EXHIBIT R-2, RDT&E Budget Item Justification					DATE: **FEBRUARY 2005**			

APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY /**			**BA-4**		R-1 ITEM NOMENCLATURE PE 0603207N Air/Ocean Tactical Applications			

COST ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost	21.427	25.186	27.094	32.145	31.265	32.205	31.945	32.617
2341 METOC Data Acquisition	7.283	8.465	9.185	10.938	10.800	11.001	11.113	11.313
2342 METOC Data Assimilation and Modeling	6.825	7.850	9.598	10.949	11.085	11.861	11.279	11.554
2343 Tactical METOC Applications	6.222	6.630	7.007	8.674	8.872	9.045	9.250	9.441
2344 Precise Timing and Astrometry	1.097	1.250	1.304	1.584	0.508	0.298	0.303	0.309
9204 Marine mammal Tracking and Mitigation*	0.000	0.991	0.000	0.000	0.000	0.000	0.000	0.000
Quantity of RDT&E Articles								

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The Air Ocean Tactical Applications (AOTA) Program Element is fully aligned with Navy's Sea Power 21 concept 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 FORCEnet-related programs of record that determine in realtime and near-realtime 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 last versions of the Global Command and Control System (GCCS), the new Joint Command and Control (JC2) system, and specific unit-level combat systems. This program also develops representations of the physical environment for incorporation into Navy and Marine Corps warfare trainers and simulations. Finally, this program develops technological upgrades for the U.S. Naval Observatory's 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.

Funding increase beginning in FY06 reflects Intelligence Preparation of Battlespace Sensor R&D to meet CNO and CFFC requirements for remote autonomous, clandestine, littoral battlespace sensing in near shore areas in support of Sea Shield & Sea Basing.

*Congressional plus up.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates systems for experimental test related to specific ship or aircraft applications**.**

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification					DATE: **FEBRUARY 2005**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2341 METOC Data Acquisition			
COST ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Project Cost	7.283	8.465	9.185	10.938	10.800	11.001	11.113	11.313
RDT&E Articles Qty								

(U) 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 are identified and the most promising candidates are transitioned from the Government's and Commercial Industry's technology base to this project. These new sensor technologies are then demonstrated, validated and integrated into operational programs of record for use by warfighters. These new sensor capabilities are to provide timely and accurate METOC data and products to Operational and Tactical level of war commanders. As the emphasis on Naval Warfare has evolved from blue water operations to the littoral and deep strike battlespace, METOC data requirements have likewise evolved. The littoral and deep strike regions are extremely dynamic and complex, characterized by strong and highly variable oceanographic and atmospheric conditions. As a result, 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. Current operational sensors, such as the standard balloon launched radiosonde, are deployed from platforms that are frequently located great distances from the target area of interest. The principal challenge is to provide a means for the collection and dissemination of METOC data in highly variable and dynamic littoral environmental conditions or in denied, remote or inaccessible areas over extended periods of time. The principal goals of this project are to: 1) Provide the means to rapidly and automatically acquire a broad array of METOC data using both off-board and on-board sensors; 2) provide an on-scene assessment capability for the tactical commander; 3) provide the tactical commander with real-time METOC data and products for operational use; 4) demonstrate and validate the use of tactical workstations and desktop computers for processing and display of METOC data and products using latest networking technologies; 5) demonstrate and validate techniques which employ data compression, connectivity and interface technologies to ingest, store, process, distribute and display these METOC data and products; 6) develop new charting and bathymetric survey techniques necessary to reduce the existing shortfall in coastal hydrographic survey requirements; and, 7) develop an expanded database for predictive METOC models in areas of interest.

Intelligence Preparation of Battlespace Sensor R&D to meet CNO and CFFC requirements for remote autonomous, clandestine, littoral battlespace sensing in near shore areas in support of Sea Shield & Sea Basing.

R-1 SHOPPING LIST - Item No. 30

EXHIBIT R-2a, RDT&E Project Justification				DATE: **FEBRUARY 2005**

APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2341 METOC Data Acquisition

(U) B. Accomplishments/Planned Program

Autonomous Sensors (AUV/UAV)	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.904	1.251	1.349	1.465
RDT&E Articles Quantity				

FY04 - Completed development and testing of prototype sensor suites for Unmanned Aerial Vehicles (UAVs). Continued development of next generation micro AUV and miniaturized UAV sensor suites for mini/micro UAV platforms.
FY05 - Test/demonstrate communications connectivity of micro AUV and miniaturized sensor suites for mini/micro UAV platforms.
FY06 - Deliver/test/demonstrate prototype Sensor Pod on operational UAVs of miniaturized sensor suites for mini/micro UAV platforms.   Deliver, test, demo prototype micro AUV.
FY07- Develop and test Network interoperability of miniaturized sensor suites for next generation mini/micro UAV platforms and micro AUV.

Acoustic Data Inversion	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	1.174	1.258	1.414	1.637
RDT&E Articles Quantity				

FY04 - Continued assessments of temporal and spatial variability of littoral environments for acoustic data inversions. Delivered Version 1 of the Geophysical Acoustic Inversion Toolkit (GAIT) to the Ocean Atmosphere Master Library (OAML).
FY05 - Complete assessments of temporal and spatial variability of littoral environments for acoustic data inversions. Continue IV&V on Geophysical Acoustic Inversion Toolkit (GAIT) Version 2 algorithms. Development and demonstration of advanced acoustic inversion techniques incorporating expert systems technology.
FY06 - Deliver Geophysical Acoustic Inversion Toolkit (GAIT) Version 2 algorithms to Ocean Atmosphere Master Library (OAML).
FY07 - Integrate Geophysical Acoustic Inversion Toolkit (GAIT) Version 2 into Fleet Combat Systems. Mature networked data sharing capabilities.

Ambient Noise Data	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.996	1.218	1.394	1.507
RDT&E Articles Quantity				

FY04 - Delivered Dynamic Ambient Noise Prediction System (DAPS) Version 1.1. Continued development of DAPS Version 2. Development of advanced techniques to acquire and manage ambient noise data.
FY05 - Conduct IV&V on Dynamic Ambient Noise Prediction System (DAPS) Version 2. Update historical shipping noise (SN) database. Deliver Dynamic Ambient Noise Prediction System (DAPS) Version 2.
FY06 - Deliver updated historical shipping noise database to the Ocean Atmosphere Master Library (OAML).
FY07 - Integrate Dynamic Ambient Noise Prediction System (DAPS) Version 2 and updated historical shipping noise database into Fleet Combat Systems. Development of Network based on DAPS. Add real-time ship tail Ambient Noise (AN) observations to the Shipping Nose (SN) database.

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EXHIBIT R-2a, RDT&E Project Justification		DATE: **FEBRUARY 2005**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2341 METOC Data Acquisition

(U) B. Accomplishments/Planned Program

Autonomous Clandestine Sensors	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.965	1.306	1.387	1.454
RDT&E Articles Quantity				

FY04 - Completed development of autonomous clandestine sensors for measurements in denied areas.   Delivered web enabled prototype.
FY05 - Deliver final version of web enabled system. Development of follow on autonomous clandestine sensors for data acquisition in denied areas.
FY06 - Deliver prototype capable of automated data assimilation via the Network infrastructure and Tactical Environmental Data Services (TEDServices).
FY07 - Demonstrate and validate automated data assimilation via the Network. Begin integration into Fleet Combat Systems.

Data Connectivity	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.973	1.213	1.314	1.459
RDT&E Articles Quantity				

FY04 - Completed development of data connectivity with Global Command and Control System - Maritime (GCCS-M). Delivered Tactical Enviromental Data Services (TEDS) Version 1 software. Continued development improvements.
FY05 - Complete development of data connectivity with Joint Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR). Deliver TEDServices Version 2 prototype.
FY06 - Deliver TEDServices Version 3 prototype.
FY07 - Demonstrate and validate TEDServices Version 3 to continue Network compatibility effort.

Acoustic Data Acquisition	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	1.479	1.133	1.222	1.705
RDT&E Articles Quantity				

FY04 - Delivered AQS-20 mine hunting sonar prototype software and Precision Undersea Mapper (PUMA) Version 2 prototype software. Development of advanced technology Through The Sensor (TTS) data acquisition techniques.
FY05 - Deliver AQS-20 mine hunting sonar prototype Version 1 and conduct IV&V on Precision Undersea Mapper (PUMA) Version 2 software. Evolutionary development of expert system acoustic data acquisition techniques to directly ingest data obtained from tactical sensors.
FY06 - Deliver prototype submarine Connectivity Temperature Depth (CTD)/Modular Ocean Data Assimilation System-Light (MODAS-L) data ingest algorithms. Deliver prototype volumetric sound velocity assimilation algorithms. Development of submarine ambient noise assimilation capability.
FY07 - Test and validate prototype Connectivity Temperature Depth (CTD)/Modular Ocean Data Assimilation System-LIght (MODAS-L) data ingest and volumetric sound velocity assimilation algorithms for Ocean Atmosphere Master Library (OAML) approval. Begin integration of these algorithms into submarine combat systems. Development of web-based submarine ambient noise assimilation capability.

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CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **FEBRUARY 2005**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2341 METOC Data Acquisition

(U) B. Accomplishments/Planned Program

Digital MC and G Analysis Program (DMAP)	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.792	1.086	0.645	1.265
RDT&E Articles Quantity				

FY04 - 07 Conduct annual pre-release technical analysis and research of new National Geospatial Agency (NGA) products used by the Navy for navigation systems and maritime safety for Quality Control, Suitability of Use, and Interoperability.
FY04 - Delivered Annual Report.
FY05 - Deliver Annual Report.
FY06 - Deliver Annual Report.
FY07 - Deliver Annual Report.

Littoral Battlespace Data Acquisition	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	0.460	0.446
RDT&E Articles Quantity				

FY06 - Develop initial Integrated Littoral Battlespace Data Acquisition Plan. Develop new databases required to support emerging sensors (i.e. Battlespace Profiler Autonomous Undersea Vehicle (BPAUV), Next Generation Atmospheric Sensor, Seaglider Data, and Helicopter/UAV atmospheric sensors) and integrate into Tactical Environmental Data Services (TEDS) and other nodes as appropriate.
FY07 - Demonstrate initial sensing plan concepts and submit Lessons Learned/Post Exercise (POSTEX). Develop new databases required to support emerging sensors and integrate into TEDServices and other nodes as appropriate.

	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	0.000	0.000
RDT&E Articles Quantity				

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CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE:
		FEBRUARY 2005
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2341 METOC Data Acquisition

(U) C. PROGRAM CHANGE SUMMARY:

	FY 2004	FY 2005	FY 2006	FY 2007
(U) Funding:				
FY05 President's Budget	7.808	8.548	8.786	10.625
FY06 President's Budget	7.283	8.465	9.185	10.938
Total Adjustments	(0.525)	(0.083)	0.399	0.313
Summary of Adjustments				
Congressional Adjustments				
Congressional Recissions		(0.081)		
Reprogrammings	(0.423)			
Programmatic Adjustments		(0.002)	0.360	0.203
Economic Assumptions			0.046	0.072
Pricing Adjustments			(0.007)	0.038
SBIR/STTR Transfers	(0.102)			
Subtotal	0.000	(0.083)	0.399	0.313

(U) Schedule:

(U) Technical:

Not applicable.

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Exhibit R-2a, RDTEN Project Justification
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CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE:
		FEBRUARY 2005
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2341 METOC Data Acquisition

(U) D. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

RELATED RDT&E: PE 0604218N, Air/Ocean Equipment Engineering - AN/SMQ-11 satellite receiver/recorder system
engineering to receive data from on orbit Defense Meteorological Satellite Program (DMSP) sensors onboard selected ships and shore sites.

(U) E. ACQUISITION STRATEGY:

Acquisition, management and contracting strategies are to support the meteorology and oceanography (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 Program Executive Officer for Command, Control, Communications, Computers, and Intelligence and Space (PEO C4I & Space).

(U) F. MAJOR PERFORMERS:
N/A

(U) G. METRICS:
Earned Value Management (EVM) is used for metrics reporting and rish management.

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Exhibit R-2a, RDTEN Project Justification
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Exhibit R-3 Cost Analysis (page 1)					DATE: **FEBRUARY 2005**						
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**			PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications			PROJECT NUMBER AND NAME 2341 METOC Data Acquisition						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Software Development	WX	NRL	21.688	4.376	N/A	4.656	N/A	5.598	N/A	CONT	CONT	
	WX	NAWC-AD Lake	0.923	0.000	N/A	0.000	N/A	0.000	N/A	CONT	CONT	
	CP	ARL/APL	4.454	0.400	N/A	0.440	N/A	0.527	N/A	CONT	CONT	
	WX	NSWC	2.362	0.300	N/A	0.330	N/A	0.395	N/A	CONT	CONT	
	CP	New Age	2.528	0.705	N/A	0.775	N/A	0.898	N/A	CONT	CONT	
	CP	PSI/R.L.Phillips	1.555	0.500	N/A	0.550	N/A	0.639	N/A	CONT	CONT	
	CP	Neptune	1.415	0.400	N/A	0.440	N/A	0.527	N/A	CONT	CONT	
	WX	FNMOC	1.661	0.000	N/A	0.000	N/A	0.000	N/A	CONT	CONT	
	N/A	MISC	11.629	1.649	N/A	1.815	N/A	2.135	N/A	CONT	CONT	
Subtotal Software Development			48.215	8.330		9.005		10.718		CONT	CONT	

Remarks:

Systems Engineering	CP	SSA/CSC	1.525	0.135	N/A	0.180	N/A	0.220	N/A	CONT	CONT	
Subtotal Support			1.525	0.135		0.180		0.220		CONT	CONT	

Remarks:

Exhibit R-3 Cost Analysis (page 2)									DATE: **FEBRUARY 2005**		

APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4** | PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications | PROJECT NUMBER AND NAME 2341 METOC Data Acquisition

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Total Cost			49.740	8.465		9.185		10.938		CONT	CONT	
Remarks:												

Exhibit R-2a, RDTEN Project Justification
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CLASSIFICATION:

EXHIBIT R4, Schedule Profile		DATE: **FEBRUARY 2005**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2341 METOC Data Acquisition

Fiscal Year	2004				2005				2006				2007				2008				2009				2010				2011			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

ROV/AUV Sensors — MICRO AUV, DEM/VAL, Stealth AUV, DEM/VAL

UAV Sensors — Mini Sensor Package, Comm Connectivity Demo, DEM/VAL, Prototype Pod, DEM/VAL, Next Generation Sensor Package, DEM/VAL, Next Generation Sensor Package, DEM/VAL

Acoustic Data Inversion — GAIT Ver 1.0, OAML, DEM/VAL, GAIT Ver 2.0, DEM/VAL, OAML, Combat System Integration, GAIT Ver 3.0, DEM/VAL, Autonomous Expert System, Combat System Upgrade

Ambient Noise Data — DAPS Ver 1.0, Integrate New SL Algorithms, DAPS Ver 2.0, DEM/VAL, Network/GCCS-M Integration, Shipping Database Development, Biological Noise, Surf Noise, DAPS Ver 3.0, DEM/VAL

Autonomous Clandestine Sensors — Web-Enabled System, DEM/VAL, FORCEnet/TEDServices Integration, Air Deployed Micro-sensors, DEM/VAL, NEXGEN Micro-sensors, DEM/VAL

Data Connectivity — TEDServices V1.0, DEM/VAL, TEDServices V2.0, DEM/VAL, TEDServices V3.0, DEM/VAL, GIG ES, DEM/VAL, NEXGEN TEDServices, DEM/VAL, NEXGEN TEDServices, DEM/VAL

Acoustic Data Acquisition/TTS — AQS-20 Prototype, PUMA V2.0 (Bathymetry), DEM/VAL, PUMA V3.0 (Vol Sovel) SubCTD, DEM/VAL, Next Generation NCOM, DEM/VAL, Next Generation TTS

Information Management/DMAP — Navy Unique, Navy Unique, Navy Unique, Navy Unique, Navy Unique, Navy Unique, Navy Unique

Littoral Battlespace Sensing — Database development/integration, DEM/VAL, Network Integration, DEM/VAL, Next Gen Database development/integration

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* Not required for Budget Activities 1, 2, 3, and 6

Exhibit R-2a, RDTEN Project Justification
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CLASSIFICATION:

Exhibit R-4a, Schedule Detail					DATE: **FEBRUARY 2005**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**		PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications			PROJECT NUMBER AND NAME 2341 METOC Data Acquisition		
Schedule Profile	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
ROV/AUV Sensors	3Q			1Q	4Q			
UAV Sensors	4Q		2Q		2Q		2Q	4Q
Acoustic Data Inversion		2Q		3Q		1Q	4Q	
Ambient Noise Data		4Q			2Q			3Q
Autonomous Clandestine Sensors	2Q	4Q		3Q				4Q
Data Connectivity				2Q	4Q		2Q	4Q
Acoustic Data Acquisition/TTS		4Q	4Q	3Q			3Q	
DMAP	2Q	2Q	2Q	2Q	2Q	2Q	3Q	3Q
Littoral Battlespace Sensing				4Q		3Q		

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CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification					DATE: **FEBRUARY 2005**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling			
COST ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Project Cost	6.825	7.850	9.598	10.949	11.085	11.861	11.279	11.554
RDT&E Articles Qty								

(U) 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, Monterey, CA and the Naval Oceanographic Office, 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 the NPOESS Preparatory Project (NPP) data. 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, 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. 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 sensors, which are continually adding new sources of disparate data types. In order to fully exploit this dynamic and massive volume of data, modern data base management systems (DBMS) are required, and must be tailored for individual computer configurations. Improved representation of smaller-scale phenomena, particularly in the littoral, is also an important consideration.

Intelligence Preparation of Battlespace Sensor R&D to meet CNO and CFFC requirements for remote autonomous, clandestine, littoral battlespace sensing in near shore areas in support of Sea Shield & Sea Basing.

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Exhibit R-2a, RDTEN Project Justification
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EXHIBIT R-2a, RDT&E Project Justification	DATE: **FEBRUARY 2005**

APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling

(U) B. Accomplishments/Planned Program

Modeling and Simulation	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.682	0.347	0.398	0.646
RDT&E Articles Quantity				

FY04 - Delivered atmospheric volume data to DoD Modeling & Simulations community. Development of improved ocean volume data. Incremental development of modeling and simulation of atmospheric and ocean environmental effects on Navy systems.
FY05 - Deliver Navy data inputs to support establishment of the Joint Modeling and Simulations Center (USAF Combat Climatology Center).
FY06 - Deliver next increment of the Joint Modeling and Simulations Center (USAF Combat Climatology Center) Navy Data Inputs to Joint Modeling and Simulations Center (USAF Combat Climatology Center). Develop Naval METOC data M&S capabilities to support the Joint Modeling and Simulations Center.
FY07 - Deliver Joint Modeling and Simulations support capabilities to Naval Oceanography Command (NAVOCEANO).

Coupled Data Assimilation	FY 04	FY 05	FY06	FY07
Accomplishments/Effort/Subtotal Cost	0.319	0.396	0.513	0.758
RDT&E Articles Quantity				

FY04 - Completed development of variational techniques for coupled assimilations.   Development of NRL Atmospheric Variational Data System (NAVDAS) Version 2 prototype and coupled data assimilation techniques incorporating Automated Expert Systems.
FY05 - Deliver NRL Atmospheric Variational Data System (NAVDAS) Version 2.   Development of next generation coupled assimilation techniques incorporating Automated Expert Systems.
FY06 - Begin operational test of NRL Atmospheric Variational Data System (NAVDAS) Version 3. Re-code NAVDAS to conform to Weather Research and Forecasting (WRF) compatibility requirements. Development of next generation coupled assimilation techniques incorporating direct satellite derived radiance data.
FY07 - Complete NRL Atmospheric Variational Data System (NAVDAS) Version 3 OPTEST and deliver to FNMOC.   Investigate and incorporate Automated Techniques into the next generation data assimilation system. Re-code NRL Atmospheric Variational Data System (NAVDAS) to conform to Weather Research and Forecasting (WRF) compatibility requirements.

Fleet Exercises	FY 04	FY 05	FY06	FY07
Accomplishments/Effort/Subtotal Cost	0.522	0.941	0.915	1.016
RDT&E Articles Quantity				

FY04 - Participated in selected Naval Exercises and delivered post exercise strawman and final reports.
FY05 - Participate in selected Naval Exercises and deliver post exercise strawman and final reports. Expand scope of fleet exercise participation to include integrated multi-sensor (data collection to application) demonstrations.
FY06 - Participate in selected Naval Exercises and deliver post exercise strawman and final reports.
FY07 - Participate in selected Naval Exercises and deliver post exercise strawman and final reports.

CLASSIFICATION:

| EXHIBIT R-2a, RDT&E Project Justification | DATE: |
| | **FEBRUARY 2005** |

| APPROPRIATION/BUDGET ACTIVITY | PROGRAM ELEMENT NUMBER AND NAME | PROJECT NUMBER AND NAME |
| **RDT&E, N / BA-4** | PE 0603207N Air/Ocean Tactical Applications | 2342 METOC Data Assimilation and Modeling |

(U) B. Accomplishments/Planned Program

High-Resolution Forecast Models	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.652	0.787	0.850	0.923
RDT&E Articles Quantity				

FY04 - Delivered Message Passage Interface (MPI)/Distributed Shared Memory (DSM) version of Coupled Atmospheric Mesoscale Prediction Systems (COAMPS).
FY05 - Deliver prototype advanced land-surface modeling system for integration into Coupled Atmospheric Mesoscale Prediction Systems (COAMPS).
FY06 - Deliver Version 3 of Coupled Atmospheric Mesoscale Prediction Systems (COAMPS). Re-code Coupled Atmospheric Mesoscale Prediction Systems (COAMPS) to conform to Weather Research and Forecasting (WRF) compatibility requirements.
FY07 - Complete demonstration and validation of Version 3. Deliver validated version to FNMOC. Re-code Coupled Atmospheric Mesoscale Prediction Systems (COAMPS) to conform to Weather Research and Forecasting (WRF) compatibility requirements. Explore incorporation of high-resolution Aerosol analyses and forecasts.

Basin Scale Ocean Models	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	1.064	0.839	0.845	1.042
RDT&E Articles Quantity				

FY04 - Completed the transition of the East Asian Sea (EAS) model. Incremental development of coastal and enclosed basin tactical scale oceanographic models.
FY05 - Develop prototype Adriatic Sea model. Complete development of next generation coastal and enclosed basin tactical scale oceanographic models. Complete validation of the EAS model.
FY06 - Complete the transition of Adriatic Sea model. Transition rapid relocatability capability. Incremental development of coupled air/ocean models for selected geographical locations in response to emergent requirements.
FY07 - Incremental development of coupled air/ocean models for selected geographical locations in response to emergent requirements. Development of the Arabian Gulf model.

Data Assimilation	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.313	0.688	0.716	0.823
RDT&E Articles Quantity				

FY04 - Transitioned FMQ-17 modules. Development of next generation new capabilities to assimilate and quality control METOC data from satellite sensors and conventional data sources.
FY05 - Transition applications using WindSat, Meteosat Second Generation (MSG), the Special Sensor Microwave Imager and Sounder (SSMIS), and MTSAT (Japanese replacement).
FY06 - Continue to transition applications using next generation WindSat, Meteosat Second Generation (MSG), the Special Sensor Microwave Imager and Sounder (SSMIS), and MTSAT (Japanese replacement).
FY07 - Incorporation of Automated Expert System techniques.

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EXHIBIT R-2a, RDT&E Project Justification		DATE: **FEBRUARY 2005**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling

(U) B. Accomplishments/Planned Program

Automated Objective Processing	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.674	0.960	0.974	1.181
RDT&E Articles Quantity				

FY04 - Delivered performance metrics for the baseline global Navy Coastal Ocean Model (NCOM) prediction system.   Completed development of techniques for bathymetry and surf zone and high-resolution micro-topography algorithms and automated objective processing in the littoral.
FY05 - Deliver data assimilation upgrades.
FY06 - Deliver prototype global Navy Coastal Ocean Model (NCOM) prediction system upgrades to the Naval Oceanography Command for testing.
FY07 - Complete testing and validation of the global Navy Coastal Ocean Model (NCOM) prediction system upgrade. Development of next generation assimilation methods for high-resolution surf zone bathymetry into coupled air/ocean forecast models.

Tide/Surf Data Visualization	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.339	0.356	0.363	0.432
RDT&E Articles Quantity				

FY04 - Delivered UNIX version of PCTides.   Incorporated Topographic Exercise (TOPEX)/Poseidon data into Surf Model. Development of next-generation tide and surf models.
FY05 - Develop and deliver documentation for Atmospheric Modeling Oversight Panel Transition to Naval Oceanography Command (NAVOCEANO) for approval.
FY06 - Finalize approved documentation and deliver Version 1 to Ocean Atmosphere Master Libraray (OAML).
FY07 - Deliver prototype Version 2 which incorporates four dimensional visualization to Naval Oceanography Command (NAVOCEANO) for testing and validation. Incremental development of tide and surf models.

NEXGEN Acoustic Models	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.885	1.150	1.044	1.167
RDT&E Articles Quantity				

FY04 - Upgraded to new Ocean Atmosphere Master Library (OAML) models for Parabolic Equation (PE) and Comprehensive Acoustic System Simulation (CASS)/Gauissin Ray Bundle (GRAB). Semi-Empirical Surface Scattering Strength Algorithm (SESSS) Version 1 completed and delivered.
FY05 - Deliver Semi-Empirical Surface Scattering Strength Algorithm (SESSS) Version 2. Incorporate Digital Bathymetric Database (DBDB) Version 5 APIs and consolidate existing databases, upgrade NAUTILUS run options.
FY06 - Incorporate variable range-step option in Range Acoustic Model (RAM) 4.0, consolidate disparate bottom databases into one consolidated database Geoacoustic Database Variable Resolution (GDB-V). Integrate latest acoustic models into the Geo Acoustic Inversion Toolkit (GAIT).
FY07 - Demonstrate and validate RAM 4.0 and deliver to Ocean Atmosphere Master Library (OAML).   Complete bottom database consolidation.   Integrate latest acoustic models into the Geo Acoustic Inversion Toolkit (GAIT).   Incorporate Automated Expert Systems model selection algorithms into the next generation Range Acoustic Model (RAM).

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EXHIBIT R-2a, RDT&E Project Justification		DATE: **FEBRUARY 2005**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling

(U) B. Accomplishments/Planned Program

Shallow Water Acoustics	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.773	0.792	0.795	1.226
RDT&E Articles Quantity				

FY04 - Completed initial assessment of Comprehensive Acoustic System Simulation (CASS) and Active System Performance Model (ASPM) and delivered initial report. Development of incremental mid-frequency bottom loss/bottom scatter models and databases for shallow water environments.
FY05 - Complete final Comprehensive Acoustic System Simulation (CASS)/Active System Performance Model (ASPM) assessment and deliver final report.   Integrate multistatics modeling and performance prediction techniques.
FY06 - Begin development of a fully automated version of Geophysical Acoustic Inversion Toolkit (GAIT). Integration of uncertainty predictions into Fleet Tactical Decision Aids (TDAs).
FY07 - Complete integration of uncertainty into Fleet Tactical Decision Aids (TDAs). Continue development of next generation mid-frequency bottom loss/bottom scatter models and databases for shallow water environments.   Development of a fully automated version of Geophysical Acoustic Inversion Toolkit (GAIT).

Fleet Applications and Data Verification & Validation	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.602	0.594	0.728	0.737
RDT&E Articles Quantity				

FY04 - 07 New applications and data are delivered from the program and require verification and validation on an annual basis.
FY04 - Delivered Annual Report.
FY05 - Deliver Annual Report.
FY06 - Deliver Annual Report.
FY07 - Deliver Annual Report.

Littoral Battlespace Sensor Data Assimilation	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	1.457	0.998
RDT&E Articles Quantity				

FY06 - Develop and deliver initial engineering documentation.   Develop in-depth data assimilation methods to support various evolving littoral sensors such as the Battle Space Profiler Autonomous Undersea Vehicle (BPAUV), Next Generation Upper Air Sensor, Seaglider, and Helicopter and/or Unmanned Aerial Vehicle (UAV) specific sensors.   Develop new sensors and/or reconfigure existing littoral sensors to support littoral Undersea Warfare (USW), Mine Warfare (MIW), Special Operations (SPECOPS) and other Naval Operations.
FY07 - Develop in-depth next generation data assimilation methods to support various evolving littoral sensors such as the Battle Space Profiler Autonomous Undersea Vehicle (BPAUV), Next Generation Upper Air Sensor, Seaglider, and Helicopter and/or Unmanned Aerial Vehicle (UAV) specific sensors.   Demonstrate prototype sensors and deliver post-demonstration report.

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APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2342 METOC Data Assimilation and Modeling

(U) C. PROGRAM CHANGE SUMMARY:

	FY 2004	FY 2005	FY 2006	FY 2007
(U) Funding:				
FY05 President's Budget	7.142	7.927	8.188	9.872
FY06 President's Budget	6.825	7.850	9.598	10.949
Total Adjustments	(0.317)	(0.077)	1.410	1.077
Summary of Adjustments				
Congressional Adjustments				
Congressional Rescissions		(0.075)		
Reprogrammings	(0.247)			
Programmatic Adjustments		(0.002)	1.386	0.988
Economic Assumptions			0.021	0.031
Pricing Adjustments			0.003	0.058
SBIR/STTR Transfers	(0.070)			
Subtotal	(0.317)	(0.077)	1.410	1.077

(U) Schedule:

    Littoral Battlespace Sensor Data Assimilation is added to the schedule.

(U) Technical:

  Not applicable.

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APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling

(U) D. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

Not applicable.

(U) E. ACQUISITION STRATEGY:

Acquisition, management and contracting strategies to support the meteorological and oceanographic (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, all with management oversight by Program Executive Officer for Command, Control, Communications, Computers, and Intelligence and Space (PEO C4I & Space).

(U) F. MAJOR PERFORMERS:

N/A

(U) G. METRICS:

Earned Value Management (EVM) is used for metrics reporting and risk management.

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Exhibit R-2a, RDTEN Project Justification
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CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)										DATE: FEBRUARY 2005		

APPROPRIATION/BUDGET ACTIVITY
RDT&E, N /   BA-4

PROGRAM ELEMENT
PE 0603207N Air/Ocean Tactical Applications

PROJECT NUMBER AND NAME
2342 METOC Data Assimilation and Modeling

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Software Development	WX	NRL	50.283	6.247	N/A	7.646	N/A	8.752	N/A	CONT	CONT	
	WX	NAWC-WD, Pax	1.520	0.208	N/A	0.253	N/A	0.285	N/A	CONT	CONT	
	PD	APL	0.985	0.290	N/A	0.353	N/A	0.397	N/A	CONT	CONT	
	Grant	Univ. S. Miss.	2.413	0.000	N/A	0.000	N/A	0.000	N/A	CONT	CONT	
	CP	Neptune	1.001	0.325	N/A	0.396	N/A	0.445	N/A	CONT	CONT	
	CP	New Age	0.700	0.325	N/A	0.396	N/A	0.445	N/A	CONT	CONT	
	N/A	MISC	12.033	0.455	N/A	0.554	N/A	0.623	N/A	CONT	CONT	
Subtotal Software Development			68.935	7.850		9.598		10.949		CONT	CONT	

Remarks:

Systems Engineering	CP	SSA/CSC	0.295	0.000	N/A	0.000	N/A	0.000	N/A	CONT	CONT	
Subtotal Support			0.295	0.000		0.000		0.000		CONT	CONT	

Remarks:

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 2)										DATE: FEBRUARY 2005		
APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-4			PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications			PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling							
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
												0.000
												0.000
												0.000
												0.000
												0.000
												0.000
												0.000
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
												0.000
												0.000
												0.000
												0.000
												0.000
												0.000
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Total Cost			69.230	7.850		9.598		10.949		CONT	CONT	
Remarks:												

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EXHIBIT R4, Schedule Profile																											DATE: **FEBRUARY 2005**				

APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling

Fiscal Year	2004				2005				2006				2007				2008				2009				2010				2011			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Schedule profile rows:

- **Modeling and Simulation**: Arm Vol Data; Joint M&S Center DEM/VAL; Joint M&S Center DEM/VAL; Joint M&S Center DEM/VAL; Joint M&S Center DEM/VAL; Joint M&S Center DEM/VAL
- **Coupled Data Assimilation**: NAVDAS 2.0 DEM/VAL; NAVDAS 3.0 DEM/VAL; Automated Techniques DEM/VAL; Automated Expert Systems Techniques DEM/VAL
- **Fleet Exercises/Demos**: DEM/VAL; DEM/VAL; DEM/VAL; DEM/VAL; DEM/VAL; DEM/VAL; DEM/VAL; DEM/VAL
- **High Resolution Coupled Models**: COAMPS MPI/DSM DEM/VAL; COAMPS Land/Sfc DEM/VAL; Moving Nested Grid DEM/VAL; Aerosol Predictions DEM/VAL; NextGen Hi-Res COAMPS DEM/VAL
- **Basin Scale Ocean Models**: East Asian Sea DEM/VAL; Adriatic Sea DEM/VAL; Arabian Gulf DEM/VAL; Emergent Requirements DEM/VAL; Emergent Requirements DEM/VAL
- **Data Assimilation**: FMQ-17 Upgrades DEM/VAL; WindSat, MSG, SSMIS, MTSAT DEM/VAL; Automated Expert System Techniques DEM/VAL; NextGen Satelites DEM/VAL; NextGen Satelites DEM/VAL
- **Automated Objective Processing**: Micro-topography algorithms DEM/VAL; Data Assimilation Upgrades DEM/VAL; Global NCOM DEM/VAL; High Res AI DEM/VAL; NextGen Hi-Res Coupled Models DEM/VAL
- **Tide/Surf/Data Visualization**: PC-Tides; AMOP Doc DEM/VAL; 4-D Visualization DEM/VAL; Network Integration DEM/VAL
- **Next Generation Acoustic Models**: RAM PE/CASS/GRAB DEM/VAL; SESSS V2.0 DEM/VAL; Database Consolidation DEM/VAL; Automated Expert System Model Selection DEM/VAL; Full Physics Single Model DEM/VAL; Full Automation
- **Shallow Water Acoustics**: CASS/GRAB Assessment DEM/VAL; GAIT Ver 2.0 DEM/VAL; GAIT Ver 3.0 (Full Automation) DEM/VAL; AI Inversions DEM/VAL; NextGen GAIT DEM/VAL
- **Fleet Apps Product and Data V&V**: DEM/VAL; DEM/VAL; DEM/VAL; DEM/VAL; DEM/VAL; DEM/VAL
- **Littoral Battlespace Sensor Data Assimilation**: Sensor Development/Reconfiguration DEM/VAL; Network Integration DEM/VAL; Next Generation Littoral Sensors DEM/VAL

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CLASSIFICATION:

Exhibit R-4a, Schedule Detail				DATE: **FEBRUARY 2005**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**		PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications		PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling			
Schedule Profile	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
---	---	---	---	---	---	---	---	---
Modeling and Simulation	1Q	3Q		1Q	2Q	3Q	3Q	
Coupled Data Assimilation		2Q	3Q	3Q				4Q
Fleet Exercises/Demonstrations	2Q	2Q	2Q	2Q	2Q	2Q	4Q	4Q
High-Resolution Coupled Models	2Q		1Q	2Q		1Q		2Q
Basin Scale Ocean Models		2Q	4Q		2Q	3Q	3Q	4Q
Data Assimilation		4Q		2Q		1Q	4Q	
Automated Objective Processing	4Q	4Q		1Q	1Q	2Q		3Q
Tide/Surf/Data Visualization								
NEXGEN Active and Passive Acoustic Models	4Q		2Q	3Q		1Q		1Q
Shallow Water Acoustics		2Q		1Q	3Q			1Q
Fleet Applications and Data V&V	2Q	4Q		2Q	4Q			1Q
Littoral Battlespace Sensor Data Assimilation				4Q		4Q		4Q

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EXHIBIT R-2a, RDT&E Project Justification						DATE: **FEBRUARY 2005**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications					PROJECT NUMBER AND NAME 2343 Tactical METOC Applications			
COST ($ in Millions)	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	
Project Cost	6.222	6.630	7.007	8.674	8.872	9.045	9.250	9.441	
RDT&E Articles Qty									

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The METOC Data Applications Project provides future operational effects decision aid capabilities for Navy and Marine Corps warfighters in the context of Joint Operations. 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 future software decision support tools are intended to 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 (MIW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare (AAW), Strike Warfare (STW), and Special Warfare. 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 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 for use by mission planners and combat/weapon system operators to develop ASW and MIW search and 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 X2341 (METOC Data Acquisition) and assimilated by software produced by Project X2342 (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 the development of new combat system and mine warfare performance prediction and MDA/OEDA 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 Mine Warfare, shallow water ASW, and missile and air defense/strike capabilities.

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EXHIBIT R-2a, RDT&E Project Justification	DATE: FEBRUARY 2005	
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2343 Tactical METOC Applications

(U) B. Accomplishments/Planned Program

Electromagnetic and Electro-optical (EM/EO) Decision Aids	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.975	1.168	1.210	1.691
RDT&E Articles Quantity				

FY04 - Completed development of an advanced electro-optical decision aid incorporating artificial intelligence techniques. Delivered the Target Acquisition Weather Software (TAWS) Version 4. Implemented new sensor data and backgrounds consistent with US Navy and US Marine Corp missions.
FY05 - Complete development of Target Acquisition Weather Software (TAWS) and deliver Version 5 including new sensor data and backgrounds consistent with US Navy and US Marine Corp missions.
FY06 - Development of Target Acquisition Weather Software (TAWS) Version 6 to include new sensor data and backgrounds consistent with Joint Operations. Development of upgrades to next generation electromagnetic and electro-optical (EM/EO) performance prediction systems to include incorporation of new Naval and Joint Sensor Suites.
FY07 - Development of Target Acquisition Weather Software (TAWS) Version 7 to include new sensor data and backgrounds consistent with Joint Operations.   Development of upgrades to next generation electromagnetic and electro-optical (EM/EO) performance prediction systems to include increased automation and fully compliant Network functionality.

Mine Littoral Warfare Tactical Decision Aids (TDA)	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	2.084	1.865	1.925	1.805
RDT&E Articles Quantity				

FY04 - Completed the incorporation of prototype Mine Warfare tactical decision aids in baseline surface ship, air and submarine performance prediction systems. Completed integration of Mine Warfare Environmental Data Applications Library (MEDAL)/Tactical Environmental Data Services (TEDS) integration. Developed and incorporated additional mine littoral warfare decision aids in applicable performance prediction systems.
FY05 - Deliver Mine Warfare Environmental Data Applications Library (MEDAL) Build 10.
FY06 - Development to incorporate additional mine littoral warfare decision aids in applicable performance prediction systems. Develop Mine Warfare Environmental Data Applications Library (MEDAL) Build 11 to include the incorporation of the new Geoacoustic Database - Variable Resolution (GDB-V) as well as the incorporation of the new Battlespace Profiling System (BPS).
FY07 - Deliver Mine Warfare Environmental Data Applications Library (MEDAL) Build 11 for fleet demonstration and validation. Begin combat system integration upon completion of development and validation. Develop Mine Warfare Environmental Data Applications Library (MEDAL) Build 11 to include the incorporation of new Mine Warfare (MIW) databases.

Tactical Decision Aids (TDA) COTS Visualization	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	1.303	1.547	1.644	1.949
RDT&E Articles Quantity				

FY04 - Delivered prototype Tactical Tomahawk Weapon Control System METOC Interface. Performed at-sea evaluation of new capabilities. Completed the application of advanced COTS visualization techniques to facilitate operator understanding of complex littoral environmental effects on sensor performance. Developed multi-dimensional Tactical Decision Aid (TDA) COTS visualization techniques and integrate into appropriate platform Advanced Development Models (ADMs).
FY05 - Deliver 4D-Vis prototype. Deliver technical reports. Incremental development of next generation multi-dimensional Tactical Decision Aid (TDA) COTS visualization techniques and integrate into appropriate platform Advanced Development Models (ADMs).
FY06 - Development of Network integration via Commercial Joint Mapping Tool Kit (CJMTK) and integration of evolving GIS based technology.
FY07 - Complete demonstration and validation of software. Complete development of Network integration via Commercial Joint Mapping Tool Kit (CJMTK) and integration of evolving GIS based technology.

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EXHIBIT R-2a, RDT&E Project Justification			DATE: **FEBRUARY 2005**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications		PROJECT NUMBER AND NAME 2343 Tactical METOC Applications

(U) B. Accomplishments/Planned Program

Platform Vulnerability	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.967	0.989	1.106	1.601
RDT&E Articles Quantity				

FY04 - Delivered platform vulnerability assessment Tactical Decision Aid (TDA) Version 2 into surface ship, submarine and air ADMs to perform vulnerability assessment for acoustic and non-acoustic sensors and weapons. Evaluated functionality during at-sea tests. Delivered technical reports. Evolutionary development of Tactical Decision Aid (TDA) .
FY05 - Deliver platform vulnerability assessment Tactical Decision Aid (TDA) Version 3 into surface ship, submarine and air ADMs to perform vulnerability assessment for acoustic and non-acoustic sensors and weapons. Evaluate functionality during at-sea tests. Deliver technical reports.
FY06 - Development of Tactical Decision Aid (TDA) Version 4 to include integration of new electromagnetic and electro-optical (EM/EO), Target Acquisition Weather Software (TAWS), and advanced visualization techniques such as 4D Visualization.
FY07 - Deliver Tactical Decision Aid (TDA) Version 4. Begin evolutionary development of Tactical Decision Aid (TDA) Version 5 to include integration of newly emerging non-acoustic sensor prediction capabilities.

Sensor Interface Capabilities	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.893	1.061	1.122	1.628
RDT&E Articles Quantity				

FY04 - Development of environmental sensor interface capabilities. Performed Preliminary Design Review (PDR) and Critical Design Review (CDR) for Build 2.5.
FY05 - Develop and deliver Build 3.0. Deliver technical reports. Incremental development of environmental sensor interface capabilities.
FY06 - Evolutionary development of Build 3.5. Evaluate functionality during at-sea tests and deliver technical reports.
FY07 - Deliver Build 3.5 and continue evolutionary development of Build 4.0.

R-1 SHOPPING LIST - Item No.   30

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE:
		FEBRUARY 2005
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2343 Tactical METOC Applications

(U) C. PROGRAM CHANGE SUMMARY:

(U) Funding:	FY 2004	FY 2005	FY 2006	FY 2007
FY05 President's Budget	6.477	6.695	6.998	8.635
FY06 President's Budget	6.222	6.630	7.007	8.674
Total Adjustments	(0.255)	(0.065)	0.009	0.039

Summary of Adjustments

	FY 2004	FY 2005	FY 2006	FY 2007
Congressional Adjustments				
Congressional Recissions		(0.063)		
Reprogrammings	(0.101)	(0.002)		
Programmatic Adjustments			(0.038)	(0.056)
Economic Assumptions			0.058	0.092
Pricing Adjustments			(0.011)	0.003
SBIR/STTR Transfers	(0.154)			
Subtotal	(0.255)	(0.065)	0.009	0.039

(U) Schedule:

(U) Technical:

Not applicable.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE:
		FEBRUARY 2005
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2343 Tactical METOC Applications

(U) D. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
RDTE								
PE 0604218N (Air/Ocean Equipment Engineering	2.851	4.461	4.558	5.69	5.841	5.949	6.085	6.195

(U) E. ACQUISITION STRATEGY:

Acquisition, management and contracting strategies are to support the METOC Data 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 by Program Executive Officer for Command, Control, Communications, Computers, and Intelligence and Space (PEOC4I & Space).

(U) F. MAJOR PERFORMERS:

N/A

R-1 SHOPPING LIST - Item No.   30

UNCLASSIFIED

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)									DATE: **FEBRUARY 2005**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**			PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2343 Tactical METOC Applications				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Software Development	WX	NUWC	1.400	0.000	N/A	0.000	N/A	0.000	N/A	CONT	CONT	
	WX	SSC SD	2.775	0.335	N/A	0.349	N/A	0.430	N/A	CONT	CONT	
	WX	NRL	1.761	0.285	N/A	0.297	N/A	0.366	N/A	CONT	CONT	
	CP	NAVSEA	30.167	5.746	N/A	6.087	N/A	7.539	N/A	CONT	CONT	
	CP	LOCKHEAD	1.053	0.000	N/A	0.000	N/A	0.000	N/A	CONT	CONT	
	N/A	MISC	5.720	0.264	N/A	0.275	N/A	0.339	N/A	CONT	CONT	
Subtotal Product Development			42.876	6.630		7.007		8.674		0.000	65.187	

Remarks:

	CP	IPD	0.595	0.000	N/A	0.000	N/A	0.000	N/A	CONT	CONT	
Subtotal Support			0.595	0.000		0.000		0.000		CONT	CONT	

Remarks:

UNCLASSIFIED

Exhibit R-2a, RDTEN Project Justification
(Exhibit R-2a, page 28 of 39)

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 2)											DATE: **FEBRUARY 2005**	
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**			PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications					PROJECT NUMBER AND NAME 2343 Tactical METOC Applications				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Total Cost			43.471	6.630		7.007		8.674		CONT	CONT	
Remarks:												

R-1 SHOPPING LIST - Item No.   30

Exhibit R-2a, RDTEN Project Justification
(Exhibit R-2a, page 29 of 39)

CLASSIFICATION:

EXHIBIT R4, Schedule Profile		DATE: **FEBRUARY 2005**

APPROPRIATION/BUDGET ACTIVITY RDT&E, N / BA-4	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2343 Tactical METOC Applications

Fiscal Year	2004				2005				2006				2007				2008				2009				2010				2011			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Schedule rows:

- **EM/EO Decision Aids**: Advanced EM/EO ▲ DEM/VAL; Next Gen EM/EO TAWS 5.0 ▲ DEM/VAL; TAWS 6.0 ▲ DEM/VAL; Adv EM/EO using AI DEM/VAL; TAWS 7.0 ▲ DEM/VAL; TAWS Target Upgrades ▲ DEM/VAL; ▲ EM/EO Sensor/Tgt Upgrades
- **Mine Warfare TDAs**: MEDAL/TEDS Integration ▲ DEM/VAL; ▲ MEDAL Build 10 ▲ DEM/VAL; MIW Database Upgrades ▽ DEM/VAL ▲; MEDAL-TTS Upgrades ▲ DEM/VAL; NEXGEN MIW TDA ▲ DEM/VAL; ▲
- **TDA COTS Visualization**: Advanced VIS ▲ DEM/VAL; 4D Vis Prototype ▲ DEM/VAL; GIG ES/FORECnet Integration ▲ ▽ DEM/VAL; Advanced Interactive Holographic Techniques ▲ DEM/VAL ▲; NEXGEN Vis ▲ DEM/VAL ▲
- **Platform Vulnerability**: TDA V2.0 DEM/VAL ▲; ▽ TDA V3.0 DEM/VAL ▲; TDA V3.0 ▽ DEM/VAL; Non-Acoustic Vul ▲; Multi-Ship Vul DEM/VAL ▲; Remote Sensing ▲ DEM/VAL; ▲
- **Sensor Interface Capabilities**: Build 2.5 ▲ DEM/VAL; Build 3.0 ▽ DEM/VAL; Build 3.5 ▲ DEM/VAL; Conventional Measurements ▽; Remote Sensing/Data Monitoring ▲ DEM/VAL ▲; NEXGEN Sensor Integration DEM/VAL ▲

R-1 SHOPPING LIST - Item No.   30

* Not required for Budget Activities 1, 2, 3, and 6

UNCLASSIFIED

CLASSIFICATION:

Exhibit R-4a, Schedule Detail					DATE: **FEBRUARY 2005**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2343 Tactical METOC Applications		
Schedule Profile	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
EM/EO Decision Aids	4Q		1Q			3Q	3Q	
Mine/Littoral Warfare TDAs	1Q	2Q	3Q		1Q	2Q	2Q	3Q
TDA COTS Visualization	3Q	4Q	4Q		2Q	3Q	2Q	4Q
Platform Vulnerability	4Q		3Q		2Q	4Q	1Q	3Q
Sensor Interface Capabilities	1Q			1Q		3Q	1Q	3Q

R-1 SHOPPING LIST - Item No.   30

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Exhibit R-2a, RDTEN Project Justification
(Exhibit R-2a, page 31 of 39)

EXHIBIT R-2a, RDT&E Project Justification				DATE: **FEBRUARY 2005**			

APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications			PROJECT NUMBER AND NAME 2344 Precise Timing and Astrometry			

COST ($ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Project Cost	1.097	1.250	1.304	1.584	0.508	0.298	0.303	0.309
RDT&E Articles Qty								

(U) 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.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification			DATE: **FEBRUARY 2005**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications	PROJECT NUMBER AND NAME 2344 Precise Timing and Astrometry	

(U) B. Accomplishments/Planned Program

Time Transfer	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.290	0.350	0.375	0.530
RDT&E Articles Quantity				

FY04 - Developments of next-generation time transfer capabilities. Installed upgraded capability.
FY05 - Deliver technical reports. Incremental developments of time transfer techniques.
FY06 - Development of next generation GPS Independent Time Transfer.
FY07 - Developments of next generation time transfer techniques incorporating neural networks to improve accuracy.

Earth Orientation/Astrometry	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.335	0.370	0.393	0.530
RDT&E Articles Quantity				

FY04 - VLBI/GPS demonstrations for earth orientation parameters. Delivered improvements for GPS upgrades.
FY05 - Evolutionary developments of next-generation earth orientation techniques. Deliver technical reports.
FY06 - Complete SASM Rx Demo. Complete Orion Array Prototype Detector. Incremental development of next generation earth orientation techniques (Astrometric Telescope).
FY07 - Deliver USNO Robotic Astrometric Telescope development.   Incremental development of earth orientation techniques.

Master Clock	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.472	0.530	0.536	0.524
RDT&E Articles Quantity				

FY04 - Delivered and install upgraded Master Clock. Continued exploitation of emergent Master Clock technologies.
FY05 - Perform initial testing of next generation Master Clock. Exploitation of emergent Master Clock technologies (Ribidium Fountain).
FY06 - Deliver Ribidium Fountain Prototype. Perform initial testing and complete initial Technical Reports.
FY07 - Complete Ribidium Fountain testing. Perform initial development of Mercury Ion Clock.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE:
		FEBRUARY 2005

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2344 Precise Timing and Astrometry

(U) C. PROGRAM CHANGE SUMMARY:

	FY 2004	FY 2005	FY 2006	FY 2007
(U) Funding:				
FY05 President's Budget	1.148	1.261	1.299	1.573
FY06 President's Budget	1.097	1.250	1.304	1.584
Total Adjustments	-0.051	-0.011	0.005	0.011
Summary of Adjustments				
Congressional Adjustments				
Congressional Recissions		-0.011		
Reprogrammings	-0.049			
Programmatic Adjustments			-0.008	-0.009
Economic Assumptions			0.013	0.020
Pricing Adjustments				
SBIR/STTR Transfers	-0.002			
Subtotal	-0.051	-0.011	0.005	0.011

(U) Schedule:

(U) Technical:

Not applicable.

R-1 SHOPPING LIST - Item No.   30

Exhibit R-2a, RDTEN Project Justification
(Exhibit R-2a, page 34 of 39)

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE:
		FEBRUARY 2005
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2344 Precise Timing and Astrometry

(U) D. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

Not applicable.

(U) E. 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 (USNO) 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 and Space (PEOC4I & Space).

(U) F. MAJOR PERFORMERS:

 N/A

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)										DATE: **FEBRUARY 2005**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**			PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2344 Precise Timing and Astrometry						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Software Development	WX	Naval Observatory	8.115	1.250	N/A	1.304	N/A	1.584	N/A	CONT	CONT	
	N/A	MISC	0.094	0.000	N/A	0.000	N/A	0.000	N/A	CONT	CONT	
Subtotal Software Development			8.209	1.250		1.304		1.584		CONT	CONT	

Remarks:

Subtotal Support			0.000	0.000		0.000		0.000		CONT	CONT	

Remarks:

UNCLASSIFIED

Exhibit R-2a, RDTEN Project Justification
(Exhibit R-2a, page 36 of 39)

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 2)										DATE: **FEBRUARY 2005**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**			PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2344 Precise Timing and Astrometry					
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Total Cost			8.209	1.250		1.304		1.584		CONT	CONT	
Remarks:												

R-1 SHOPPING LIST - Item No.   30

Exhibit R-2a, RDTEN Project Justification
(Exhibit R-2a, page 37 of 39)

CLASSIFICATION:

EXHIBIT R4, Schedule Profile																												DATE:			
																												FEBRUARY 2005			
APPROPRIATION/BUDGET ACTIVITY								PROGRAM ELEMENT NUMBER AND NAME												PROJECT NUMBER AND NAME										
RDT&E, N /				BA-4				PE 0603207N Air/Ocean Tactical Applications												2344 Precise Timing and Astrometry										

Fiscal Year	2004				2005				2006				2007				2008				2009				2010				2011			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Time Transfer		Neural Networks ▽			DEM/VAL		▲	DEM/VAL				▽ GPS Independed TT			DEM/VAL			Neural Networks	DEM/VAL ▲			▲	Advanced Time Transfer			DEM/VAL					▲	
Earth Orientation			DEM/VAL	▲	Full-Sky Astrometric Mapping Explorer ▽					▽ Orion Array - Prototype Detector		DEM/VAL			USNO Robotic Astrometric Telescope ▲	DEM/VAL			▽	Full-Sky Astrometric Mapping Explorer	DEM/VAL			▲						
Master Clock				DEM/VAL		▲ DEM/VAL		Ribidium Fountain Prototype	▽	DEM/VAL			▲	Mercury Ion Clocks	DEM/VAL			Pulsar Profile Technology ▲		DEM/VAL									▲	

R-1 SHOPPING LIST - Item No. 30

* Not required for Budget Activities 1, 2, 3, and 6

CLASSIFICATION:

Exhibit R-4a, Schedule Detail					DATE: **FEBRUARY 2005**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**		PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications			PROJECT NUMBER AND NAME 2344 Precise Timing and Astrometry			
Schedule Profile	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Time Transfer		4Q				2Q	1Q	4Q
Earth Orientation	4Q				2Q			2Q
Master Clock			1Q		1Q		1Q	4Q

R-1 SHOPPING LIST - Item No.   30