Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy										DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*				R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*							
COST ($ in Millions)	**FY 2009 Actual**	**FY 2010 Estimate**	**FY 2011 Base Estimate**	**FY 2011 OCO Estimate**	**FY 2011 Total Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	1.069	1.366	1.358	0.000	1.358	1.439	0.926	0.947	0.966	Continuing	Continuing
1830: *RADIAC Development*	1.069	1.366	1.358	0.000	1.358	1.439	0.926	0.947	0.966	Continuing	Continuing

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 (10CFR). 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 involving radiological or nuclear materials in order to enable continuity 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 and 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, Weapons, Medical, Industrial Radiography 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603542N: *Radiological Control*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	1.090	1.372	0.000	0.000	0.000
Current President's Budget	1.069	1.366	1.358	0.000	1.358
Total Adjustments	-0.021	-0.006	1.358	0.000	1.358
• Congressional General Reductions		-0.006			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.021	0.000			
• Program Adjustments	0.000	0.000	1.358	0.000	1.358

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

FY11 from previous President's Budget is shown as zero because no FY11-15 data was presented in President's Budget 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*	PROJECT 1830: *RADIAC Development*	

COST ($ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
1830: *RADIAC Development*	1.069	1.366	1.358	0.000	1.358	1.439	0.926	0.947	0.966	Continuing	Continuing
Quantity of RDT&E Articles	13	14	33	0	33	0	0	0	0		

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 (10CFR). 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 and 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, Weapons, Medical, Industrial Radiography and Training. Expanded Maritime Intercept Operations (EMIO): 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 Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Naval Academy Midshipman Summer Internship	0.015	0.015	0.015	0.000	0.015

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*	PROJECT 1830: *RADIAC Development*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
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. *FY 2009 Accomplishments:* Accomplished study assigned by Naval Academy instructor. *FY 2010 Plans:* Accomplish study assigned by Naval Academy instructor. *FY 2011 Base Plans:* Accomplish study assigned by Naval Academy instructor.					
Next Generation Air Particle Detector The IM-239/WDQ Air Particle Detector (APD) is a 400-pound piece of installed equipment on nuclear powered ships that monitors emissions into the air from the ships' nuclear power plants. There are eight on each Nimitiz class carrier and six on each submarine of all classes. The current version is approximately 30 years old and despite component upgrades it has reached the end of its useful life due to parts and technological obsolesence. Naval Reactors requires a new version for the nuclear fleet. The RADIAC Program is working with the pre-eminent facility in this field in the U.S., the DoE Remote Sensing Laboratory at Nellis AFB, NV, to develop the new version. *FY 2009 Accomplishments:* Resolved final technical issues, developed final specifications and produced first three prototypes. *FY 2010 Plans:* Complete final three prototypes and issue them to Nuclear Propulsion Test Units for T&E.	0.750	0.750	0.700	0.000	0.700

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*	PROJECT 1830: *RADIAC Development*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Based on T&E results, issue final specifications and solicit vendors to build prototypes and provide cost estimates for full production. Artifact quantities is an estimate that will be dependent upon the number of offerors, and/or the number of prototypes they propose to build.					
Naval Nuclear Propulsion Program (NNPP) Survey Meter A survey meter for NNPP must meet military specifications for shipboard use, to include high tolerances for exposure to characteristics such as shock, temperature, humidity and sea water. COTS survey meters, which in most cases might be adequate in the mentioned environmental regards for shore-based requirements, cannot meet military requirements. COTS equipment is evaluated for compliance with technical specifications, and for potential hardening for shipboard use. *FY 2009 Accomplishments:* Procured COTS equipment, began environmental and technical performance testing. *FY 2011 Base Plans:* Solicit vendor prototypes for T&E.	0.304	0.000	0.026	0.000	0.026
Pressurized Ion Chamber The Radiological Affairs Support Office (RASO) has requested a feasability study into the performance of a pressurized ion chamber in a pulsed X-ray field. Articles are commercial equipment for evaluation. *FY 2010 Plans:* Procure articles for evaluation. T&E and issue report to RASO on findings.	0.000	0.090	0.000	0.000	0.000
Electronic Pocket Dosimeter (EPD) Mesh Network	0.000	0.461	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*	PROJECT 1830: *RADIAC Development*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Naval Reactors has requested the study of adding capabilities to the newly fielded Electronic Pocket Dosimeter (EPD). Besides its basic functionality for recording dose exposure, this instrument also has the ability to remotely monitor and report the radiation exposure of on-scene emergency responders. This feature has not been implemented in the Navy EPDs that were recently procured and fielded, but the USAF already makes extensive use of the same EPD, along with the extra hardware and software required for the purpose of keeping track of responders in emergencies in terms both of their accumulated exposure and precise location. A second application of the EPD telemetry capability is for radiological work. This would include workers wearing EPDs during high radiation level work, and EPDs being posted at locations where radiation level measurements are required in high radiation background areas. Posting of EPDs in such a situation would preclude having a technician enter the danger area with a survey meter to measure the radiation level. An example would be monitoring the radiation level of the pipe through which primary plant resin is being discharged from the ship. *FY 2010 Plans:* Procure items for evaluation. Issue report and make recommendation.					
Optically Stimulated Luminesence (OSL) The need for dosimetry is a very significant consequence of working with or around ionizing radiation. The expensive infrastructure and investments by the Navy in its dosimetry program is evidence of the importance of a robust dosimetry system to the health and safety of the Navy's military and civilian personnel. As new and improved technologies appear, it is important to evaluate them for their potential to improve performance while reducing total operating costs. OSL is a relatively new technology where the benefits appear to be significant but have yet to be fully evaluated. This project's objective is to make modest investments with the labor of a Navy Health Physicist to explore, in	0.000	0.050	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
colloboration with a U.S. Army colleague interested in the same technology for Army use, the potential of the military application for OSL dosimetry. *FY 2010 Plans:* Conduct colloborative preliminary testing. Issue a report recommending further T&E, or other alternatives.					
Speciality Survey Meters and Detectors Develop replacements for obsolete equipment and develop new capabilities for specialized applications. These include: 1) a Radiological Affairs Support Program survey meter; 2) a neutron detector to replace the obsolete Self Indicating Pocket Dosimeter; 3) a uRem survey meter; 4) a shipboard gamma detector that could be part of a Chemical, Biological and Radiological sensor network; and 5) a teletector. Articles are prototypes for T&E. *FY 2011 Base Plans:* Develop replacements for obsolete equipment and develop new capabilities for specialized applications.	0.000	0.000	0.535	0.000	0.535
Visit, Board, Search & Seizure (VBSS) The 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 recently fielded AN/PDX-1 RADIAC Set contains several instruments that serve different purposes, perhaps the most significant item being the detector. 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	0.000	0.000	0.082	0.000	0.082

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
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 2011 Base Plans:* Procure equipment for T&E.					
Accomplishments/Planned Programs Subtotals	1.069	1.366	1.358	0.000	1.358

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• OPN 2920: *RADIAC*	9.176	5.971	6.104	0.000	6.104	8.005	8.181	8.732	8.996	Continuing	Continuing

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 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*	PROJECT 1830: *RADIAC Development*

Product Development ($ in Millions)

				FY 2010		FY 2011 Base		FY 2011 OCO		FY 2011 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	C/FP	Various Not Specified	11.390	0.000		0.000		0.000		0.000	0.000	11.390	11.390
		Subtotal	11.390	0.000		0.000		0.000		0.000	0.000	11.390	11.390

Remarks

Support ($ in Millions)

				FY 2010		FY 2011 Base		FY 2011 OCO		FY 2011 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	WR	NSWC Carderock West Bethesda, MD	3.297	0.285	Nov 2009	0.366	Nov 2010	0.000		0.366	Continuing	Continuing	Continuing
Development Support	SS/CPIF	Univ. of Washington Seattle, WA	1.157	0.000		0.000		0.000		0.000	0.000	1.157	1.157
		Subtotal	4.454	0.285		0.366		0.000		0.366			

Remarks

Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*	PROJECT 1830: *RADIAC Development*

Test and Evaluation ($ in Millions)

				FY 2010		FY 2011 Base		FY 2011 OCO		FY 2011 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Operational Test & Evaluation	WR	Various Not Specified	0.833	0.117	Feb 2010	0.000		0.000		0.000	0.000	0.950	0.950
		Subtotal	0.833	0.117		0.000		0.000		0.000	0.000	0.950	0.950

Remarks

Management Services ($ in Millions)

				FY 2010		FY 2011 Base		FY 2011 OCO		FY 2011 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	C/FP	Orbis, Inc., Charleston, SC	2.029	0.210	Nov 2009	0.238	Nov 2010	0.000		0.238	Continuing	Continuing	Continuing
Labor (Researach Personnel)	MIPR	DoE, RSL, Nellis AFB, NV	3.033	0.750	Nov 2009	0.750	Nov 2010	0.000		0.750	Continuing	Continuing	Continuing
Travel	WR	NAVSEA Washington, D.C.	0.365	0.004	Nov 2009	0.004	Nov 2010	0.000		0.004	Continuing	Continuing	Continuing
		Subtotal	5.427	0.964		0.992		0.000		0.992			

Remarks

Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*	PROJECT 1830: *RADIAC Development*	

	Total Prior Years Cost	FY 2010		FY 2011 Base		FY 2011 OCO		FY 2011 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	22.104	1.366		1.358		0.000		1.358			

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603542N: *Radiological Control*	PROJECT 1830: *RADIAC Development*

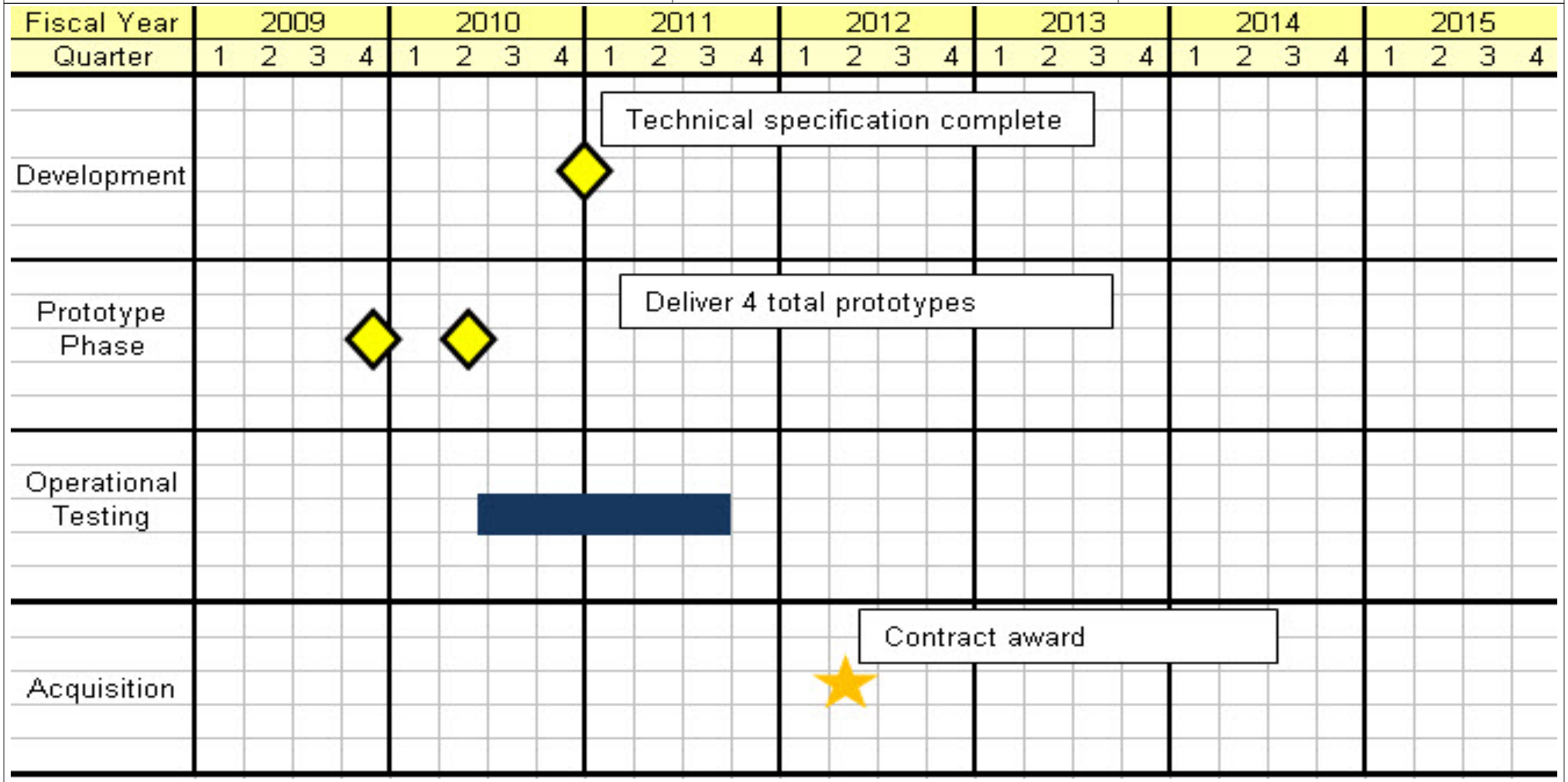

Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603542N: *Radiological Control*	**PROJECT** 1830: *RADIAC Development*

Schedule Details

	Start		End	
Event	**Quarter**	**Year**	**Quarter**	**Year**
Development	4	2010	4	2010
Prototypes	4	2009	2	2010
Operational Testing	3	2010	3	2011
Acquisition (Contract Award)	2	2010	2	2010