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 0603207N: *Air/Ocean Tactical Applications*							
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	65.532	118.495	123.331	0.000	123.331	113.306	77.992	47.071	47.515	Continuing	Continuing
2341: *METOC Data Acquisition*	19.258	21.930	15.288	0.000	15.288	12.606	13.432	13.819	14.088	Continuing	Continuing
2342: *METOC Data Assimilation and Mod*	17.979	19.336	15.311	0.000	15.311	13.666	13.901	12.860	12.735	Continuing	Continuing
2343: *Tactical METOC Applications*	6.116	16.097	13.736	0.000	13.736	15.729	15.293	12.166	12.418	Continuing	Continuing
2344: *Precise Timing and Astronomy*	19.615	2.249	2.118	0.000	2.118	1.199	1.217	1.243	1.269	Continuing	Continuing
3207: *Fleet Synthetic Training*	0.968	1.004	3.437	0.000	3.437	1.007	1.043	1.067	1.088	Continuing	Continuing
3229: *JMAPS*	0.000	54.971	73.441	0.000	73.441	69.099	33.106	5.916	5.917	Continuing	Continuing
9999: *Congressional Adds*	1.596	2.908	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.193

A. Mission Description and Budget Item Justification

The Air Ocean Tactical Applications (AOTA) Program Element is fully aligned with the Navy's maritime strategy to enhance the future mission capabilities of the Navy-Marine Corps Team. New state-of-the art government and commercial technologies are identified, transitioned, demonstrated and then integrated into Combat Systems and programs of record and Tactical Decision Aids that determine in real-time and near-real-time the operational effects of the physical environment on the performance of combat forces and their new and emerging platforms, sensors, systems and munitions. The AOTA program element focuses on sensing and characterizing the littoral and deep-strike battlespace in the context of regional conflicts and crisis response scenarios. Projects in this program element transition state-of-the art sensing, assimilation, modeling and decision aid technologies from Government and commercial sources. Unique project development efforts include atmospheric and oceanographic data assimilation techniques, forecast models, data base management systems and associated software for use in mainframe, desktop and laptop computers. Global Geospatial Information and Services efforts within this program address the bathymetric and gravimetric needs of the Navy. Also developed are algorithms to process new satellite sensor data for integration into Navy and Marine Corps decision support systems and for display as part of the common operational and tactical pictures. In addition, the projects provide for demonstration and validation of specialized atmospheric and oceanographic instrumentation and measurement techniques, new sensors, communications and interfaces. Included are new capabilities to assess, predict and enhance the performance of current and emerging undersea warfare and mine warfare weapons systems. AOTA capabilities are designed to support the latest versions of the Global Command and Control System and specific unit-level combat systems. Finally, this program develops technological upgrades for the U.S. Naval Observatory's

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Master Clock system to keep pace with the demands of modern military communications, cryptographic, intelligence, geolocation, and targeting systems; develops near-real-time earth orientation predictions; develops very precise determination of positions of both faint and bright stars; and supports satellite tracking and space debris studies.

Major emphasis areas include the Littoral Battlespace Sensors - Unmanned Undersea Vehicle (comprised of ocean Gliders and Autonomous Undersea Vehicles), the Naval Integrated Tactical Environmental System Next Generation, the J-MAPS programs of record, and the Meteorological and Oceanographic Future Mission Capabilities (METOC), the METOC Space-Based Sensing Capabilities, the Precise Timing and Astrometry, the Fleet Synthetic Training and the Tactical Oceanographic Capabilities / Under Sea Warfare projects.

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	67.531	116.082	0.000	0.000	0.000
Current President's Budget	65.532	118.495	123.331	0.000	123.331
Total Adjustments	-1.999	2.413	123.331	0.000	123.331
• Congressional General Reductions		-0.493			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.014			
• Congressional Adds		2.920			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.500	0.000			
• SBIR/STTR Transfer	-1.499	0.000			
• Program Adjustments	0.000	0.000	123.331	0.000	123.331

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: 9999: *Congressional Adds*		
Congressional Add: *Non-Gasoline Burning Outboard Engine*	0.000	1.514
Congressional Add: *Semi-Submersible UUV*	1.596	1.394
Congressional Add Subtotals for Project: 9999	1.596	2.908
Congressional Add Totals for all Projects	1.596	2.908

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy	DATE: February 2010
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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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2341: *METOC Data Acquisition*	

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
2341: *METOC Data Acquisition*	19.258	21.930	15.288	0.000	15.288	12.606	13.432	13.819	14.088	Continuing	Continuing
Quantity of RDT&E Articles	0	4	0	0	0	0	0	0	0		

A. Mission Description and Budget Item Justification

The major thrust of the Meteorology and Oceanography (METOC) Data Acquisition Project is to provide future mission capabilities to warfighters that will allow them to detect and monitor the conditions of the physical environment throughout the entire battlespace. New sensor technologies (including unmanned vehicles, tactical sensor exploitation, in-situ sensors) identified as the most promising candidates are transitioned from the government's and commercial industry's technology base. These new sensor technologies are demonstrated, validated and integrated into operational programs for warfighters. These new sensor capabilities provide timely and accurate METOC data and products to operational and tactical commanders. METOC data requirements have likewise evolved as the emphasis on naval warfare has evolved from blue water operations to the littoral and deep strike battlespace. The littoral and deep strike regions are dynamic and complex, characterized by strong and variable oceanographic and atmospheric conditions. The need to accurately characterize these conditions is more crucial than ever in planning and executing amphibious warfare, mine warfare, special operations, anti-submarine warfare, and strike warfare operations. Routinely available data sources, such as climatology, oceanographic and meteorological numerical models, and satellite remote sensing are necessary but not sufficient to support these warfare areas in the littoral and deep strike regions. Operational sensors, such as the balloon-launched radiosonde, are deployed great distances from the target area of interest. The challenge is to collect and disseminate METOC data in variable and dynamic littoral environmental conditions or in denied, remote or inaccessible areas over extended periods of time. This project: 1) provides the means to rapidly and automatically acquire a broad array of METOC data using both off-board and on-board sensors; 2) provides an on-scene assessment capability for the tactical commander; 3) provides the tactical commander with real-time METOC data and products for operational use; 4) demonstrates and validate the use of tactical workstations and desktop computers for processing and display of METOC data and products; 5) demonstrates and validates techniques which employ data compression, connectivity and interface technologies to obtain, store, process, distribute and display these METOC data and products; 6) develops new charting and bathymetric survey techniques necessary to reduce the existing shortfall in coastal hydrographic survey requirements; 7) develops an expanded database for predictive METOC models in areas of interest; and 8) supports the development of radar weather using through-the-sensor techniques and development of ocean glider and Autonomous Undersea Vehicles (AUV), sensors, tracking and telemetry, and mission planning system as part of the littoral battlespace sensing, fusion and integration programs.

Major emphasis areas include the Littoral Battlespace Sensors - Unmanned Undersea Vehicle (LBS-UUV) (comprised of ocean Gliders and Autonomous Undersea Vehicles (LBS-AUV)), the Navy Integrated Tactical Environmental System Next Generation, programs of record, and the Meteorological and Oceanographic Future Mission Capabilities, and the Tactical Oceanographic Capabilities / Under Sea Warfare projects.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
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FY 2011 request provides for continued LBS-UUV (LBS-AUV) System Development and Demonstration phase activities, advanced component and prototype efforts associated with acquiring environmental data, and METOC data transport, storage, delivery, design and development efforts in a Net-centric environment.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Acquisition Workforce	0.096	0.000	0.000	0.000	0.000
FY 2009 Accomplishments: Funded acquisition workforce fund.					
Littoral Battlespace Sensing, Unmanned Undersea Vehicles (LBS-UUV)	4.841	8.771	2.465	0.000	2.465
FY 2009 Accomplishments: Began development of end-to-end Littoral Battlespace Sensing, Fusion and Integration Increment 1.0 Littoral Battlespace Sensing - Glider (LBS-G) sensor and support systems (LBS-G Development Contract awarded March 2009). Defined Engineering Change Proposal (ECP) improvements to the LBS-G system including associated support systems (launch and recovery, mission planning, test equipment, etc.). Conducted ECP studies (Analyses of Alternatives, Engineering Studies, etc.) and associated cost estimates as required. Began preparations for the System Development and Demonstration (SDD) phase of the Autonomous Undersea Vehicle (AUV) component of this program. *FY 2010 Plans:* Complete the SDD phase of the LBS-G system (LBS-G Milestone C is scheduled for Q4FY10). Deliver four LBS-G Engineering Design Models (EDMs) and complete at-sea and ashore Development Testing and Evaluation of the complete end-to-end LBS-G system including command and control, mission planning, launch and recovery, mission profile characteristics and other Key Performance Parameters and Key System Parameters. Complete the development of the LBS-G ECP definition and associated engineering studies and analyses of alternatives. Begin the SDD phase of the Littoral Battlespace Sensing - Autonomous Undersea Vehicle (LBS-AUV). Funding increase reflects the beginning of the SDD phase of the LBS-AUV portion of the Littoral Battlespace Sensors - Unmanned Undersea Vehicle (LBS-UUV) program.					

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
FY 2011 Base Plans: Update LBS-G Analysis of Alternatives, engineering studies, and cost estimates for the LBS-G ECPs as required. Continue the LBS-AUV SDD Phase (LBS-AUV Milestone C is scheduled for Q1/Q2 FY12). Develop the LBS-AUV Capability Production Document. Conduct the LBS-AUV Critical Design Review. Deliver two LBS-AUV EDMs and begin Developmental Testing and Evaluation of the LBS-AUV systems.					
Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC)	7.078	8.230	7.369	0.000	7.369
FY 2009 Accomplishments: Continued advanced component and prototype efforts associated with acquiring environmental data. Continued development of advanced data measurement and survey techniques to improve survey planning and execution. Continued development of improved data quality control technologies and the automation of data acquisition processes. Continued to develop advanced technologies and techniques to improve Geospatial Information and Services (GI&S) capabilities within Navy METOC production centers and throughout the fleet user base. Implemented through-the-sensor (TTS) technologies to use tactical detection systems to characterize undersea and atmospheric environment in the battlespace integrate with analysis and C4I distribution systems. Continued development of the SPY-1 Tactical Environmental Processor (TEP) prototype and integration of Hazardous Weather Detection and Display Capability (HWDDC) into the SPS-48G Radar Obsolescence and Availability (ROAR). Developed TEP requirements, specifications, standards and system engineering plans for integration of the TEP algorithms into the Aegis SPY-1 Open Architecture upgrade program. Worked with the SPS-48G program office and prime contractor to integrate HWDDC algorithms into the ROAR system. *FY 2010 Plans:* Continue advanced component and prototype efforts associated with acquiring environmental data. Continue development of advanced data measurement and survey techniques to improve survey					

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
planning and execution. Continue development of improved data quality control technologies and the automation of data acquisition processes. Continue to develop advanced technologies and techniques to improve GI&S capabilities within Navy METOC production centers and throughout the fleet user base. Implement TTS technologies to use tactical detection systems to characterize undersea and atmospheric environment in the battlespace integrate with analysis, Command, Control, Communications, Computers and Intelligence (C4I) distribution, and tactical decision systems. Develop TEP requirements, specifications, standards and system engineering plans for integration of the TEP algorithms into the Aegis SPY-1 Open Architecture upgrade program. *FY 2011 Base Plans:* Continue advanced component and prototype efforts associated with acquiring environmental data. Continue development of advanced data measurement and survey techniques to improve survey planning and execution. Continue development of improved data quality control technologies and the automation of data acquisition processes. Continue to develop advanced technologies and techniques to improve GI&S capabilities within Navy METOC production centers and throughout the fleet user base. Implement TTS technologies to use tactical detection systems to characterize undersea and atmospheric environment in the battlespace integrate with analysis, distribution, and tactical decision systems. Develop TEP requirements, specifications, standards and system engineering plans for integration of the TEP algorithms into the Aegis SPY-1 Open Architecture upgrade program. Develop advanced data acquisition and data processing techniques for oceanographic and atmospheric data.					
Naval Integrated Tactical Environmental System Next Generation (NITES-Next) *FY 2009 Accomplishments:* Supported Meteorological and Oceanographic (METOC) data transport, storage, delivery, design and development efforts in a Net-centric environment for pre-Milestone C NITES-Next activities.	2.439	0.094	0.000	0.000	0.000

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Continue support for METOC data transport, storage, delivery, design and development efforts from FY09 in preparation for Milestone C NITES-Next activities.					
Tactical Environmental Support System/Naval Integrated Tactical Environmental Subsystem (TESS/NITES) *FY 2009 Accomplishments:* Tactical Environmental Support System/Naval Integrated Tactical Environmental Subsystem (TESS/ NITES) software development and testing for technology upgrades, refreshes, migrations, and system engineering efforts.	0.015	0.000	0.000	0.000	0.000
Tactical Oceanography Capabilities / Undersea Warfare (USW) *FY 2009 Accomplishments:* Geo-acoustic data inversion through-the-sensor efforts rolled into the Ocean Bottom Characterization Initiative (OBCI). Continued to develop, test and demonstrate advanced Geographic Information Systems (GIS) in support of world-wide Anti-Submarine Warfare (ASW) operations. Developed mission planning tools in support of littoral combat operations. Developed capability to quickly calculate transmission loss (TL) values in tactical timeframes. Continued data analysis and processing development for environmental characterization for mission planning & tactical decision aid use. Continued development, test/document and quality control fusion and product uncertainty tools and techniques to transform data into information to support product development for mission planners and tactical decision aid (TDA) use. Developed and validate ASW product effectiveness metrics algorithms. Designed the automated model metrics system. Continued to develop and demonstrate advanced processing tools to work with insitu data sources to populate environmental database and support forward deployed oceanographic personnel. Development and demonstration of advanced insitu sensor systems to support very near shore situational awareness in support of Anti-Submarine Warfare missions. Continued development, verify and validate performance and document adaptive geoacoustic survey work for transition to unmanned vehicles and T-AGS 60 class ships. Continued	0.289	4.835	5.454	0.000	5.454

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
the development and demonstration of oceanographic and in-situ sensors & systems. Utilized tactical and survey platforms for insitu measurements. *FY 2010 Plans:* Continue FY09 efforts. Continue to develop, test and demonstrate advanced mission planning tools and GIS in support of world-wide Undersea Warfare (USW) operations. Continue to develop capability to calculate TL values in tactical timeframes to include uncertainty quantification of those values. Develop and validate both acoustic and non-acoustic USW product effectiveness algorithms to aid in environmental analysis of Naval exercises. Develop and validate methods for a theater-wide ambient noise planning and forecasting capability. OBCI: Develop and demonstrate advanced in-situ sensor systems to support littoral environmental awareness in support of USW missions. Use operational Navy platforms for in-situ oceanographic and acoustic measurements. Develop Next Generation bottom loss and backscatter databases and database structures. Develop improved techniques to support geoacoustic and oceanographic survey operations. Develop algorithms for inclusion of bioacoustic effects in acoustic surveys. FY09 OBCI efforts were accomplished under the OBCI project. *FY 2011 Base Plans:* Continue FY10 efforts. Develop advanced data collection systems to generate products and populate databases that characterize the acoustic environment in support of ASW missions. Develop autonomous vehicle/system technology demonstrations to measure in-situ oceanographic, acoustic and geoacoustic parameters remotely from Fleet survey vessels. Continue to develop capabilities to calculate acoustic TL values in tactical timeframes to include uncertainty quantification of those values. Continue to develop next generation acoustic bottom loss and backscatter databases and database structures for transition into U.S. Navy ASW TDAs. Conduct Validation and Verification of next generation acoustic models, databases and algorithms. Continue to develop improved techniques to support geoacoustic and oceanographic survey operations. Continue to develop algorithms for inclusion of bioacoustic effects in acoustic surveys and Navy ASW operations. Develop					

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
active acoustic sources to aid geoacoustic survey operations. Provide project technical and program management oversight.					
Ocean Bottom Characterization Initiative (OBCI)	4.500	0.000	0.000	0.000	0.000
FY 2009 Accomplishments: Developed capability to rapidly map coastal and deep-water seabed geoacoustic properties through characterization of seabed variability. Designed offboard geo-acoustic survey platform and sensor prototypes for deployment aboard Tactical Auxiliary Command class ships and other Naval Oceanographic Office (NAVOCEANO) assets. Continued development, validation and verification of the delivered Geophysical Acoustic Inversion Toolkit Version 3 bottom loss algorithms for AntiSubmarine Warfare Tactical Decision Aids (ASW TDAs) and NAVOCEANO assets to include active inversion methods. Continued development of a passive seabed classification system. Verified & validated performance of Through The Sensor applications for inclusion in Navy Standard databases. Continued development of advanced geo-acoustic merging algorithms to support inversions. Pursued adaptive sampling techniques for NAVOCEANO geoacoustic survey assets. Characterized backscatter (i.e. reverberation) data for inclusion in NAVOCEANO databases. Adapted ocean glider and autonomous underwater vehicle sensors and behavior algorithms to support NAVOCEANO survey operations. Performed gravity/seismic data set correlation to improve geoacoustic databases. Extended bandwidth of existing bottom loss databases and algorithms to include all active and passive tactical acoustic frequencies. Defined frequency extrapolation limits of existing reverberation data sets. Continued to develop prototype replacement acoustic source for NAVOCEANO survey operations. Began development of active acoustic clutter characterization algorithms into Fleet Synthetic Training systems. Adapted the Generalized Acoustic Bottom Interaction Model to act as the first-order solution for a comprehensive, integrated system to generate an acoustic bottom loss and backscatter database in regions of strategic Navy interest. Provided technical and program management oversight for the OBCI. Continued investigation of Low Frequency Active source to characterize the seabed.					

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
Accomplishments/Planned Programs Subtotals	19.258	21.930	15.288	0.000	15.288

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/4226: *METEOROLOGICAL EQUIPMENT*	21.169	14.514	25.581	0.592	26.173	24.430	22.430	24.575	25.765	Continuing	Continuing
• RDTEN/0604218N: *Air/Ocean Equipment Engineering*	5.362	7.454	5.735	0.000	5.735	5.993	5.615	5.737	5.852	Continuing	Continuing

D. Acquisition Strategy

Acquisition, management and contracting strategies are to support the meteorological and oceanographic (METOC) Data Acquisition Project to develop, demonstrate, and validate METOC data collection methods and sensors, and to evolve the ability to provide timely and accurate METOC data and products to the Tactical Commander, all with management oversight by the Navy.

E. Performance Metrics

Goal: Develop techniques and tools to acquire METOC data in order to improve the accuracy of global and regional scale meteorological and oceanographic forecast models. Advanced sensor component, data collection, and meteorological, oceanographic and hydrographic survey technique development tasks are directed by Resource Sponsor, with input from external Systems Commands and/or Type Commanders, in response to validated capability gaps or operational fleet requirements. Wherever applicable, and based on favorable Science & Technology (S&T) assessments, tasks shall leverage or transition existing Small Business Innovative Research and/or RDT&E Budget Activity 6.2 - 6.3 S&T work.
Metric -- Tasks will address no less than 75% of applicable capability gaps and requirements.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy		DATE: February 2010
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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
METOC Future Mission Capabilities	WR	NRL Washington, DC	47.495	6.487	Oct 2009	4.726	Oct 2010	0.000		4.726	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	WR	SSC California	18.913	2.970	Oct 2009	2.259	Oct 2010	0.000		2.259	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/Various	MISC MISC	30.756	12.265	Nov 2009	8.087	Nov 2010	0.000		8.087	Continuing	Continuing	Continuing
LBS-G	C/CPIF	Teledyne Brown Eng Alabama	6.557	0.000		0.000		0.000		0.000	0.000	6.557	Continuing
		Subtotal	103.721	21.722		15.072		0.000		15.072			

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
METOC Future Mission Capabilities	C/CPIF	MISC MISC	2.464	0.208	Nov 2009	0.216	Nov 2010	0.000		0.216	Continuing	Continuing	Continuing
		Subtotal	2.464	0.208		0.216		0.000		0.216			

Remarks

Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy		DATE: February 2010
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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
METOC Future Mission Capabilities	WR	OPTEVFOR Virginia	0.160	0.000		0.000		0.000		0.000	0.000	0.160	Continuing
METOC Future Mission Capabilities	MIPR	JITC Arizona	0.040	0.000		0.000		0.000		0.000	0.000	0.040	Continuing
		Subtotal	0.200	0.000		0.000		0.000		0.000	0.000	0.200	

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
Acquisistion Workforce	Various/ Various	Not Specified Not Specified	0.096	0.000	Oct 2009	0.000	Nov 2010	0.000		0.000	0.000	0.096	Continuing
		Subtotal	0.096	0.000		0.000		0.000		0.000	0.000	0.096	

Remarks

	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	106.481	21.930		15.288		0.000		15.288			

Exhibit R-3, RDT&E Project Cost Analysis: PB 2011 Navy			DATE: February 2010
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	Total Prior Years Cost	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	Cost To Complete	Total Cost	Target Value of Contract

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 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2341: *METOC Data Acquisition*

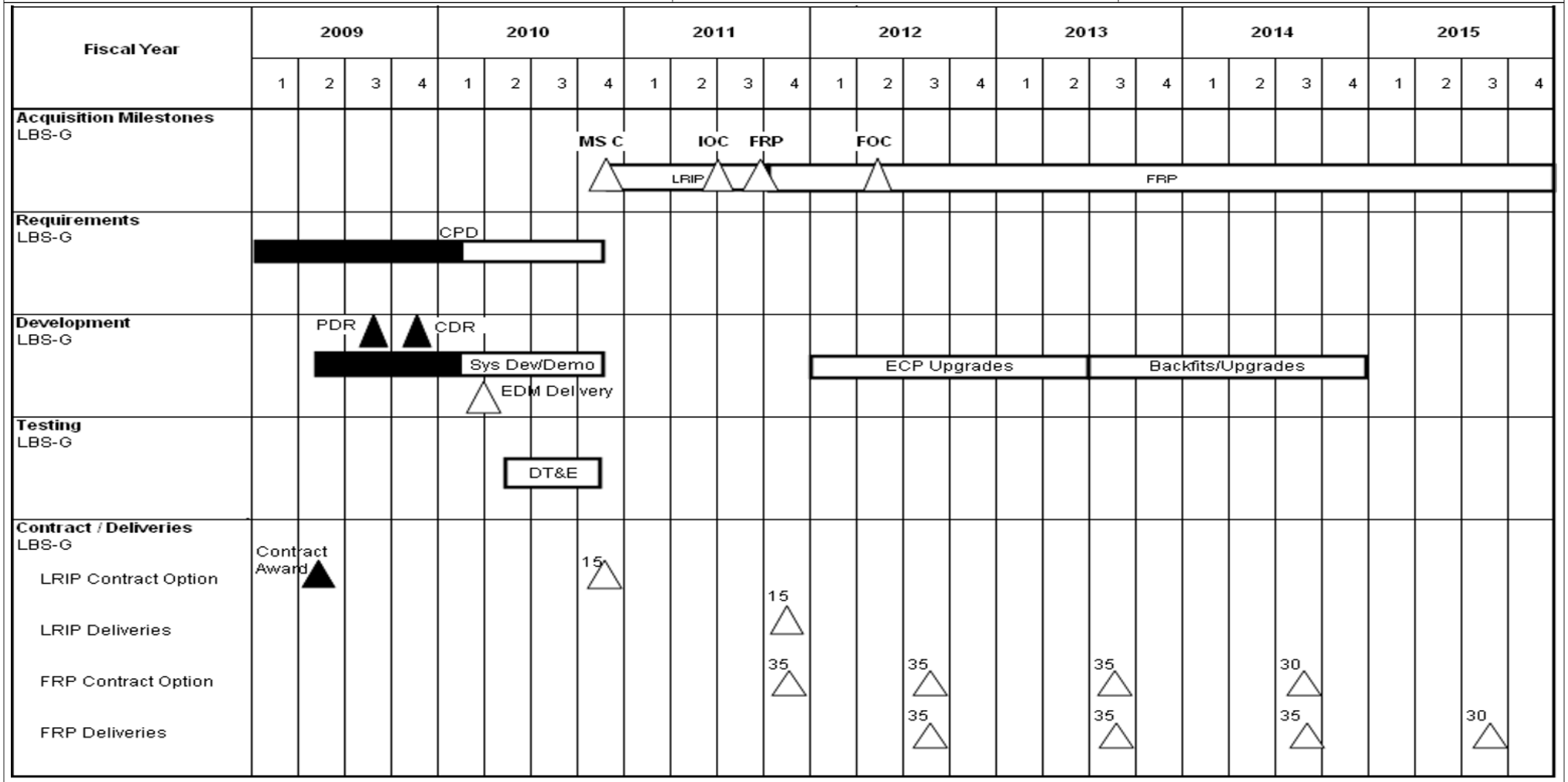

Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2341: *METOC Data Acquisition*

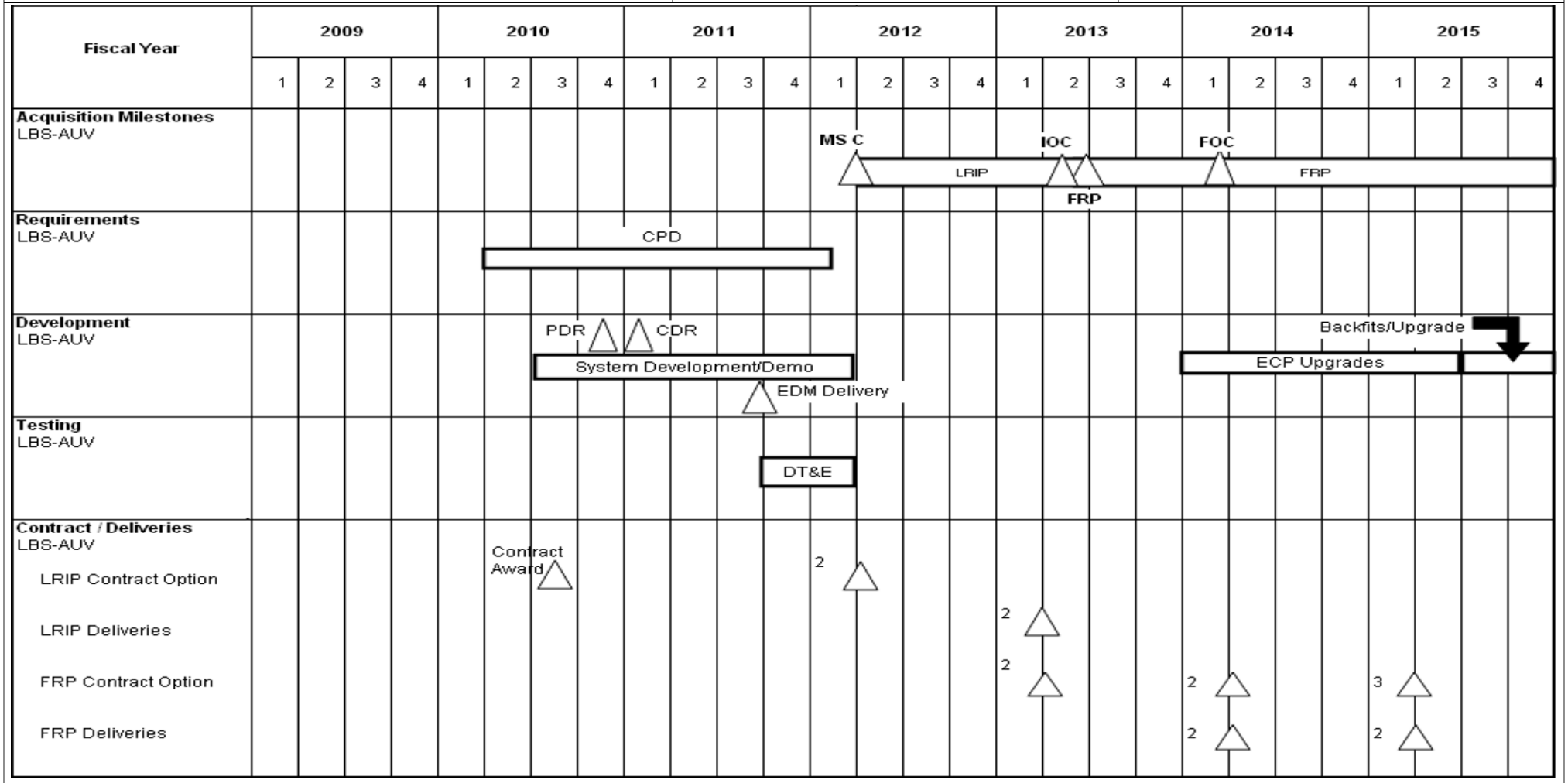

Exhibit R-4, **RDT&E Schedule Profile:** PB 2011 Navy		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2341: *METOC Data Acquisition*

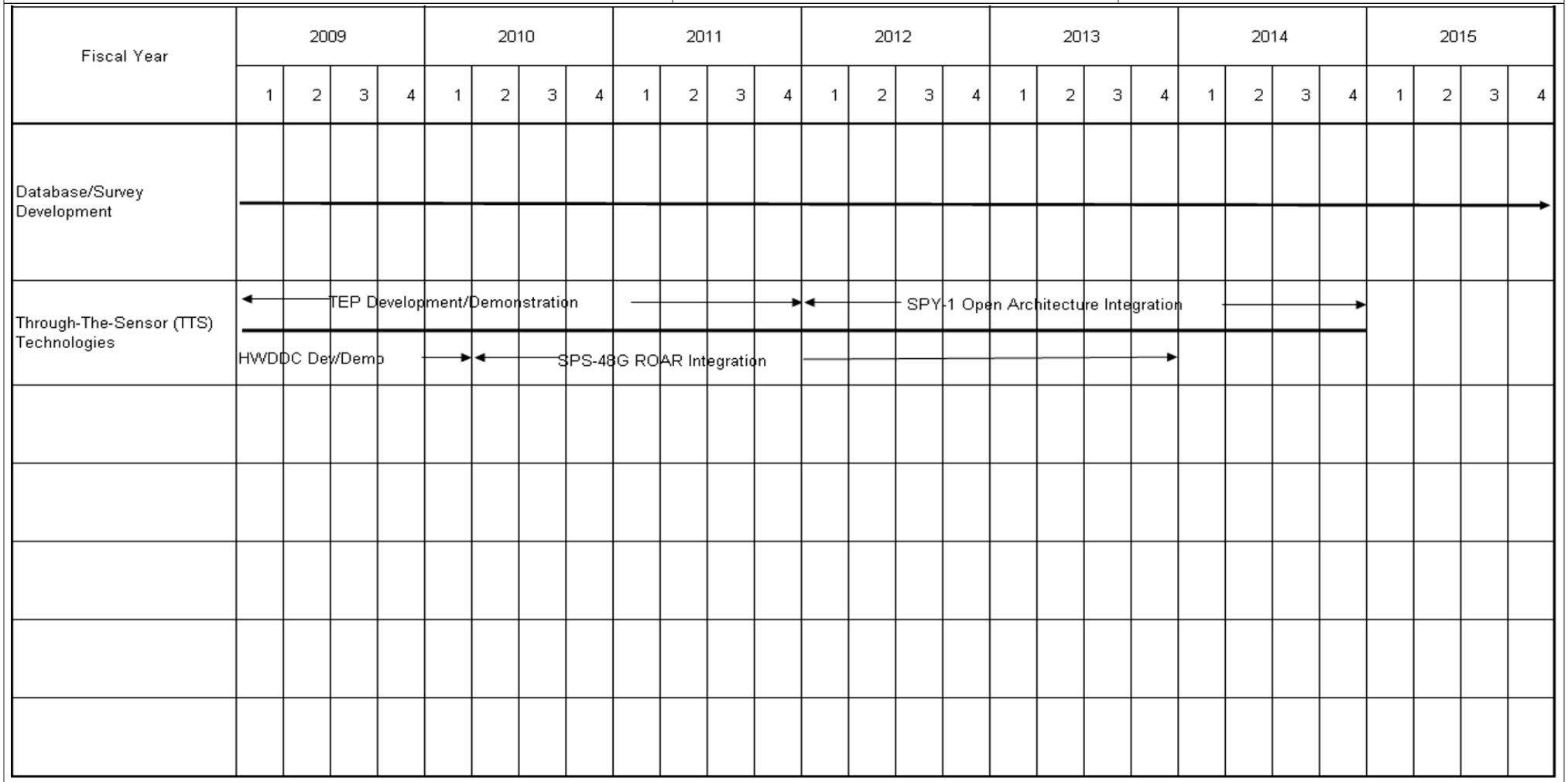

Exhibit R-4, RDT&E Schedule Profile: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2341: *METOC Data Acquisition*

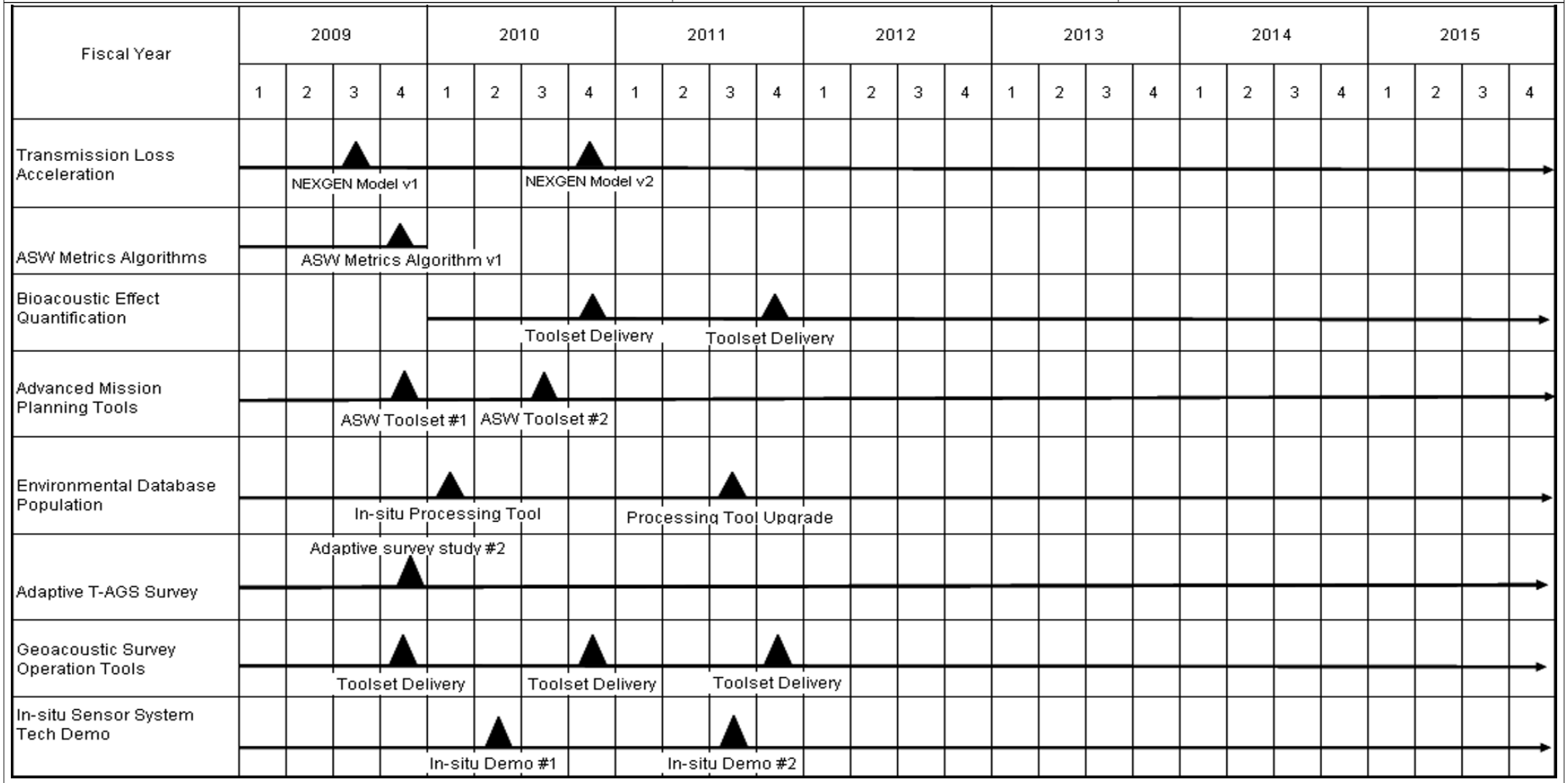

Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2341: *METOC Data Acquisition*

Schedule Details

	Start		End	
Event	Quarter	Year	Quarter	Year
METOC FMC Database/Survey Development	1	2009	4	2015
METOC FMC TEP Development/Demonstration	1	2009	4	2011
METOC FMC HWDDC Dvelopment/Demonstration	1	2009	1	2010
METOC FMC SPS-48G ROAR Integration	2	2010	4	2013
METOC FMC SPY-1 Open Architecture Integration	1	2012	4	2014
TOC USW Transmission Loss Acceleration	1	2009	4	2015
TOC USW NEXGEN Model v1	3	2009	3	2009
TOC USW NEXGEN Model v2	4	2010	4	2010
TOC USW Anti-Submarine Warfare (ASW) Metrics Algorithms	1	2009	4	2009
TOC USW ASW Metrics Algorithm v1	4	2009	4	2009
TOC USW Bioacoustic Effect Quantification	1	2010	4	2015
TOC USW Bioacoustic Effect Quantification Toolset Delivery 1	4	2010	4	2010
TOC USW Bioacoustic Effect Quantification Toolset Delivery 2	4	2011	4	2011
TOC USW Advanced Mission Planning Tools	1	2009	4	2015
TOC USW ASW Toolset #1	4	2009	4	2009
TOC USW ASW Toolset #2	3	2010	3	2010
TOC USW Environmental Database Population	1	2009	4	2015
TOC USW In-situ Processing Tool	1	2010	1	2010

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	Start		End	
Event	Quarter	Year	Quarter	Year
TOC USW Processing Tool Upgrade	3	2011	3	2011
TOC USW Adaptive T-AGS Survey	1	2009	4	2015
TOC USW Adaptive Survey Study #2	4	2009	4	2009
TOC USW Geoacoustic Survey Operation Tools	1	2009	4	2015
TOC USW Geoacoustic Survey Operation Toolset Deliver #1	4	2009	4	2009
TOC USW Geoacoustic Survey Operation Toolset Deliver #2	4	2010	4	2010
TOC USW Geoacoustic Survey Operation Toolset Deliver #3	4	2011	4	2011
TOC USW In-situ Sensor System Tech Demo	1	2009	4	2015
TOC USW In-situ Demo #1	2	2010	2	2010
TOC USW In-situ Demo #2	3	2011	3	2011
LBS-Glider Milestone C (MS C)	4	2010	4	2010
LBS-G Low Rate Initial Production (LRIP)	4	2010	3	2011
LBS-G Initial Operational Capability (IOC)	2	2011	3	2011
LBS-G Full Rate Production (FRP)	3	2011	4	2015
LBS-G Full Operational Capability (FOC)	2	2012	2	2012
LBS-G Capabilities Production Document (CPD)	1	2009	4	2010
LBS-G System Development / Demonstration	2	2009	4	2010
LBS-G Preliminary Design Review (PDR)	3	2009	3	2009
LBS-G Critical Design Review (CDR)	4	2009	4	2009
LBS-G Enterprise Data Model (EDM) Delivery	2	2010	2	2010

Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy		DATE: February 2010
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	Start		End	
Event	Quarter	Year	Quarter	Year
LBS-G Engineering Change Proposals (ECPs) Upgrades	1	2012	2	2013
LBS-G Backfits / Upgrades	3	2013	4	2014
LBS-G Development, Test & Evaluate (DT&E)	2	2010	4	2010
LBS-G Contract Award	2	2009	2	2009
LBS-G LRIP Contract Option: 15	4	2010	4	2010
LBS-G LRIP Deliveries: 15	4	2011	4	2011
LBS-G FRP Contract Option (1): 35	4	2011	4	2011
LBS-G FRP Contract Option (2): 35	3	2012	3	2012
LBS-G FRP Contract Option (3): 35	3	2013	3	2013
LBS-G FRP Contract Option (4): 30	3	2014	3	2014
LBS-G FRP Deliveries (1): 35	3	2012	3	2012
LBS-G FRP Deliveries (2): 35	3	2013	3	2013
LBS-G FRP Deliveries (3): 35	3	2014	3	2014
LBS-G FRP Deliveries (4): 30	3	2015	3	2015
LBS-Autonomous Undersea Vehicles MS C	1	2012	2	2012
LBS-AUV LRIP	1	2012	2	2013
LBS-AUV IOC	2	2013	2	2013
LBS-AUV FRP	2	2013	4	2015
LBS-AUV FOC	1	2014	1	2014
LBS-AUV CPD	2	2010	1	2012

Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy		DATE: February 2010
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	Start		End	
Event	**Quarter**	**Year**	**Quarter**	**Year**
LBS-AUV System Development / Demonstration	3	2010	1	2012
LBS-AUV PDR	4	2010	4	2010
LBS-AUV CDR	1	2011	1	2011
LBS-AUV EDM Delivery	3	2011	4	2011
LBS-AUV ECPs Upgrades	1	2014	2	2015
LBS-AUV Backfits / Upgrades	3	2015	4	2015
LBS-AUV DT&E	4	2011	1	2012
LBS-AUV Contract Award	3	2010	3	2010
LBS-AUV LRIP Contract Option: 2	1	2012	2	2012
LBS-AUV LRIP Delivieries: 2	1	2013	2	2013
LBS-AUV FRP Contract Option (1): 2	1	2013	2	2013
LBS-AUV FRP Contract Option (2): 2	1	2014	2	2014
LBS-AUV FRP Contract Option (3): 3	1	2015	2	2015
LBS-AUV FRP Deliveries (1): 2	1	2014	2	2014
LBS-AUV FRP Deliveries (2): 2	1	2015	2	2015

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy			DATE: February 2010
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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
2342: *METOC Data Assimilation and Mod*	17.979	19.336	15.311	0.000	15.311	13.666	13.901	12.860	12.735	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

A. Mission Description and Budget Item Justification

The meteorological and oceanographic (METOC) Data Assimilation Project is a multi-faceted project that provides future mission capabilities for warfighters to characterize the physical environment within their battlespace. This project includes: 1) development, demonstration and validation of atmospheric and oceanographic data assimilation techniques, forecast models, database management systems, and associated software for use in both mainframe and tactical scale computers. Included are numerical oceanographic and atmospheric models for the Large Scale Computers at the Navy Fleet Numerical Meteorology and Oceanography Center (FNMOC), Monterey, CA and the Naval Oceanographic Office (NAVO), Stennis Space Center, MS. These models, combined with a global communications network for data acquisition and distribution, form a prediction system which provides METOC data and products necessary to support naval operations worldwide in virtually every mission area; 2) other models, which focus on ocean thermal structure and circulation, and surf and tide prediction; 3) techniques to process and manage satellite remotely-sensed environmental data at Oceanography Centers ashore and on ships equipped with the AN/SMQ-11 satellite receiver/recorder; 4) National Polar-orbiting Operational Environmental Satellite System (NPOESS) readiness and risk reduction preparations to develop hardware and software that will allow ground stations to receive, ingest and exploit NPOESS data including the NPOESS Preparatory Project. These techniques allow for the integration and tactical application of significant oceanographic and atmospheric data derived from satellite-borne sensors. Included are techniques and algorithms for the processing of sensor measurements, conversion of raw signal data to geophysical information, analysis schemes encompassing Artificial Intelligence and Expert Systems, and other satellite data applications and field validation of end products; and, 5) a family of acoustic system performance models beginning with active system models and databases in the low-, mid-, and high-frequency regimes and culminating with high fidelity simulation products. As weapons and sensors become more sophisticated and complex, the marine environment has an increasingly significant impact on system performance. Operational limitations induced by the ocean and atmosphere must be understood, and the resulting constraints on mission effectiveness and system employment minimized. Hence, the operating forces require more accurate worldwide forecasts of METOC conditions with increased temporal and spatial resolution. An additional challenge is posed by the emergence of new satellite sensor data. In order to fully exploit this dynamic and massive volume of data, modern Data Base Management Systems are required, and must be tailored for individual computer configurations at both FNMOC and NAVO. Improved representation of smaller-scale phenomena, particularly in the littoral, is also an important consideration. Intelligence Preparation of the Environment Sensor R&D to meet Chief of Naval Operations and Commander, Fleet Forces Command requirements for remote autonomous, clandestine, littoral battlespace sensing in near shore areas in support of Sea Shield & Sea Basing.

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Major emphasis areas include the Littoral Battlespace Sensors - Unmanned Undersea Vehicle (comprised of ocean Gliders and Autonomous Undersea Vehicles programs of record, and the Meteorological and Oceanographic Future Mission Capabilities (METOC) the Meteorological and Oceanographic (METOC) Space-Based Sensing Capabilities, the Fleet Synthetic Training and the Tactical Oceanographic Capabilities / Under Sea Warfare projects.

FY 2011 request provides for continued advanced component development and prototype efforts associated with advanced data assimilation into environmental prediction systems (to include development of tactical decision aids and asset allocation tools), the continued development of advanced oceanographic and atmospheric prediction systems and architectures to provide improved forecasts and estimates of product accuracies, continued development of improved data fusion techniques, data quality control technologies and accelerate the automation prediction processes, and the development of data assimilation and fusion techniques and technologies for tactical radars, remote sensing and undersea sensor systems.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Acquisition Workforce Fund *FY 2009 Accomplishments:* Funded acquisition workforce fund.	0.090	0.000	0.000	0.000	0.000
Littoral Battlespace Sensing, Unmanned Undersea Vehicle (LBS-UUV) *FY 2009 Accomplishments:* Continued, from FY07, the development of advanced data assimilation and fusion algorithms for glider and Autonomous Undersea Vehicles (AUVs) data including, temperature, depth, salinity, optics, hydrographic, bathymetric and other water column and ocean bottom properties. Demonstrated a basic capability to assimilate, database, and relay data and derived products from ocean gliders and AUVs, including optics, bathymetry, temperature, depth, salinity, and currents. Demonstrated prototype mission planning and adaptive sampling capability. Began defining LBSF&I Unmanned Undersea Vehicle (UUV) Engineering Change Proposal (ECP) Fusion and Integration requirements and capabilities. Conducted ECP capability studies and analyses as required.	1.700	1.800	0.473	0.000	0.473

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: Demonstrate a basic capability to assimilate, database, and relay data and derived products from ocean gliders, including optics (glider analysis, satellite coupling, Navy Coastal Ocean Model integration, etc.), temperature, depth, salinity, and currents. Demonstrate prototype mission planning and adaptive sampling capability as part of the Littoral Battlespace Sensing - Gliders (LBS-G) System Development and Demonstration (SDD) phase. Continue development of advanced bathymetric data assimilation techniques such as Inertial Navigation Drift, automated fusion, micronavigation, and feature based navigation. Continue to define the LBS-UUV ECP Fusion requirements and capabilities. Integrate advanced quality control algorithms into the LBS-G system as required as part of the SDD phase of the procurement. Complete at-sea and ashore Development Testing and Evaluation of the complete end-to-end glider system including command and control, mission planning, mission profile characteristics and other Key Performance Parameters and Key System Parameters. Begin the SDD phase of the Littoral Battlespace Sensing - Autonomous Undersea Vehicle (LBS-AUV). *FY 2011 Base Plans:* Continue the development of advanced LBS-G and LBS-AUV data fusion efforts. Demonstrate prototype mission planning and adaptive sampling capability as part of the LBS-G SDD phase. Begin integration of advanced quality control algorithms as required into the LBS-AUV program as part of its SDD phase. Continue the LBS-AUV SDD Phase.					
Meteorological and Oceanographic (METOC) Future Mission Capabilities (FMC) *FY 2009 Accomplishments:* Continued advanced component development and prototype efforts associated with advanced data assimilation into environmental prediction systems. Continued development of advanced oceanographic and atmospheric prediction systems and architectures to provide improved forecasts and estimates of product accuracies. Continued development of improved data fusion techniques, data quality control technologies and accelerate the automation prediction processes. Developed	9.517	9.044	6.250	0.000	6.250

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
data assimilation and fusion techniques and technologies for tactical radars, remote sensing and undersea sensor systems. Developed atmospheric fusion algorithms and demonstrate Tactical Environmental Processor (TEP) and Hazardous Weather Detection and Display Capability reachback fusion capability. Developed network integration capability and continued to develop systems engineering plans, requirements, standards, studies, and other documentation supporting integration of these products into the SPY-1 Open Architecture and SPS-48G radars. Developed advanced data assimilation and data quality control algorithms for glider and Autonomous Undersea Vehicles (AUVs) data including, temperature, depth, salinity, optics, hydrographic, bathymetric and other water column and ocean bottom properties. *FY 2010 Plans:* Continue advanced component development and prototype efforts associated with advanced data assimilation into environmental prediction systems, to include development of tactical decision aids and asset allocation tools. Continue development of advanced oceanographic and atmospheric prediction systems and architectures to provide improved forecasts and estimates of product accuracies. Continue development of improved data fusion techniques, data quality control technologies and accelerate the automation prediction processes. Develop data assimilation and fusion techniques and technologies for tactical radars, remote sensing and undersea sensor systems. Develop atmospheric fusion algorithms and demonstrate TEP reachback fusion capability. Development of network integration capability and continue to develop systems engineering plans, requirements, standards, studies, and other documentation supporting integration of these products. Development of advanced data assimilation and data quality control algorithms for glider and AUVs data including, temperature, depth, salinity, optics, hydrographic, bathymetric and other water column and ocean bottom properties. *FY 2011 Base Plans:* Continue advanced component development and prototype efforts associated with advanced data assimilation into environmental prediction systems, to include development of tactical decision aids					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
and asset allocation tools. Continue development of advanced oceanographic and atmospheric prediction systems and architectures to provide improved forecasts and estimates of product accuracies. Continue development of improved data fusion techniques, data quality control technologies and accelerate the automation prediction processes. Develop data assimilation and fusion techniques and technologies for tactical radars, remote sensing and undersea sensor systems. Develop atmospheric fusion algorithms and demonstrate TEP reachback fusion capability. Development of network integration capability and continue to develop systems engineering plans, requirements, standards, studies, and other documentation supporting integration of these products. Development of advanced data assimilation and data quality control algorithms for glider and AUVs data including, temperature, depth, salinity, optics, hydrographic, bathymetric and other water column and ocean bottom properties.					
Meteorological and Oceanographic (METOC) Space-Based Sensing Capabilities	3.362	5.051	5.008	0.000	5.008
FY 2009 Accomplishments: Continued development of the National Polar-orbiting Operational Environmental Satellite System (NPOESS) data assimilation algorithms and applications previously funded under PE 0305160N, Navy METOC Support (Space), Project 0524 which used simulations and on-orbit heritage sensors. The NPOESS program constellation of satellites included the NPOESS Preparatory Project (NPP) satellite, the NPOESS satellites (C-1, C-2 and replacements) and the European METOC (European Meteorological Operational satellite program) . *FY 2010 Plans:* Continue development of techniques for the assimilation of data from current and future civil, military and international earth observing systems. Develop Naval applications using this data for Naval METOC Production Centers. Funding increase reflects the need for additional data assimilation algorithms and applications resulting from the anticipated launch of the NPP satellite in early FY11.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Continue development of the NPOESS data assimilation algorithms using NPP data. Continue development of techniques for the assimilation of data from current and future civil, military and international earth observing systems. Continue research and development of data assimilation processes and advanced modeling techniques for ingesting NPOESS sensor data.					
Tactical Oceanographic Capabilities (TOC) / Undersea Warfare (USW)	3.310	3.441	3.580	0.000	3.580
FY 2009 Accomplishments: Continued development of Anti-Submarine Warfare (ASW) mission planning, analysis and reconstruction tools, including Geographic Information Systems, for operational use at the ASW Reachback Cell (RBC). Reconstruction and Analysis (R&A) tool set expanded to support all ASW communities, integrate mission planning functions and contain both acoustic/non-acoustic reconstruction data in a GIS environment. Continued to develop ASW tactical decision aid asset allocation and mission planning tools to optimize deployment of both environmental data collection assets and tactical acoustic and non-acoustic sensors. Developed ASW-related performance surface products for use at the NAVOCEANO ASW Reachback Cell and in mission planning systems to include Probability of Detection maps. Assessed uncertainty values associated with acoustic performance prediction products. Identified, developed and tested environmentally-oriented, mathematically-based decision support tools for application in support of ASW operations and exercises. Began development of models, databases and algorithms to quantify non-acoustic/ acoustic uncertainty. Continue development of algorithms to create area acoustic assessments and analogous exercise area tools. Developed descriptive dynamic oceanography features assessment tool for ocean model accuracy/reliability determination. Continued spiral development of the RAM and Parabolic Equation acoustic models. Integrated upgrade NAUTILUS propagation model into fleet systems. Continued annual upgrades to the Scalable Tactical Acoustic Propagation Loss Engine system. Developed a self-consistent semi-empirical surface loss model. Used reverberation workshop results to develop new Navy Standard active reverberation model. Continued development					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
of algorithms that recommend active sonar waveforms based on the state of the environment and algorithms that validate and improve the quality of modeled low frequency active planning. Developed models that quantify effects of near- surface turbulence and N-gradients on target detection. Developed Fish Scattering Strength algorithm Continued development of a short-term ambient noise forecasting capability using previously collected ambient noise data from tactical sensors. Continued to develop methods and techniques to aid in the collection, archiving/databasing and dissemination of both omni-directional and directional ambient noise data. Developed ambient noise databases for emerging airborne and submarine-based ASW systems. Provided project technical and program management oversight. *FY 2010 Plans:* Continue FY09 efforts. Continue to develop decision tool asset allocation and mission planning modules to optimize deployment of both environmental data collection assets and tactical Undersea Warfare (USW) acoustic and non-acoustic sensors. Continue to refine and validate USW-related performance assessment and decision products for use at the NAVOCEANO ASW RBC and in USW decision tools. Continue spiral development of active and passive acoustic propagation loss models for use in fleet mission planning systems supporting mono- and multistatic Antisubmarine Warfare operations. Continue technology upgrades to transmission loss acceleration algorithms. Develop algorithms that characterize acoustic reverberation as well as boundary and volume loss/ scatter functions as observed by active and passive tactical sonar systems. Develop decision tool algorithms that optimize operational sonar system performance. Continue to develop directional and omnidirectional regional ambient noise characterization tools. Conduct technical demonstration of in-situ ocean parameter collection systems. Populate/upgrade oceanographic and acoustic databases in COCOM areas of interest. Transition algorithms that capture and communicate variability and uncertainty, robustness and sensitivity as input to Fleet USW decision tools and underlying models and data bases. Develop oceanographic operations analysis tools Develop real-time and post-event ASW performance assessment tools. Provide project technical and program management oversight.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Continue to develop decision tool asset allocation and mission planning modules to optimize deployment of both environmental data collection assets and tactical ASW acoustic and non-acoustic sensors. Continue to refine and validate ASW-related performance assessment and decision products for use at the NAVOCEANO ASW RBC and in ASW decision tools. Develop algorithms for quantification of volume scattering effects on active sonar. Continue spiral development of active and passive acoustic propagation loss models for use in fleet mission planning systems supporting mono- and multistatic ASW operations. Continue technology upgrades to transmission loss acceleration algorithms. Develop algorithms that characterize acoustic volume loss/scatter functions as observed by active tactical sonar systems. Develop sea surface and seabed boundary interaction characterizations to support sensor performance predictions. Expand capabilities and increase access speed of acoustic surface scattering and loss modules. Continue to develop directional and omnidirectional regional ambient noise characterization and forecasting tools. Populate/upgrade oceanographic and acoustic databases in COCOM areas of interest. Transition algorithms that capture and communicate variability and uncertainty, robustness and sensitivity as input to Fleet ASW decision tools and underlying models and data bases. Develop an ASW RBC ocean model assessment toolkit. Develop post-ASW event R&A validation tools and capabilities. Develop ASW Reachback Cell visual analysis toolset. Provide project technical and program management oversight. Continue capability upgrades and validation of Next Generation electro-magnetic and electro-optic performance prediction systems and decision tools. Develop Through-the-Sensor echnologies to characterize atmospheric boundary layer parameters for ASW applications.					
Accomplishments/Planned Programs Subtotals	17.979	19.336	15.311	0.000	15.311

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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/4226: *METEOROLOGICAL EQUIPMENT*	21.169	14.514	25.581	0.592	26.173	24.430	22.430	24.575	25.765	Continuing	Continuing
• RDTEN/0604218N: *Air/Ocean Equipment Engineering*	5.362	7.454	5.735	0.000	5.735	5.993	5.615	5.737	5.852	Continuing	Continuing

D. Acquisition Strategy

Acquisition, management and contracting strategies to support the METOC Data Assimilation Project which is a multi-faceted program which includes: 1) development, demonstration and validation of atmospheric and oceanographic data assimilation techniques, forecast models, database management systems, and associated software for use in both mainframe and tactical scale computers; 2) other models, which focus on ocean thermal structure and circulation, and surf and tide prediction; 3) techniques to process and manage satellite remotely-sensed environmental data at Oceanography Centers ashore and on ships equipped with the AN/SMQ-11 satellite receiver/recorder; and, 4) a family of acoustic system performance models beginning with active system models and databases in the low-, mid-, and high-frequency regimes and culminating with high fidelity simulation products.

E. Performance Metrics

Goal: Develop techniques and tools to assimilate meteorological and oceanographic (METOC) data in order to improve the accuracy of global and regional scale meteorological and oceanographic forecast models. Data assimilation is expanded to include new in-situ and remotely-sensed data types, based on operational need. Tasks are directed toward advanced techniques enabling assimilation of disparate sources on non-synoptic time scales. Acoustic, atmospheric, and oceanographic model development, prototyping and transition is focused on improved model physics, increased resolution, and computational efficiency.
Metric -- Tasks will address no less than 75% of applicable capability gaps and requirements.

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2342: *METOC Data Assimilation and Mod*

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
METOC Future Mission Capabilities	WR	NRL Washington DC	91.094	11.475	Oct 2009	8.728	Oct 2010	0.000		8.728	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	WR	SSCs California, South Carolina	1.486	0.786	Oct 2009	0.662	Oct 2010	0.000		0.662	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/Various	MISC MISC	34.108	7.075	Oct 2009	5.921	Oct 2010	0.000		5.921	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	FFRDC	Univ. S. Miss. Mississippi	2.413	0.000		0.000		0.000		0.000	0.000	2.413	Continuing
		Subtotal	129.101	19.336		15.311		0.000		15.311			

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
METOC Future Mission Capabilities	C/CPIF	SSA/CSC MISC	0.295	0.000		0.000		0.000		0.000	0.000	0.295	Continuing
		Subtotal	0.295	0.000		0.000		0.000		0.000	0.000	0.295	

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2342: *METOC Data Assimilation and Mod*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2010 Cost	FY 2010 Award Date	FY 2011 Base Cost	FY 2011 Base Award Date	FY 2011 OCO Cost	FY 2011 OCO Award Date	FY 2011 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Acquisition Workforce	Various/ Various	Not Specified Not Specified	0.090	0.000		0.000		0.000		0.000	0.000	0.090	Continuing
		Subtotal	0.090	0.000		0.000		0.000		0.000	0.000	0.090	

Remarks

	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	129.486	19.336		15.311		0.000		15.311			

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 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2342: *METOC Data Assimilation and Mod*

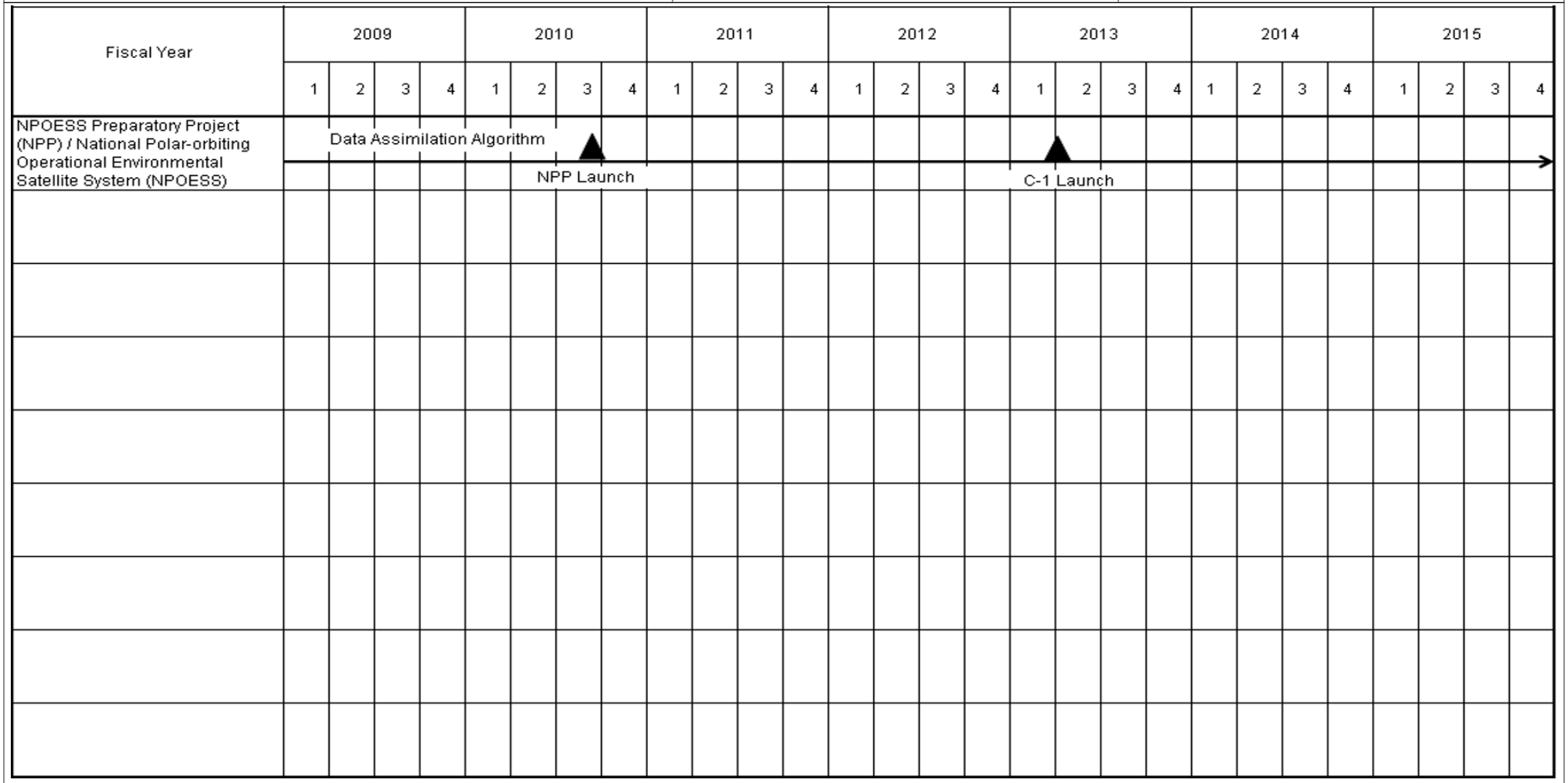


Exhibit R-4, **RDT&E Schedule Profile:** PB 2011 Navy		**DATE:** February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2342: *METOC Data Assimilation and Mod*

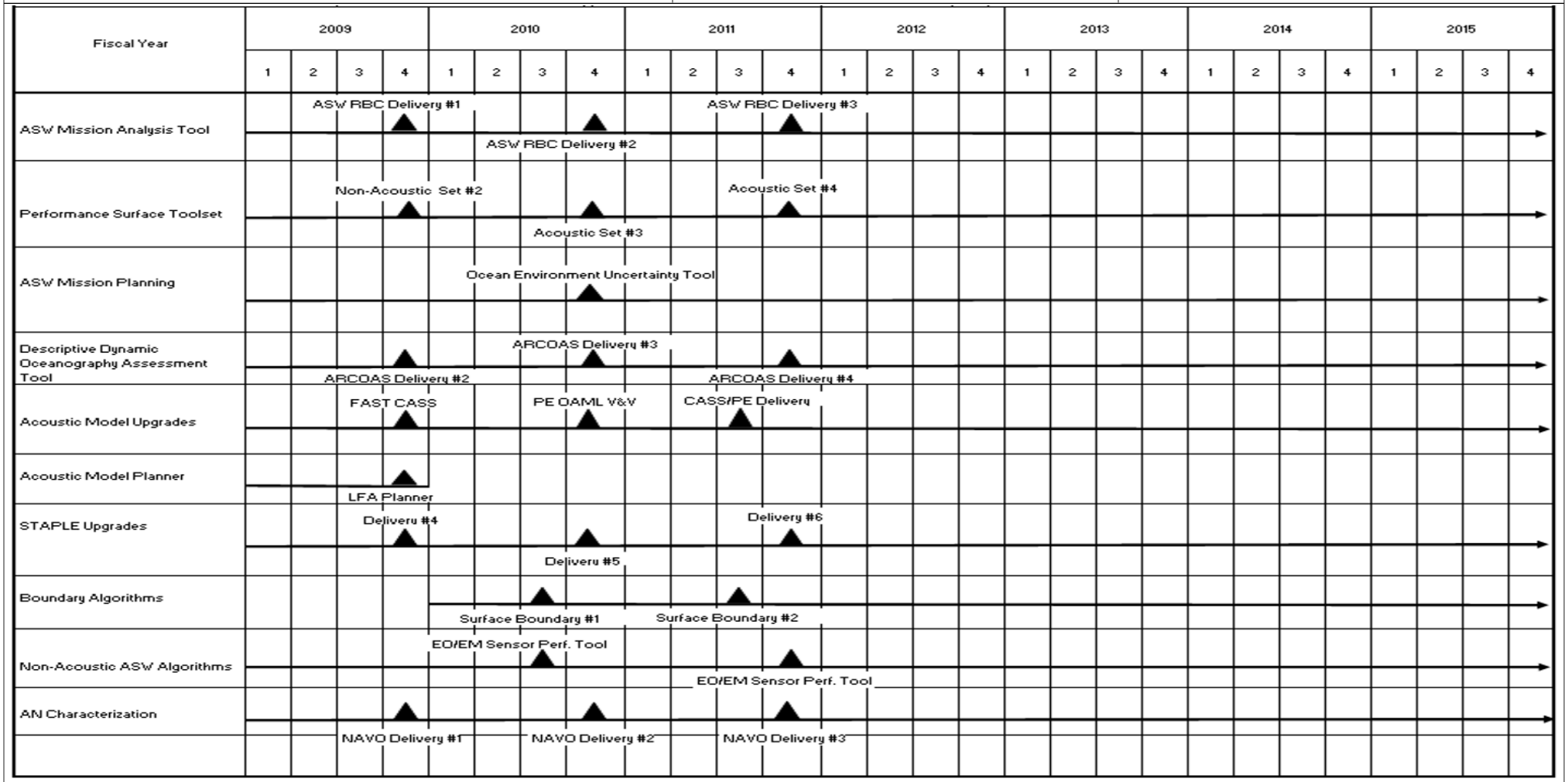


Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	R-1 ITEM NOMENCLATURE PE 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2342: *METOC Data Assimilation and Mod*

Schedule Details

	Start		End	
Event	Quarter	Year	Quarter	Year
TOC USW Anti-Submarine (ASW) Mission Analysis Tool	1	2009	4	2015
TOC USW ASW Reachback (RBC) Delivery #1	4	2009	4	2009
TOC USW ASW RBC Delivery #2	4	2010	4	2010
TOC USW ASW RBC Delivery #3	4	2011	4	2011
TOC USW Performance Surface Toolset	1	2009	4	2015
TOC USW Non-Acoustic Set #2	4	2009	4	2009
TOC USW Acoustic Set #3	4	2010	4	2010
TOC USW Acoustic Set #4	4	2011	4	2011
TOC USW ASW Mission Planning	1	2009	4	2015
TOC USW Ocean Environment Uncertainty	4	2010	4	2010
TOC USW Descriptive Dynamic Oceanography Assessment Tool	1	2009	4	2015
TOC USW ARCOAS Delivery #2	4	2009	4	2009
TOC USW ARCOAS Delivery #3	4	2010	4	2010
TOC USW ARCOAS Delivery #4	4	2011	4	2011
TOC USW Acoutic Model Upgrades	1	2009	4	2015
TOC USW FAST CASS	4	2009	4	2009
TOC USW PE OAML V&V	4	2010	4	2010
TOC USW CASS/PE Delivery	3	2011	3	2011

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2342: *METOC Data Assimilation and Mod*

	Start		End	
Event	Quarter	Year	Quarter	Year
TOC USW Acoustic Model Planner	1	2009	4	2009
TOC USW LFA Planner	4	2009	4	2009
TOC USW STAPLE Upgrades	1	2009	4	2015
TOC USW Delivery #4	4	2009	4	2009
TOC USW Delivery #5	4	2010	4	2010
TOC USW Delivery #6	4	2011	4	2011
TOC USW Boundary Algorithms	1	2010	4	2015
TOC USW Surface Boundary #1	3	2010	3	2010
TOC USW Surface Boundary #2	3	2011	3	2011
TOC USW Non-Acoustic ASW Algorithms	1	2009	4	2015
TOC USW Electro-Magnetic / Electro-Optic (EO/EM) Sensor Performance Tool	3	2010	3	2010
TOC USW EO/EM Sensor Performance Tool	4	2011	4	2011
TOC USW Ambient Noise (AN) Characterization	1	2009	4	2015
TOC USW NAVO Delivery #1	4	2009	4	2009
TOC USW NAVO Delivery #2	4	2010	4	2010
TOC USW NAVO Delivery #3	4	2011	4	2011

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2343: *Tactical METOC Applications*	

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
2343: *Tactical METOC Applications*	6.116	16.097	13.736	0.000	13.736	15.729	15.293	12.166	12.418	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

A. Mission Description and Budget Item Justification

The Tactical Meteorological and oceanographic (METOC) Applications Project provides future operational effects decision aid capabilities for Navy and Marine Corps warfighters in the context of Joint Operations in a net-centric environment. This project identifies and transitions state-of-the-art decision support software technologies from the government's and commercial Industry's technology base and then demonstrates and validates these capabilities before fielding. These software decision support tools provide platform, sensor, communications, and weapon systems performance assessments for warfighters in terms of their littoral and deep-strike battlespace environments. These assessments allow mission planners and warfighters, from the unit to theater level, to optimize their sensor employment on airborne, surface, and subsurface platforms in support of all Naval Composite Warfare mission areas including Undersea Warfare (USW), Anti-Submarine Warfare (ASW), Mine Warfare, Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare (AAW), Strike Warfare (STW), and Naval Special Warfare (NSW). Performance assessments leading to improvements in operational and tactical control are conducted through a two-tiered approach: 1) METOC Decision Aids (MDAs) and, 2) Operational Effects Decision Aids (OEDAs). MDAs consist of a series of analysis tools which characterize the physical environment conditions of the battlespace based on the best set of physical environment data available at the time (i.e., some combination of historical and/or real-time (or near real-time) in-situ, and numerically modeled forecast data). OEDAs then use the MDA information by fusing it with relevant, often-classified sensor and target data to predict how own-force weapons and sensor systems will perform against hostile targets. Performance results are displayed in tabular and graphic formats integrated into net-centric visualization tools for use by mission planners and combat/weapon system operators to develop localization plans, USW/AAW/ASUW screens, STW profiles, AMW ingress and egress points, and for other warfare considerations. MDAs and OEDAs typically use data derived from sensors developed in Project 2341 (METOC Data Acquisition) and assimilated by software produced by Project 2342 (METOC Data Assimilation and Modeling). MDAs and OEDAs also use data obtained through direct interfaces to Navy combat systems. A current emphasis area of the project is capabilities required to characterize and/or predict sensor and weapons system performance in the highly complex littoral environments in support of regional conflict scenarios. It addresses multi-warfare areas, particularly shallow water ASW, NSW, and missile and air defense/strike capabilities.

Major emphasis areas include the Naval Integrated Tactical Environmental System Next Generation (NITES-Next) program of record, and the Tactical Oceanographic Capabilities / Under Sea Warfare (USW) project.

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2343: *Tactical METOC Applications*

FY 2011 request provides for the continued development of NITES-Next system architecture, system engineering, and software, including integration with next generation Electromagnetic and Electro-optical EM/EO and performance prediction systems.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Acquisition Workforce Fund	0.031	0.000	0.000	0.000	0.000
FY 2009 Accomplishments: Funded acquisition workforce fund.					
Naval Integrated Tactical Environmental System Next Generation (NITES-Next)	6.085	15.821	13.736	0.000	13.736
FY 2009 Accomplishments: Conducted NITES-Next development contract award preparation activities and associated development of system architecture, system engineering, and software development, including development of upgrades to next generation Electromagnetic and Electro-optical (EM/EO) and Advanced Refractive Environmental Prediction System performance prediction systems. Awarded the NITES-Next Release 1 (Ashore requirements and NITES-Fielded legacy software updates) development contract, conducted the Initial Baseline Review. Developed the Mine Warfare and Environmental Data Applications Library to include the incorporation of the new environmental databases and model updates.					
FY 2010 Plans: Continue development of system architecture, system engineering, software development, test and integration activities for NITES-Next System Development and Demonstration, including integration into next generation EM/EO and performance prediction systems. Conduct NITES-Next Release 1 System Readiness Review (SRR)/System Functional Review (SFR), System Design Review (SDR), Preliminary Design Review (PDR) and Critical Design Review (CDR) involving lab, fleet and site testing and early Commander, Operational Test & Evaluation Force (COMOPTEVFOR) involvement. Initiate extensive NITES-Next software development across the multiple Computer Software Configuration Items.					

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2343: *Tactical METOC Applications*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: Conduct NITES-Next Design Readiness Review. Continue the development of NITES-Next Release 1 system architecture, system engineering, and software, including integration with next generation EM/EO and performance prediction systems. Award NITES-Next development contract Option 1 (Release 2 (Afloat and Mobile requirements)). Conduct NITES-Next Release 2 SRR/SFR, SDR, PDR and CDR involving lab, fleet and site testing and early Commander, Operational Test & Evaluation Force involvement. Continue Developmental Test and Evaluation efforts in preparation for Initial Operational Test and Evaluation and Milestone C involving lab, fleet and site testing.					
Tactical Oceanographic Capabilities (TOC) / Undersea Warfare (USW)	0.000	0.276	0.000	0.000	0.000
FY 2010 Plans: Continue capability upgrades and validation of Next Generation electro-magnetic and electro-optic performance prediction systems and decision tools. Develop Through-the-Sensor technologies to characterize atmospheric boundary layer parameters for Anti-Submarine Warefare applications.					
Accomplishments/Planned Programs Subtotals	6.116	16.097	13.736	0.000	13.736

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
• RDTEN/0604218N: *Air/Ocean Equipment Engineering*	5.362	7.454	5.735	0.000	5.735	5.993	5.615	5.737	5.852	Continuing	Continuing

D. Acquisition Strategy

Acquisition, management and contracting strategies are to support the Tactical METOC Applications project to continue the development of state-of-the-art software capabilities that provide sensor, communication, and weapon system performance assessments across the full spectrum of open ocean and littoral operating environments, meteorology and oceanography , all with management oversight incorporating these into the Naval Integrated Tactical Environmental System Next Generation program under JCIDS by the Department of the Navy (DoN).

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 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2343: *Tactical METOC Applications*

E. Performance Metrics

Goal: Develop meteorological and oceanographic (METOC) future operational effects decision aid capabilities for Navy and Marine Corps war fighters in order to facilitate the characterization and prediction of the entire battle space.

Metric: Improve the accuracy of meteorological and oceanographic tactical decision aids and applications in order to address no less than 75% of applicable capability gaps and requirements.

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2343: *Tactical METOC Applications*

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
Product Development	WR	NRL Washington, DC	3.238	0.655	Oct 2009	0.593	Oct 2010	0.000		0.593	Continuing	Continuing	Continuing
NITES/NITES-Next	WR	SSCs California, South Carolina	5.686	1.637	Oct 2009	0.646	Oct 2010	0.000		0.646	Continuing	Continuing	Continuing
NITES/NITES-Next	C/Various	MISC MISC	3.877	1.898	Oct 2009	1.778	Oct 2010	0.000		1.778	Continuing	Continuing	Continuing
NITES	C/Various	MISC MISC	61.400	0.000		0.000		0.000		0.000	0.000	61.400	Continuing
NITES-Next	C/CPIF	GD-IT Viginia	3.508	11.907	Jan 2010	10.719	Nov 2010	0.000		10.719	Continuing	Continuing	Continuing
		Subtotal	77.709	16.097		13.736		0.000		13.736			

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
Support Cost	C/CPIF	IPD Not Specified	0.595	0.000		0.000		0.000		0.000	0.000	0.595	Continuing
		Subtotal	0.595	0.000		0.000		0.000		0.000	0.000	0.595	

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2343: *Tactical METOC Applications*

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

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
Acquisition Workforce	Various/ Various	Not Specified Not Specified	0.031	0.000		0.000		0.000		0.000	0.000	0.031	Continuing
		Subtotal	0.031	0.000		0.000		0.000		0.000	0.000	0.031	

Remarks

	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	78.335	16.097		13.736		0.000		13.736			

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 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2343: *Tactical METOC Applications*

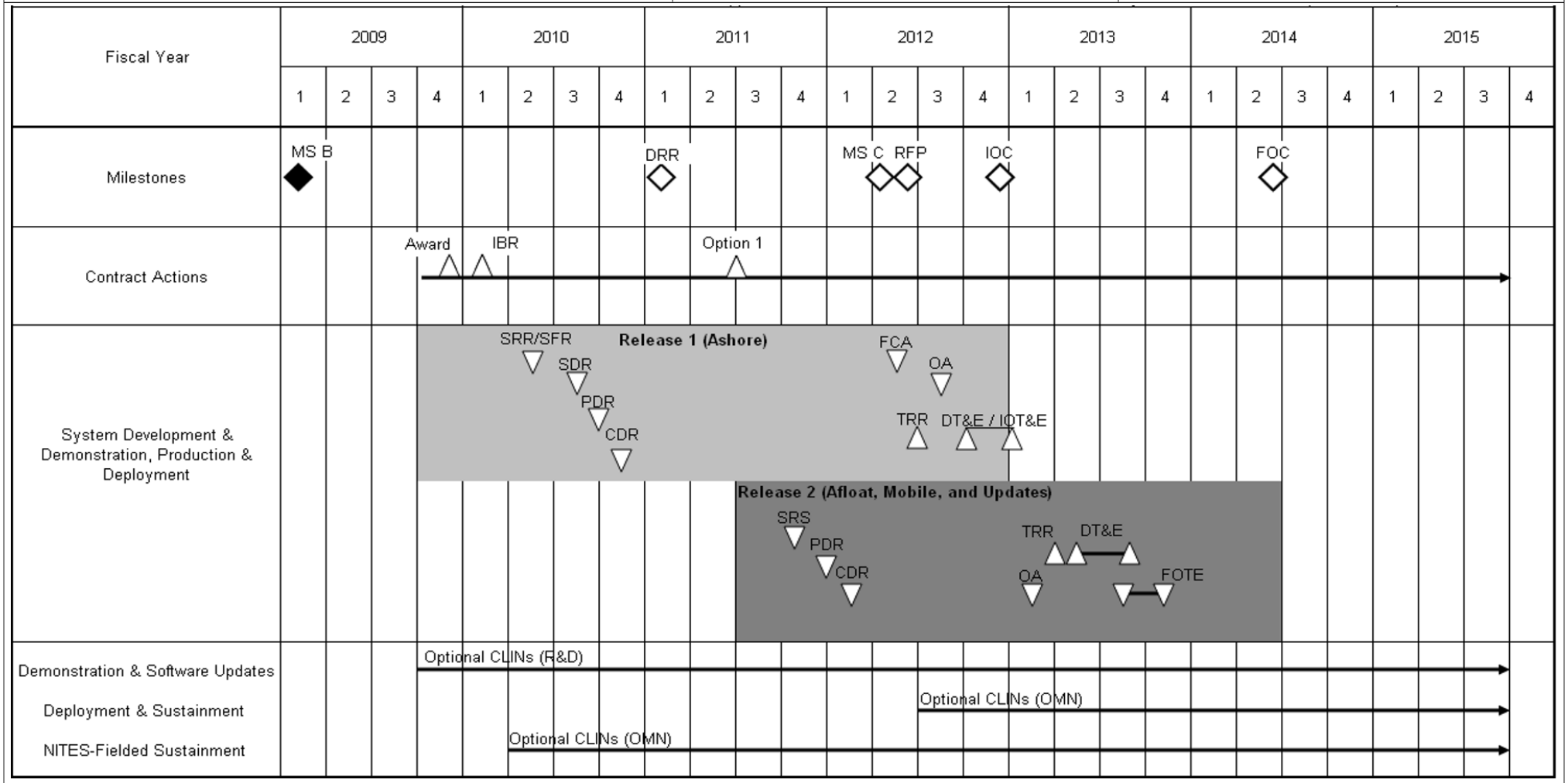


Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2343: *Tactical METOC Applications*

Schedule Details

	Start		End	
Event	**Quarter**	**Year**	**Quarter**	**Year**
NITES-Next Milestone B (MS B)	1	2009	1	2009
NITES-Next Design Readiness Review (DRR)	1	2011	1	2011
NITES-Next MS C	1	2012	2	2012
NITES-Next Request for Proposal (RFP)	2	2012	3	2012
NITES-Next Initial Operational Capability (IOC)	4	2012	1	2013
NITES-Next Full Operational Capability (FOC)	2	2014	3	2014
NITES-Next Base Award	4	2009	4	2009
NITES-Next Initial Base Review (IBR)	1	2010	1	2010
NITES-Next Contract Option 1	2	2011	3	2011
NITES-Next Release 1: System Readiness Review (SRR) / SFR	2	2010	2	2010
NITES-Next Release 1: System Design Review (SDR)	3	2010	3	2010
NITES-Next Release 1: Production Design Review (PDR)	3	2010	4	2010
NITES-Next Release 1: Critical Design Review (CDR)	4	2010	4	2010
NITES-Next Release 1: FCA	2	2012	2	2012
NITES-Next Release 1: Technical Readiness Review (TRR)	2	2012	3	2012
NITES-Next Release 1: OA	3	2012	3	2012
NITES-Next Release 1: Development, Test, & Eval (DT&E) / IOT&E	3	2012	1	2013
NITES-Next Release 2: SRS	4	2011	4	2011

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2343: *Tactical METOC Applications*

	Start		End	
Event	Quarter	Year	Quarter	Year
NITES-Next Release 2: Production Design Review (PDR)	4	2011	1	2012
NITES-Next Release 2: Critical Design Review (CDR)	1	2012	1	2012
NITES-Next Release 2: OA	1	2013	1	2013
NITES-Next Release 2: Technical Readiness Review (TRR)	1	2013	2	2013
NITES-Next Release 2: Development, Test, & Evaluation (DT&E)	2	2013	3	2013
NITES-Next Release 2: FOT&E	3	2013	4	2013
NITES-Next Demonstration & Software Updates Optional CLINs (R&D)	1	2010	3	2015
NITES-Next Development & Sustainment Option CLINs (OMN)	3	2012	3	2015
NITES-Next NITES-Fielded Sustainment Optional CLINs (OMN)	2	2010	3	2015

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2344: *Precise Timing and Astronomy*	

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
2344: *Precise Timing and Astronomy*	19.615	2.249	2.118	0.000	2.118	1.199	1.217	1.243	1.269	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

A. Mission Description and Budget Item Justification

The major thrust of the Precise Timing and Astrometry Project is to provide future capabilities that directly support the mission of the U.S. Naval Observatory (USNO). These future mission capabilities are intended to:
1) address DoD requirements for needed increases in positioning accuracies of modern weapons systems by the determination of star positions (including objects at other than optical wavelengths) and the stellar inertial reference system (to which all navigation, guidance, and positioning systems are ultimately referred); 2) develop techniques for the prediction of the Earth's instantaneous orientation with respect to the stellar inertial reference system; 3) oversee the determination and dissemination of precise time information using the Navy/DoD Master Clock System and precise time distribution networks; and, 4) develop advanced electronic light detectors and interferometry in the optical and infrared wavelength regions for very precise determination of the positions of both faint and bright stars, satellite tracking, and space debris studies. DoD Instruction 5000.2 assigns to the Navy the responsibility for coordinating Precise Time and Time Interval (PTTI) requirements and for maintaining a PTTI reference standard (astronomical and atomic) for use by all DoD Services, Federal agencies, and related scientific laboratories. The Navy is also responsible for providing astronomical data for navigation, positioning, and guidance, including space. Some operational and many emerging requirements surpass current support capabilities. In response to these DoD requirements, this project transitions Research (6.1) and Exploratory Development (6.2) efforts, as well as developments in the civilian sector, into the operational capabilities of the USNO.

FY11 request provides for the installation and operational testing of the complete Master Clock systems installation at USNO.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Precise Timing and Astronomy	1.373	2.249	2.118	0.000	2.118

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2344: *Precise Timing and Astronomy*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Operational Readiness Review (ORR) for Rubidium (Rb) Fountain at the U.S. Naval Observatory (USNO). Installation and testing for two Rb fountain systems. Continue fabrication of four Rb Fountain Systems . Demo GPS Military (M) Code tracking for Timing Receivers. *FY 2010 Plans:* Complete fabrication of four Rb Fountain systems; complete installation and testing of Alternate Master Clock Fountain environmental systems. Complete contract preparation and award for unique capabilities GPS M Code Timing Receiver. Begin development, installation and testing of electronic Very Long Base-Line Interferometry (eVLBI) wide-band data connectivity capability. *FY 2011 Base Plans:* Complete installation and operational testing of the complete Master Clock systems installation at USNO, DC. Continue development of and begin production of the GPS-III M-Code Timing Receiver. Continue the development, installation and testing of electronic eVLBI wide-band data connectivity capability.					
Joint Milli-Arcsecond Pathfinder Survey (J-MAPS) *FY 2009 Accomplishments:* Joint Milli-Arcsecond Pathfinder Survey (J-MAPS) completed Phase A (conceptual design) and Phase B (preliminary design) of the overall spacecraft and mission. In addition, long lead item developments will began immediately after the System Requirements Review. Developments included focal plane assemblies, readout and processing electronics, and optical components. Delivered a preliminary design for the spacecraft. Beginning in FY10 the resources for the J-MAPS program are budgeted in project 3229.	18.143	0.000	0.000	0.000	0.000
Acquisition Workforce Fund	0.099	0.000	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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2344: *Precise Timing and Astronomy*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: Funded acquisition workforce fund.					
Accomplishments/Planned Programs Subtotals	19.615	2.249	2.118	0.000	2.118

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Acquisition, management and contracting strategies are to support the Precise Timing and Astrometry Project in direct support of the U.S. Naval Observatory in: 1) addressing DoD requirements for needed increases in positioning accuracies of modern weapons systems by the determination of star positions and the stellar inertial reference system ; 2) developing techniques for the prediction of the Earth's instantaneous orientation with respect to the stellar inertial reference system; 3) overseeing the determination and dissemination of precise time information using the Navy/DoD Master Clock System and precise time distribution networks; and, 4) developing advanced electronic light detectors and interferometry in the optical and infrared wavelength regions for very precise determination of the positions of both faint and bright stars, satellite tracking, and space debris studies, all with management oversight by Program Executive Officer for Command, Control, Communications, Computers, and Intelligence.

E. Performance Metrics

Goal: Address Navy/DoD requirements for needed increases in positioning accuracies of modern weapons systems by the determination of star positions, oversee the determination and dissemination of precise time information using the Navy/DoD Master Clock System and precise time distribution networks.

Metric: Measurable progress toward stated GPS-III requirement to meet or exceed a 2 sigma accuracy of 0.5 nanoseconds (ns) for the M Code Rx error and 0.1ns Master Clock error. Improve star position accuracy to within 10 milliarcseconds in support of National Technical Means (classified) program requirements.

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2344: *Precise Timing and Astronomy*	

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
Product Development	WR	Naval Observatory Washington, DC	14.305	2.249	Nov 2009	2.118	Oct 2010	0.000		2.118	0.000	18.672	Continuing
Precise Timing & Astrometry	Various/ Various	Misc VAR	0.438	0.000		0.000		0.000		0.000	0.000	0.438	Continuing
Precise Timing & Astrometry	Various/ Various	VAR Not Specified	18.706	0.000		0.000		0.000		0.000	0.000	18.706	Continuing
		Subtotal	33.449	2.249		2.118		0.000		2.118	0.000	37.816	

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
Acquisition Workforce	Various/ Various	Not Specified Not Specified	0.099	0.000		0.000		0.000		0.000	0.000	0.099	Continuing
		Subtotal	0.099	0.000		0.000		0.000		0.000	0.000	0.099	

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2344: *Precise Timing and Astronomy*	

	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	33.548	2.249		2.118		0.000		2.118	0.000	37.915	

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 2344: *Precise Timing and Astronomy*

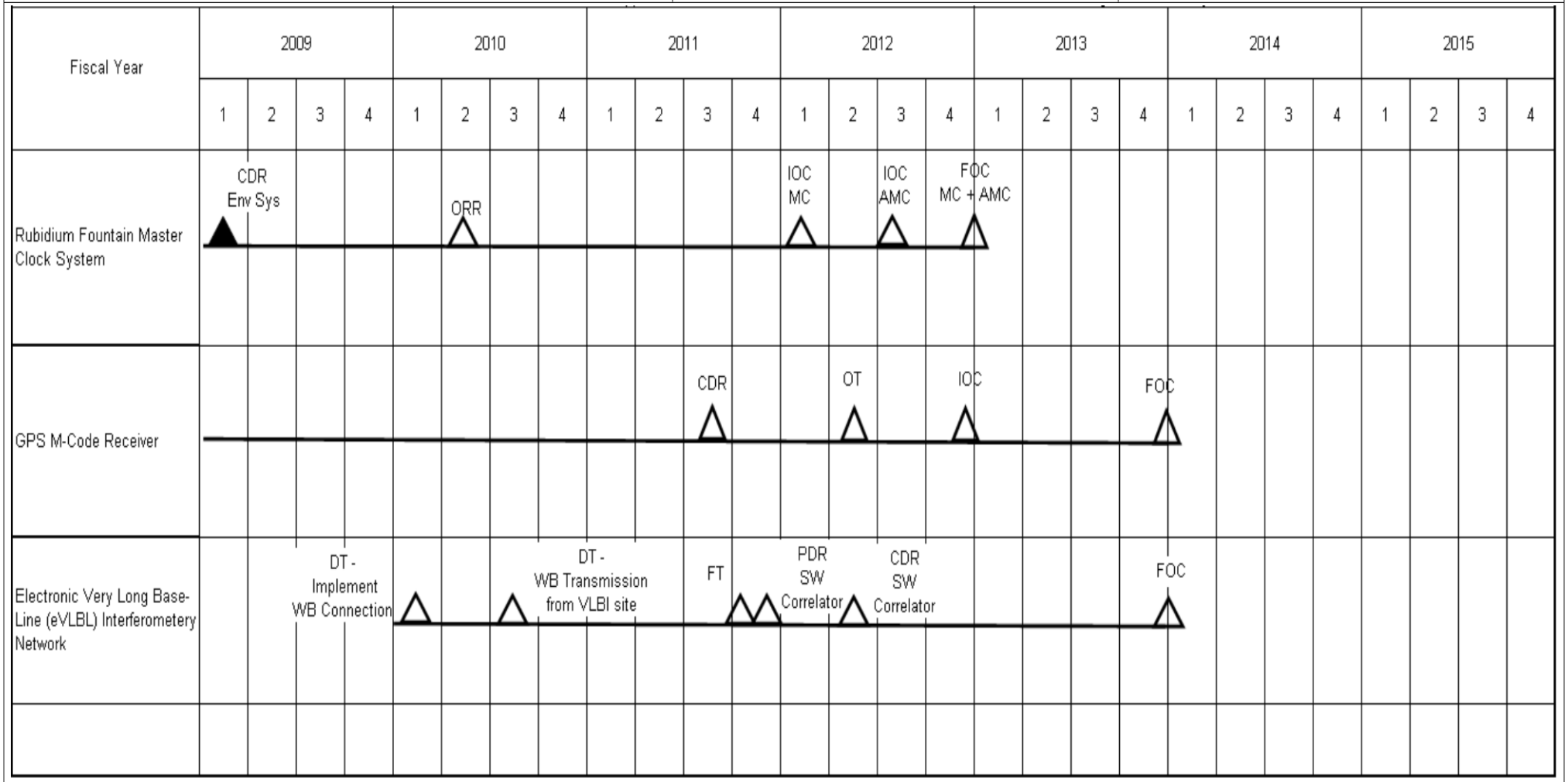


Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 2344: *Precise Timing and Astronomy*

Schedule Details

	Start		End	
Event	**Quarter**	**Year**	**Quarter**	**Year**
Rubidium Fountain Master Clock System	1	2009	4	2013
Critical Design Review (CDR) - Environmental System	1	2009	1	2009
Operational Readiness Review (ORR)	2	2010	2	2010
Initial Operational Capability (IOC) - Milestone C (MC)	1	2012	1	2012
IOC - AMC	3	2012	3	2013
Full Operational Capability (FOC) - MC	4	2012	4	2012
FOC - AMC	4	2012	4	2012
Critical Design Review (CDR)	3	2011	3	2011
OT	2	2012	2	2012
Contract Award	2	2012	2	2012
IOC	4	2012	4	2012
FOC 1	4	2013	4	2013
DT - Implement WB Connection	1	2010	1	2010
DT - WB Transmission from VLBI site	3	2010	3	2010
PDR SW Correlator	4	2011	4	2011
CDR SW Correlator	2	2012	2	2012
FOC 2	4	2013	4	2013
FT	4	2011	4	2011

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3207: *Fleet Synthetic Training*	

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
3207: *Fleet Synthetic Training*	0.968	1.004	3.437	0.000	3.437	1.007	1.043	1.067	1.088	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

A. Mission Description and Budget Item Justification

Fleet Synthetic Training (FST) provides naval forces with an enhanced in-port training capability. Integrating embedded shipboard training devices, aircraft and submarine simulators into an interoperable network with joint, coalition and interagency partners will provide more effective training for our deploying naval forces.

A key factor in achieving this new way of training our naval forces is to ensure that the required training is based on realistic characterizations of the physical environment. This project develops and delivers software that characterizes the ocean and atmospheric environments; adjusts to meet fleet-required training scenarios; allows synthetic training to be conducted in areas of planned and contingency operations; and, provides sufficient detail to simulate the real-world conditions of the physical environment in those areas of interest.

To support Fleet readiness the Navy has established a persistent training environment. It enables the use of modeling and simulation in support of FST. Navy's Fleet Training Continuum (NCTE) satisfies this requirement by providing the infrastructure and connectivity required for distributed simulation-based training, events, and exercises. The JSAF simulation provides the core model for maritime constructive representation and stimulation for Navy Training and Joint Training events.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Fleet Synthetic Training	0.968	1.004	3.437	0.000	3.437
The Navy Training Baseline Joint Semi-Automated Forces (JSAF) and other virtual components will connect live players, significantly realism of the exercise. Improved terrain representation is required for every exercise AOR, to augment the limited data provided for the rest of the world representation. This provides higher quality wargaming scenarios for units participating in the training. Order of battle changes are quicker for developers; the ability to use the existing Link-16 model and services to					

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3207: *Fleet Synthetic Training*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
represent Link-11 platform operations; and FST events and joint wargames that require the use of unclassified or releasable JSAF can be supported. *FY 2009 Accomplishments:* - Develop environmental archive data for 4/14 Navy Continuous Training Environment (NCTE) exercise. - Develop link between claimancy data architecture and architecture for data provision in support of NCTE. - Develop ocean data query capability. - Refine and automate the process for producing performance surface products used in the anti-submarine warfare white cell. - Develop synthetic bathythermographs and satellite imagery to enhance the training experience. *FY 2010 Plans:* - Develop environmental archive data for 4-6 NCTE exercise areas. - Test and evaluate link between claimancy data architecture and architecture for data provision in support of NCTE. - Develop GCCS-M overlays of performance surface products. - Implement ocean data query capability. - Continue to refine and automate the process for producing performance surface products as required. - Develop additional synthetic point data and field imagery products. *FY 2011 Base Plans:* - Develop environmental archive data for 4-6 additional NCTE exercises areas. - Refine link between claimancy data architecture and architecture for data provision in support of NCTE. - Continue to automate the process for producing performance surface products.					

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3207: *Fleet Synthetic Training*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Develop additional synthetic point data and field imagery products. - Research feasibility of providing live data in support of synthetic training events. - Research implementation of climatology products into Fleet Synthetic Training. - Develop fleet-required capabilities and enhancements to the NCTE and JSAF Navy software application baselines - Develop capabilities to address the following requirements: -- JTAC Participation in Synthetic Training (SAT) -- USMC DVTE/MSAT Merge -- JSAF Prediction Aids -- JSAF Inhibit Detection -- Radars & Emitters Parametric Data Refresh -- JSAF P-3 Link-11 LVC Development -- Navy JSAF Unclass/Releasable Version Data Update -- JSAF Unit Creation GUI -- JSAF (PAC-AUS, Treasure Coast, Carribbean, UK/Scotland) Terrain Updates					
Accomplishments/Planned Programs Subtotals	0.968	1.004	3.437	0.000	3.437

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Produce meteorological and oceanographic environmental databases for 4 or 14 NCTE exercise areas. Will implement, test, and integrate with JSAF and other federates in accordance with requirements.

2) Complete data and architecture integration, including information assurance compliance for provision of synthetic METOC data to the NCTE.

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3207: *Fleet Synthetic Training*

3) Produce bathythermographic data collection based on synthetic ocean environment and synthetic satellite/radar imagery based on meteorological environmental data for 4 of 14 NCTE exercise areas.

4) Initiate improvements in characterization of ambient noise in an effort to enhance ASW operations in live and synthetic events.

5) Research and develop the software and associated efforts to include documentation; will design and implement upgrades to JSAF consistent with approved requirements and CRs and document the effects of JSAF capabilities (robustness) and stability. Will design, implement, test, and integrate JSAF enhancements in accordance with requirements.

6) NWDC will produce releases to include applicable documentation updates for the Guidance, Rational, and Interoperability Manual (GRIM) and Federation Agreement Document (FAD). Will implement JSAF capability enhancements to support evolving joint and Coalition training requirements.

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3207: *Fleet Synthetic Training*

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
System Engineering	WR	Alion Fairfax, VA	0.000	0.000		2.600	Oct 2010	0.000		2.600	0.000	2.600	Continuing
		Subtotal	0.000	0.000		2.600		0.000		2.600	0.000	2.600	

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	NRL Not Specified	0.000	0.400	Jan 2010	0.335	Nov 2010	0.000		0.335	0.000	0.735	Continuing
Software Development	WR	NSWC Caderock Not Specified	0.000	0.400	Jan 2010	0.335	Nov 2010	0.000		0.335	0.000	0.735	Continuing
Studies and Analysis	Various/ Various	Various Not Specified	0.000	0.104	Nov 2009	0.067	Nov 2010	0.000		0.067	0.000	0.171	Continuing
Configuration Management	Various/ Various	Various Not Specified	0.000	0.100	Nov 2009	0.100	Nov 2010	0.000		0.100	0.000	0.200	Continuing
		Subtotal	0.000	1.004		0.837		0.000		0.837	0.000	1.841	

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3207: *Fleet Synthetic Training*	

	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	0.000	1.004		3.437		0.000		3.437	0.000	4.441	

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 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 3207: *Fleet Synthetic Training*

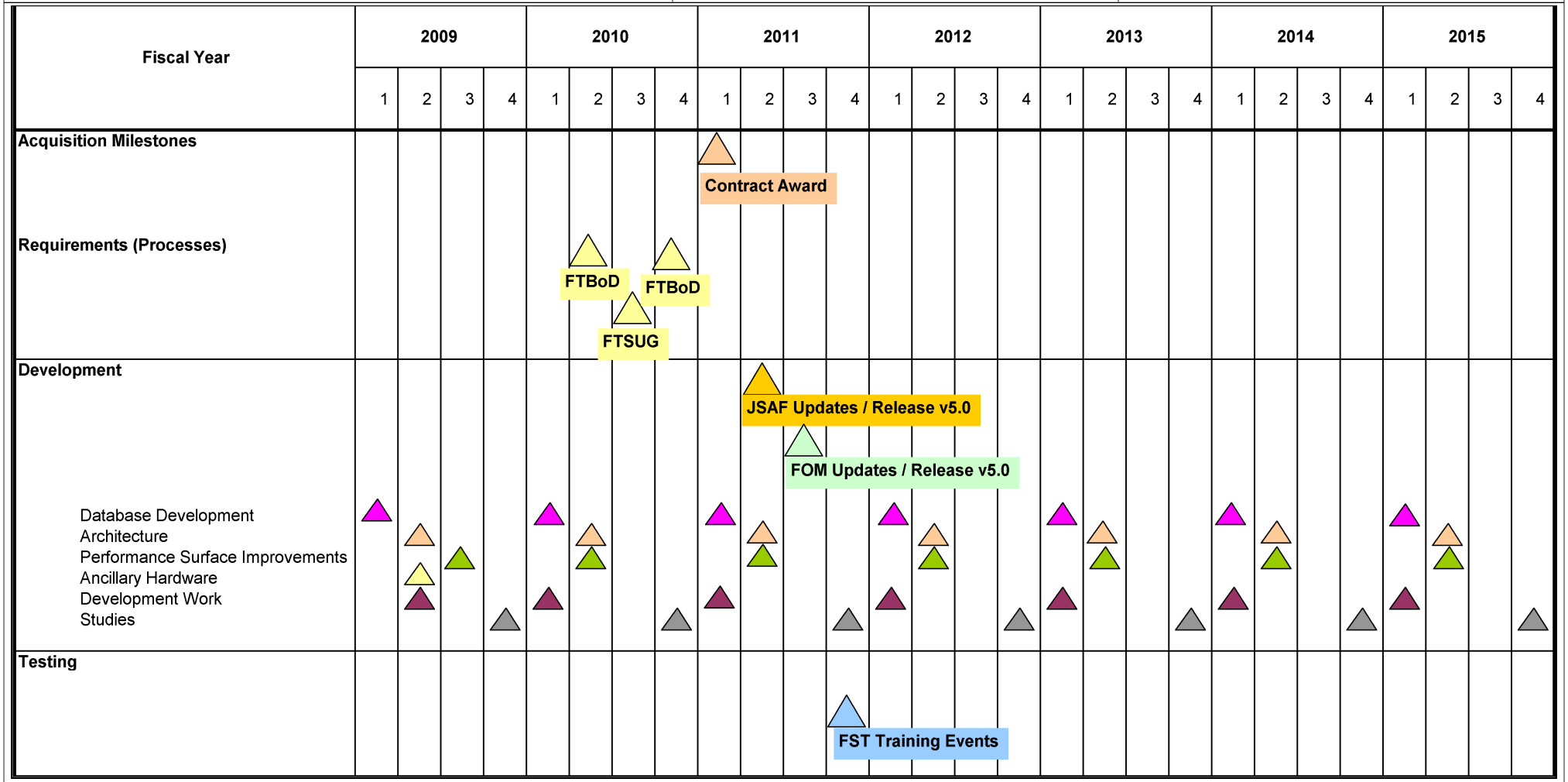


Exhibit R-4A, RDT&E Schedule Details: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 ITEM NOMENCLATURE** PE 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 3207: *Fleet Synthetic Training*

Schedule Details

	Start		End	
Event	**Quarter**	**Year**	**Quarter**	**Year**
Acquisition Milstones - Contract Award	1	2011	1	2011
Requirements - Fleet Training Software Users Group (FTSUG)	2	2010	2	2010
Requirement - Fleet Training Board of Directors (FTBoD)	1	2010	4	2010
Testing - FST Training Event	4	2011	4	2011
Dvelopment - JSAF Update/Release	2	2011	2	2011
Development - JVLC FOM Update/Release	3	2011	3	2011
Development - Database Development	1	2009	1	2015
Development - Architecture	2	2009	2	2015
Development - Performance Surface Improvements	3	2010	2	2015
Development - Ancillary Hardware	2	2009	2	2009
Development - Development Work	2	2009	1	2015
Development - Studies	4	2009	4	2015

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3229: *JMAPS*	

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
3229: *JMAPS*	0.000	54.971	73.441	0.000	73.441	69.099	33.106	5.916	5.917	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

Note

FY 2009 efforts were budgeted in Project 2344 (Precise Timing and Astronomy).

A. Mission Description and Budget Item Justification

Joint Milli-Arcsecond Pathfinder Survey (JMAPS) satellite program. Joint strike operations require extremely accurate Positioning, Navigation, and Timing (PNT) systems in order to both: locate hostile threats with space-borne Intelligence Surveillance and Reconnaissance (ISR) systems, and then to deliver ordnance on targets. The Navy provides a key component of PNT - the Celestial Reference Frame. This reference frame is defined in star catalogs that are used in conjunction with star trackers to determine orientation of space-based sensors to minimize location error and the resultant weapon system delivery accuracy. The accuracy of star positions (hence weapon delivery accuracy) is degrading with time due to the movement of stars since the last highly accurate space-based measurements of star positions were made in 1991. The accuracy of the catalog is approaching the minimum necessary to support current requirements, and will not meet the needs for future sensors and weapon systems. Therefore, the Navy, in concert with other agencies in the Space and ISR communities, is developing JMAPS to satisfy the emerging requirements for a new high accuracy star catalog through a space-based astrometry mission. It will also "pathfind" new star tracker technology as a risk reduction for future ISR systems. Producing star catalogs with sufficient accuracy to meet these requirements can only be done from satellites due to atmospheric interference on ground-based systems and the physical limitations of aircraft.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
JMAPS	0.000	54.971	73.441	0.000	73.441
FY 2010 Plans: Engineering analysis and conceptual design work required for the system requirements review including some risk reduction by maturing a single focal plane array and the astrometric and band					

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3229: *JMAPS*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
pass filters. In addition, the program will begin the preliminary design activities of the instrument, spacecraft and ground systems. Phase A activities planned for System Requirements Review include mission and system requirements analysis, engineering analysis of spacecraft attitude determination and control system and spacecraft design to include preliminary thermal requirements, and detailed system performance specifications from mission concept design and requirements definition. Technology risk reduction activities will include the advanced development of two independent focal plane arrays, as well as the astrometric and band pass filters. Phase B activities planned to support a Preliminary Design Review include maturing the instrument, spacecraft and ground system design and the procurement of long-lead items. Additional engineering analysis to evaluate the developing technologies in the instrument design for performance and mission satisfaction. *FY 2011 Base Plans:* Complete Preliminary Design review, including maturing the instrument, spacecraft, and ground system design and begin the activities and engineering analysis required for the critical design review. Phase C activities will include the completion of a detailed design for the instrument, spacecraft and ground system in support of a Critical Design Review. End to end performance analysis will be conducted to verify the system and new technologies are sufficiently mature to satisfy mission requirements. The program will begin Phase D by initiating the procurement of the sub-system and components of the instrument, spacecraft and ground system.					
Accomplishments/Planned Programs Subtotals	0.000	54.971	73.441	0.000	73.441

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 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 3229: *JMAPS*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

The JMAPS program will not be developed as an Evolutionary Acquisition (EA). JMAPS will begin as an S&T government activity and transition to acquisition at Milestone B. The contract mechanisms at the Naval Research Laboratory and U.S Naval Observatory will support the development of the program. JMAPS will be executed as a class B/C program in accordance with Military handbook DOD-HDBK-343 (USAF) of 01 February 1986, Design Construction and Testing Requirements for One of a Kind Space Equipment. Additionally, JMAPS will adhere to the Key Decision Point and gates established for acquisition programs. Complete traceability will be limited to only key requirements. Technology below TRL 6 at Milestone B will be acceptable by providing risk mitigation strategies and maintaining alternate implementations.

E. Performance Metrics

The JMAPS program will update the currently degrading celestial catalog to meet current and future war fighter requirements. The JMAPS catalog will provide 1 milli-arcsecond position accuracy and 1 milli-arcsecond proper motion on the bright stars, magnitude 1 through 12, no later than 2017. The JMAPS program will provide photometric accuracy better than 7% in three wavelength bands from 450nm to 750nm.

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3229: *JMAPS*	

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
System Requirements Review (SRR)	Various/ Various	NRL Washington, DC	0.000	10.471	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_1	Various/ CPFF	Comtech AeroAstro Ashburn, VA	0.000	15.000	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_2	SS/CPFF	L3 Communications SSG Tinsley, Wilmington, MA	0.000	3.000	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_3	SS/CPFF	Teledyne Scientific & Imaging: Teledyne Imaging Sensors Camarillo, CA	0.000	3.000	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_4	SS/CPFF	Raytheon Vision Systems Goleta, CA	0.000	3.000	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_5	SS/CPFF	Orbital Science Corporation Various	0.000	10.000	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_6	C/CPFF	Space/Ground System Solutions, Inc West Melbourne, FL	0.000	1.000	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3229: *JMAPS*	

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
System Requirements Review (SRR)_7	C/CPFF	Silver Engineering, Inc. Melbourne, FL	0.000	0.500	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_8	Various/ CPFF	Broadreach Engineering Phoenix, AZ	0.000	1.000	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_9	C/CPFF	Northrop Grumman, Woodland Hills San Bernardino, CA	0.000	1.000	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
System Requirements Review (SRR)_10	C/CPFF	L3 Communications Telemetry-West San Diego, CA	0.000	1.000	Jan 2010	0.000		0.000		0.000	0.000	1.000	Continuing
Preliminary Design Review and Critical Design Review (PDR & CDR)	Various/ Various	NRL Washington, DC	0.000	0.000		15.541	Oct 2010	0.000		15.541	Continuing	Continuing	Continuing
Preliminary Design Review and Critical Design Review (PDR & CDR)_1	Various/ CPFF	Comtech AeroAstro Ashburn, VA	0.000	0.000		18.000	Oct 2010	0.000		18.000	Continuing	Continuing	Continuing
Preliminary Design Review and Critical Design Review (PDR & CDR)_2	SS/CPFF	L3 Communications SSG Tinsley, Wilmington, MA	0.000	0.000		2.000	Oct 2010	0.000		2.000	Continuing	Continuing	Continuing

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3229: *JMAPS*	

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
Preliminary Design Review and Critical Design Review (PDR & CDR)_3	SS/CPFF	Teledyne Scientific & Imaging: Teledyne Imaging Sensors Camarillo, CA	0.000	0.000		4.000	Oct 2010	0.000		4.000	Continuing	Continuing	Continuing
Preliminary Design Review and Critical Design Review (PDR & CDR)_4	SS/CPAF	Raytheon Vision Systems Goleta, CA	0.000	0.000		4.000	Oct 2010	0.000		4.000	Continuing	Continuing	Continuing
Preliminary Design Review and Critical Design Review (PDR & CDR)_5	SS/CPFF	Orbital Science Corporation Various	0.000	0.000		10.000	Oct 2010	0.000		10.000	Continuing	Continuing	Continuing
Preliminary Design Review and Critical Design Review (PDR & CDR)_6	SS/CPFF	Space/Ground System Solutions, Inc. West Melbourne, FL	0.000	0.000		4.000	Oct 2010	0.000		4.000	Continuing	Continuing	Continuing
Preliminary Design Review and Critical Design Review (PDR & CDR)_7	C/FP	Silver Engineering, Inc, Melbourne, FL	0.000	0.000		0.500	Oct 2010	0.000		0.500	Continuing	Continuing	Continuing
Preliminary Design Review and Critical Design Review (PDR & CDR)_9	Various/ CPFF	Northrop Grumman Various, CA	0.000	0.000		1.000	Oct 2010	0.000		1.000	Continuing	Continuing	Continuing
	C/CPFF		0.000	0.000		1.000	Oct 2010	0.000		1.000	Continuing	Continuing	Continuing

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3229: *JMAPS*	

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
Preliminary Design Review and Critical Design Review (PDR & CDR)_10		L3 Communications Telemetry-West San Diego, CA											
Ground Data Processing Design	Various/ Various	USO Washington, DC	0.000	0.000		3.200	Oct 2010	0.000		3.200	Continuing	Continuing	Continuing
		Subtotal	0.000	48.971		63.241		0.000		63.241			

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
Requirements and Performance Analysis	Various/ Various	USNO Washington, DC	0.000	4.700	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
Requirements and Performance Analysis_1	SS/CPFF	Draper Laboratory Arlington, VA	0.000	0.500	Jan 2010	0.000		0.000		0.000	Continuing	Continuing	Continuing
Performance Analysis	Various/ Various	USNO Washington, DC	0.000	0.000		2.500	Oct 2010	0.000		2.500	Continuing	Continuing	Continuing
Performance Analysis_1	SS/CPFF	Draper Laboratory	0.000	0.000		0.500	Oct 2010	0.000		0.500	Continuing	Continuing	Continuing

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3229: *JMAPS*

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
		Arlington, VA											
		Subtotal	0.000	5.200		3.000		0.000		3.000			

Remarks

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
Requirements and Performance Analysis	Various/ Various	NRL Washington, DC	0.000	0.000		6.200	Oct 2011	0.000		6.200	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		6.200		0.000		6.200			

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
Program Office Support	C/TBD	ONR	0.000	0.800	Jan 2010	1.000	Oct 2011	0.000		1.000	Continuing	Continuing	Continuing

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 3229: *JMAPS*

Management Services ($ in Millions)

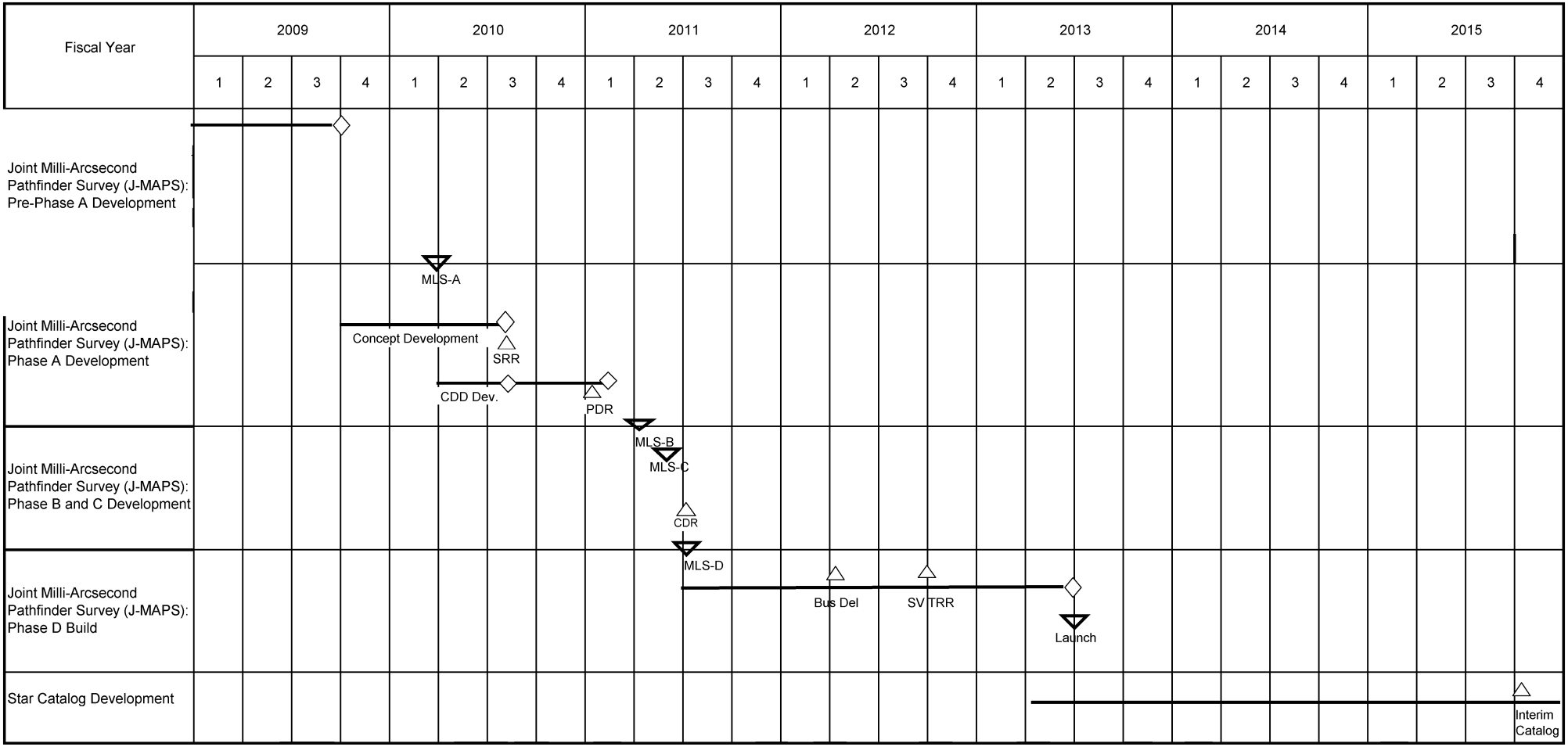
Cost Category Item	Contract Method & Type	Performing Activity & Location	Total Prior Years Cost	FY 2010 Cost	FY 2010 Award Date	FY 2011 Base Cost	FY 2011 Base Award Date	FY 2011 OCO Cost	FY 2011 OCO Award Date	FY 2011 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Arlington, VA											
		Subtotal	0.000	0.800		1.000		0.000		1.000			

Remarks

	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	0.000	54.971		73.441		0.000		73.441			

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 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 3229: *JMAPS*	



SRR=System Requirements Review, PDR=Preliminary Design Review, MLS=Milestone Reviews, CDR=Critical Design Review, CDD=Capabilities Development Document, TRR=Test Readiness Review, SV=Space Vehicle, TRA=Technology Readiness Assessment, ICE=Independent Cost Evaluation

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 0603207N: *Air/Ocean Tactical Applications*	**PROJECT** 3229: *JMAPS*

Schedule Details

	Start		End	
Event	**Quarter**	**Year**	**Quarter**	**Year**
Pre-Phase A Development -- Pre-Milestone A Studies	1	2009	3	2009
Pre-Phase A Development -- Milestone - A	2	2010	2	2010
Phase A Development -- Concept Development	4	2009	3	2010
Phase A Development -- System Requirements Review (SRR)	3	2010	3	2010
Phase A Development -- Capability Development Document (CDD) Development	2	2010	1	2011
Phase A Development -- Preliminary Design Review	1	2011	1	2011
Phase A Development -- Milestone - B	2	2011	2	2011
Phase B Development -- Milestone -C	2	2011	2	2011
Phase C Development -- Critical Design Review	3	2011	3	2011
Phase C Development -- Milestone - D	3	2011	3	2011
Phase D Build -- Bus Delivery	2	2012	2	2012
Phase D Build -- Space Vehicle Test Readiness Review (TRR)	4	2012	4	2012
Phase D Build -- Launch	3	2013	3	2013
Star Catalog Development -- Interim Catalog Delivery	4	2015	4	2015

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 9999: *Congressional Adds*	

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
9999: *Congressional Adds*	1.596	2.908	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	16.193
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

A. Mission Description and Budget Item Justification

Congressional adds.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Non-Gasoline Burning Outboard Engine *FY 2010 Plans:* Develop a Non-Gasoline Burning Outboard Engine.	0.000	1.514
Congressional Add: Semi-Submersible UUV *FY 2009 Accomplishments:* Continued the design and development efforts for a Semi-Submersible Unmanned Underwater Vehicle. *FY 2010 Plans:* Continue the design and development efforts for a Semi-Submersible Unmanned Underwater Vehicle.	1.596	1.394
Congressional Adds Subtotals	1.596	2.908

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 0603207N: *Air/Ocean Tactical Applications*	PROJECT 9999: *Congressional Adds*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Congressional adds.

E. Performance Metrics

Congressional adds.