper: Write up of study results 2017	1	2018	3	2018
Prepare White Paper: Write up of study results 2018	1	2019	3	2019
Presentation: Annual Convention of the Health Physics Society: Present White Paper 2014	3	2015	3	2015
Presentation: Annual Convention of the Health Physics Society: Present White Paper 2015	3	2016	3	2016
Presentation: Annual Convention of the Health Physics Society: Present White Paper 2016	3	2017	3	2017
Presentation: Annual Convention of the Health Physics Society: Present White Paper 2017	3	2018	3	2018

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Presentation: Annual Convention of the Health Physics Society: Present White Paper 2018	3	2019	3	2019
Radiological Shipboard Defense Monitor				
Acquisition Milestones: Milestone B	2	2015	2	2015
Acquisition Milestones: Milestone C	1	2017	1	2017
Test & Evaluation: Development Test	2	2015	2	2016
Visit, Board, Search & Seizure				
Acquisition Milestones: Milestone B	4	2015	4	2015
Acquisition Milestones: Milestone C	4	2016	4	2016
System Development: System Development	2	2015	4	2015
Test & Evaluation: Developmental Test	1	2016	3	2016
Calibrators				
Acquisition Milestones: Milestone C	4	2019	4	2019
Tritium Monitor				
Acquisition Milestones: Milestone C	3	2017	3	2017
System Development: System Development	1	2015	4	2015
Test & Evaluation: Evaluation Testing	1	2016	4	2016
Radiological Detection System				
Acquisition Milestones: Milestone B	2	2015	2	2015
Acquisition Milestones: Milestone C	1	2017	1	2017
Test & Evaluation: Development Test	2	2015	2	2016
Primary Dosimetry				
Test & Evaluation: Evaluation Testing	1	2015	4	2017
Secondary Dosimetry				
Acquisition Milestones: Milestone A	1	2015	1	2015
Acquisition Milestones: Milestone B	4	2015	4	2015

Exhibit R-4A, RDT&E Schedule Details: PB 2017 Navy		Date: February 2016
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603542N / *Radiological Control*	**Project (Number/Name)** 1830 / *RADIAC Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Acquisition Milestones: Milestone C	4	2016	4	2016
Test & Evaluation: Development Test	1	2015	3	2016
Air Particle Detector				
Acquisition Milestones: Milestone A	2	2015	2	2015
Acquisition Milestones: Milestone B	4	2015	4	2015
Acquisition Milestones: Milestone C	4	2017	4	2017
System Development: Material Development Decision	1	2015	1	2015
System Development: Specifications Development	2	2015	4	2015
Test & Evaluation: Development Test	1	2016	4	2016
Test & Evaluation: Operational Test	1	2017	4	2017