CLASSIFICATION:	UNCLASSIFIED						
EXHIBIT R-2, RDT&E BUDGET ITEM JUSTIFICATION						DATE May 2009	
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**			R-1 ITEM NOMENCLATURE **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**				
COST (In Millions)	FY 2008	FY 2009	FY 2010				
Total PE Cost	14.685	13.767	10.172				
0770 / Adv Sub Supp Equip Prog	4.215	4.349	4.374				
1739 / Submarine Arctic W/F Development	5.451	5.827	5.798				
9999 / CONGRESSIONAL ADDS	5.019	3.591	0.000				

A. MISSION DESCRIPTION:

The Submarine Tactical Warfare Systems program element is comprised of the Advanced Submarine Support Equipment Program (ASSEP) and the Submarine Special Operations Support Program. The objective is to improve submarine operational effectiveness through the development and implementation of advanced Research and Development (R&D). In order to provide improved operational effectiveness, research and development efforts are focused on Advanced Imaging Developments and Advanced Electronic Warfare Support (ES) Developments. A continuing need exists to improve these capabilities in view of the advancements in potential imaging counter detection, the need to support specialized missions and the increasingly dense and sophisticated electronic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Ongoing developments in 360 degree imaging systems and radar range finding (PATRIOT) technologies are supporting these needs. The Submarine Arctic Warfare Development program responds to the increased threat of Naval activity in the Littorals and the continuing threat of submarine and surface ship activity in regions of the world through the development of advanced submarine R&D technology to provide improved operational capability in shallow water regions. Particular emphasis is placed in the areas of sonar operability and maintainability, Littoral operations, mine warfare, tactical surveillance, weapon utility and other submarine support missions. Efforts include assessment of combat system effectiveness, development of Arctic shallow water specific improvements for existing sonars and weapons, development of class specific Arctic operational guidelines and the testing of ice-capable submarine support structures. This program also provides the framework for various R&D programs to conduct Test and Evaluation in shallow water and Arctic regions.

CLASSIFICATION:	UNCLASSIFIED	
EXHIBIT R-2, RDT&E BUDGET ITEM JUSTIFICATION (CONTINUATION)		DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	R-1 ITEM NOMENCLATURE **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**	

B. PROGRAM CHANGE SUMMARY:

Funding:	FY 2008	FY 2009	FY 2010
FY09 President's Budget	14.806	10.212	10.353
FY10 President's Budget	14.685	13.767	10.172
Total Adjustments	-0.121	3.555	-0.181
(U) Summary of Adjustments			
Congressional Rescissions	0.000	0.000	0.000
Congressional Adjustments	0.000	3.591	0.000
SBIR/STTR/FTT Assessment	-0.046	0.000	0.000
Program Adjustments	0.000	0.000	0.000
Rate/Misc Adjustments	-0.075	-0.036	-0.181
Total	-0.121	3.555	-0.181

CLASSIFICATION:	UNCLASSIFIED						
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION					DATE May 2009		
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**				PROJECT NUMBER AND NAME **0770/Adv Sub Supp Equip Prog**		
COST (In Millions)	FY 2008	FY 2009	FY 2010				
Project Cost	4.215	4.349	4.374				
RDT&E Articles Qty	0	0	0				

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

A continuing need exists to improve Imaging and Electronic Warfare Support (ES) capabilities in view of the advancements in potential imaging counter detection, the need to support specialized missions and the increasingly dense electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for submarine ES and imaging to be operationally effective in the following mission areas: Joint Littoral Warfare, Joint Surveillance, Space and Electronic Warfare, Intelligence Collection, Maritime Protection and Joint Strike. The program is divided into two project categories: Advanced Imaging Project Development and Advanced Electronic Warfare Support Project Development. Both of these categories will allow for the evaluation of the vulnerability of submarine masts, periscopes and sensors to visual, radar, and infrared detection and evaluation of state of the art technology to implement periscope/mast engineering improvements to reduce counter detection threats, the pursuit of technologies (such as PATRIOT LPI radar range finding and 360 degree imaging systems) to develop submarine unique improvements to mast, periscope, and ES electromagnetic and electro-optic sensors based on emerging technologies available from DOD Exploratory Development Programs, industry Independent Research and Development, academia and other sources. Feasibility demonstration models (FDMs) are developed, evaluated, and validated in the lab and through at-sea testing.

The Advanced Imaging Project Development Projects Include the development of: 360 Degree Imaging - Far Term Advanced System, 360 Degree Imaging - Near Term System, 360 Degree Submarine Panoramic Infra-Red (SPIR) Imaging System, 360 Degree Affordable Modular Panoramic Periscope (AMPP), Low Cost Expendable Sensor (LCES), Advanced Head Window Water Shedding, Electro-Optic Diploops, and a Low Cost, Multi-Spectral, Grade A Head Window. The Advanced Electronic Warfare Support (ES) Development Projects include the development of: PATRIOT Phase B - Low Probability of Intercept (LPI) Radar, LPI Direction Finding (DF), Distant ES Support and Remote Log-In, Specific Emitter Identification (SEI) Improvements, ES Vulnerability Tool, Integrated ES and ECS Radio Frequency Distribution Unit (RFDU), Multi-function Modular Mast (MMM) Payloads, Mast Signature Reduction, PATRIOT Non-Scanning LPI Radar.

All programs funded in this project are non-acquisition category programs. Program plans and priorities are established by N87. The test articles identified consist of critical components that will be fully developed during engineering development into Engineering Development Models (EDMs). ASSEP Programs will eventually be broken down into initial and developmental research, for both Imaging and Electronic Warfare.

CLASSIFICATION:	UNCLASSIFIED	
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION		DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**	PROJECT NUMBER AND NAME **0770/Adv Sub Supp Equip Prog**

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2008	FY 2009	FY 2010
Advanced Imaging Project Development	2.310	2.263	2.537
RDT&E Articles Quantity	0	0	0

FY 08-10
360 Degree Imaging (JPL) - Far Term Advanced System
360 Degree Imaging ONR T18)- Near Term System
360 Degree Submarine Panoramic Mid-Wave Infra-Red (MWIR) Imaging System
360 Degree Affordable Modular Panoramic Periscope (AMPP)
Low Cost Expendable Sensor (LCES)
Advanced Head Window Water Shedding
Electro-Optic Diploops
Low Cost, Multi-Spectral Grade A Head Window

	FY 2008	FY 2009	FY 2010
Advanced Electronic Warfare Support (ES) Project Development	1.905	2.086	1.837
RDT&E Articles Quantity	0	0	0

FY 08-10
PATRIOT Phase B - Low Probability of Intercept (LPI) Radar
Capability Insertions (CI)
- LPI Direction Finding (DF)
- Distant ES Support and Remote Log-In
- Specific Emitter Identification (SEI) Improvements
- ES Vulnerability Tool
- Integrated ES and ECS Radio Frequency Distribution Unit (RFDU)

Multi-function Modular Mast (MMM) Payloads
Mast Signature Reduction
PATRIOT Non-Scanning LPI Radar

CLASSIFICATION:	UNCLASSIFIED	
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION (CONTINUATION)		DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**	PROJECT NUMBER AND NAME **0770/Adv Sub Supp Equip Prog**

C. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

(U)Other Program Funding Summary: Not applicable.

(U) Related RDT&E: Not applicable.

D. ACQUISITION STRATEGY:

This project optimizes technology insertion using a build-test-build approach to support ES and imaging operational needs. Operational needs have been based on the tactical requirements identified in CNO letters, Serial N77/3U629212, dated 04 Sep 03, Serial N77/3U629205, dated 01 Apr 03, and Serial N77/1U651534, dated 30 Oct 01, COMSUBLANT/COMSUBPAC Command Capability Issues (CCIs), Virginia Class SSN Operational Requirements Document objectives, a review, assessment and prioritization of Sensor and Processor efforts and SSN force level projections for SSN688/688I, SSN21, and SSN 774 classes through FY2010. Project efforts develop submarine unique improvements to mast, periscope, and ES electromagnetic and electro-optic sensors based on emerging technologies that are available from DOD Exploratory Development Programs, industry Independent Research and Development, and other sources. Feasibility Demonstration Models (FDMs) will be developed to provide a realistic method of evaluating the improvements, including deployment on submarines for testing.

E. MAJOR PERFORMERS:

NAWC, China Lake, CA

NUWC, Newport, RI

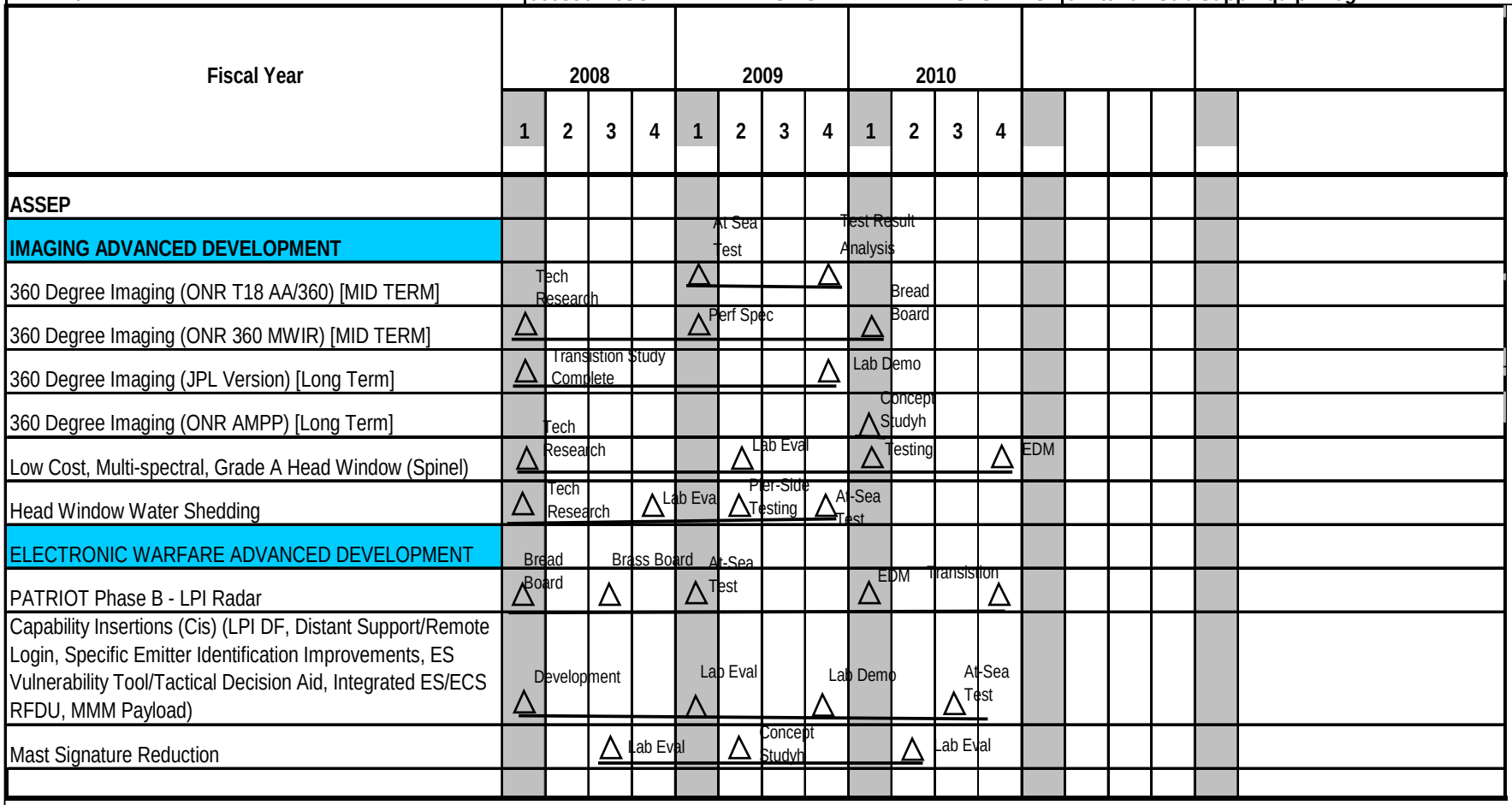
NASA JPL, Pasadena, CA

JHU, Columbia, MD

Navy Research Laboratories (NRL)

CLASSIFICATION:		UNCLASSIFIED								
EXHIBIT R-3, RDT&E PROJECT COST ANALYSIS							DATE May 2009			
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**		PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARI**			PROJECT NUMBER AND NAME **0770/Adv Sub Supp Equip Prog**					
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY Cost ($000)	FY 2009 Cost ($000)	FY 2009 Award Date	FY 2010 Cost ($000)	FY 2010 Award Date			
Primary Hardware Development	SS/CPIF	JPL/NRL	4.865	1.457	OCT-08	1.781	OCT-09			
Systems Engineering	WR	NUWC Newport, RI	2.789	0.969	OCT-08	1.473	OCT-09			
Systems Engineering	WR/RC	NAWC China Lake	4.441	1.225	OCT-08	0.194	OCT-09			
Subtotal Product Development			**12.095**	**4.082**		**4.106**				
Remarks:										
Engineering Technical Services	CPAF	AT&T GSI, Vienna, VA	0.650	0.230	FEB-09	0.235	FEB-10			
Subtotal Support Costs			**0.650**	**0.230**		**0.235**				
Remarks:										
Travel	WR	Various	0.090	0.037	VAR	0.033	VAR			
Subtotal Management Services			**0.090**	**0.037**		**0.033**				
Remarks:										
Total Cost			**12.835**	**4.349**		**4.374**				

CLASSIFICATION:	UNCLASSIFIED		
EXHIBIT R-4, SCHEDULE PROFILE			DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**		PROJECT NUMBER AND NAME **0770/Adv Sub Supp Equip Prog**



CLASSIFICATION:	UNCLASSIFIED						
EXHIBIT R-4a, SCHEDULE DETAIL					DATE May 2009		
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**			PROJECT NUMBER AND NAME **0770/Adv Sub Supp Equip Prog**			
Schedule Profile	FY 2008	FY 2009	FY 2010				
360 Degree Imaging (ONR) - T18 - (At-Sea Test)		Q1					
360 Degree Imaging (ONR) - T18 - Term - (Complete Testing)		Q4					
360 Degree Imaging (ONR) - MWIR - (Technology Research)	Q1						
360 Degree Imaging (ONR) - MWIR - (Performance Specification)		Q1					
360 Degree Imaging (ONR) - MWIR - (Bread Board)			Q1				
360 Degree Imaging (JPL.) - MWIR - (Lab/Pier Demonstration)		Q4					
360 Degree Imaging (JPL) - High Resolution (Encapsulation)			Q4				
Low Cost, Multi-Spectral, Grade A, Head Window - (Concept Study)	Q1						
Low Cost, Multi-Spectral, Grade A, Head Window - (Lab Evaluation)		Q2					
Low Cost, Multi-Spectral, Grade A, Head Window - (Testing)			Q1				
Low Cost, Multi-Spectral, Grade A, Head Window - (EDM)			Q4				
PATRIOT Phase B - LPI Radar - (Bread Board)	Q1						
PATRIOT Phase B - LPI Radar - (Brass Board)	Q3						
PATRIOT Phase B - LPI Radar - (At-Sea Testing)		Q2					
PATRIOT Phase B - LPI Radar - (EDM)			Q1				
PATRIOT Phase B - LPI Radar - (Transition)			Q4				
Capability Insertions (CI) - (Algorithm Development and Testing)	Q1						
Capability Insertions (CI) - (Lab Evaluation)		Q1					
Capability Insertions (CI) - (Lab Demo)		Q4					
Capability Insertions (CI) - (At-Sea Testing)			Q3				
Mast Signature Reduction - (Concept Studies)		Q2					
Mast Signature Reduction - (Lab Evaluations)	Q3		Q2				

CLASSIFICATION:	UNCLASSIFIED						
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION					DATE May 2009		
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**				PROJECT NUMBER AND NAME **1739/Submarine Arctic W/F Development**		
COST (In Millions)	FY 2008	FY 2009	FY 2010				
Project Cost	5.451	5.827	5.798				
RDT&E Articles Qty	0	0	0				

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The Submarine Arctic Warfare Development Project responds to the increased threat of Naval activity in the littoral and continuing threat of submarine and surface ship activity in all regions of the world through the development of advanced submarine concepts. It places particular emphasis on submarine operability and mission support in unique environments. Efforts include assessment of combat system effectiveness, weapons testing, use of high frequency sonars in Arctic regions, testing of ice-capable submarine structures, and development of class specific Arctic shallow water operational guidelines. This Project also provides the framework for various R&D programs to conduct test and evaluation in shallow water and Arctic regions.

CLASSIFICATION:	UNCLASSIFIED		
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION			DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**	PROJECT NUMBER AND NAME **1739/Submarine Arctic W/F Development**	

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2008	FY 2009	FY 2010
Conduct ICEX and Arctic Transit Mission, ICEX Workup and Training, Ice Camp	5.451	5.827	5.798
RDT&E Articles Quantity	0	0	0

FY09-10 Plans:

Conduct Ice Exercise (ICEX) mission, Arctic transit mission, ICEX workup, ICEX training, and Ice Camp. Provide planning and logistics, and support Ice Camp Operations and Scientific Ice Expedition (SCICEX) accommodations. Support Arctic deployments, including inter-fleet transfers, as required by the Submarine Force Commanders. Investigate, research, develop and deploy new systems for Arctic submarine support. Support testing and tactical development required to improve submarine Arctic operability and warfighting. Coordinate and provide technical and logistical support for the Ice Camp in the Arctic Ocean in FY09 through FY10.

C. OTHER PROGRAM FUNDING SUMMARY:

Not applicable.

D. ACQUISITION STRATEGY:

Use sole source and competitively awarded contracts through the Fleet Industrial Supply Center (FISC) regional contracting office for equipment and technical services. NAVSEA university omnibus contract will be used for procurement of logistics support for Ice Camps.

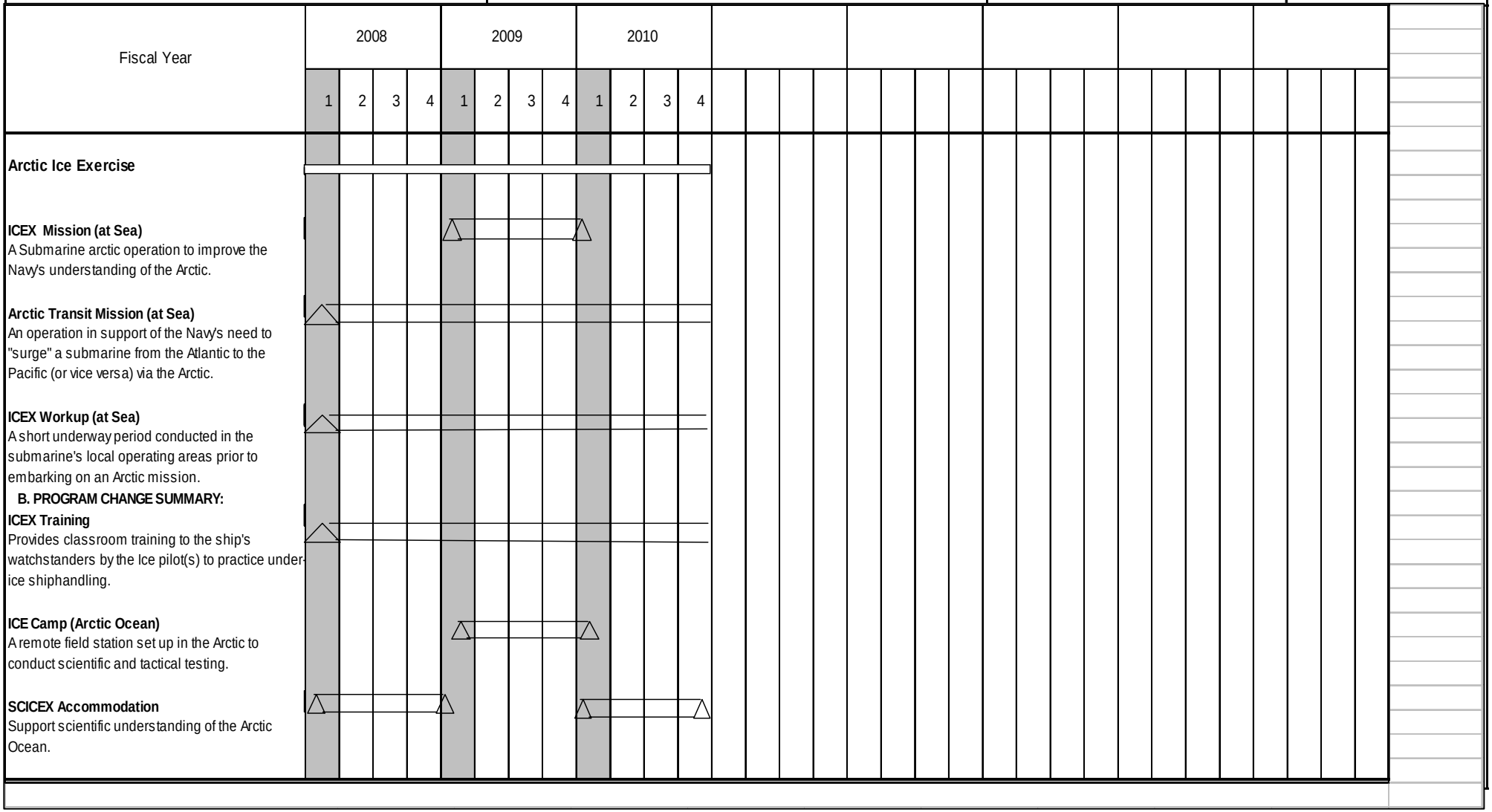
E. MAJOR PERFORMERS:

- Command Submarine Force, US Pacific Fleet (COMSUBPAC), Pearl Harbor, HI
- University of Washington Applied Physics Laboratory (UW/APL), Seattle, WA

Develop and definitize an Arctic-Deploying Side Scan Sonar replacement plan, which will deliver a significant, improved, and qualitative view of the underside of the Ice Canopy Sighting, and tracking of surfaceable features of current submarines, and the VIRGINIA class submarine.

CLASSIFICATION:		UNCLASSIFIED								
EXHIBIT R-3, RDT&E PROJECT COST ANALYSIS							DATE May 2009			
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**		PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTI**			PROJECT NUMBER AND NAME **1739/Submarine Arctic W/F Development**					
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY Cost ($000)	FY 2009 Cost ($000)	FY 2009 Award Date	FY 2010 Cost ($000)	FY 2010 Award Date			
Developmental Test & Evaluation	WR	SUBDEVRON FIVE, WA	10.427	4.377	OCT-08	4.248	OCT-09			
Developmental Test & Evaluation	C/CPFF	APL/University of Washington	3.150	1.300	OCT-08	1.400	OCT-09			
Subtotal Test and Evaluation			**13.577**	**5.677**		**5.648**				
Remarks:										
Program Management Support	C/CPFF	EG&G, VA	0.153	0.000		0.000				
Program Management Support	C/CPFF	BAE SYSTEMS, MD	0.253	0.140	NOV-08	0.140	NOV-09			
Travel	WR	NAVSEA PEO IWS 5, DC	0.030	0.010	OCT-08	0.010	OCT-09			
Subtotal Management Services			**0.436**	**0.150**		**0.150**				
Remarks:										
Total Cost			**14.013**	**5.827**		**5.798**				

CLASSIFICATION:	UNCLASSIFIED	
EXHIBIT R-4, SCHEDULE PROFILE		DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**	PROJECT NUMBER AND NAME **1739/Submarine Arctic W/F Development**



CLASSIFICATION:	UNCLASSIFIED						
EXHIBIT R-4a, SCHEDULE DETAIL					DATE May 2009		
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**			PROJECT NUMBER AND NAME **1739/Submarine Arctic W/F Development**			
Schedule Profile	FY 2008	FY 2009	FY 2010				
ICEX Mission (at Sea)		1Q-4Q					
Arctic Transit Mission (at Sea)	1Q-4Q	1Q-4Q	1Q-4Q				
ICEX Workup (at Sea)	1Q-4Q	1Q-4Q	1Q-4Q				
ICEX Training	1Q-4Q	1Q-4Q	1Q-4Q				
ICE Camp (Arctic Ocean)		1Q-4Q					
SCICEX Accommodation	1Q-4Q		1Q-4Q				

CLASSIFICATION:	UNCLASSIFIED	
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION		DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603562N/SUBMARINE TACTICAL WARFARE SYSTEMS**	PROJECT NUMBER AND NAME **9999/CONGRESSIONAL ADDS**

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2008	FY 2009	FY 2010
9B79A/Organic Sub ISRT Demo	2.782	0.000	0.000
RDT&E Articles Quantity	0	0	0

The objective of the Organic Submarine Airborne ISRT Demo effort is to design, development and prototyping of Stealthy Affordable Capsule System (SACS) configured for stowage and launch of a UAV. Focus of effort includes Payload Ejection System (PES) that will eject payload from broached SACS capsule and internal SACS support structure and electrical interfaces for UAV application.

	FY 2008	FY 2009	FY 2010
9B78A/High Awareness Littoral Observing (HALO) Sen-360 Degree Imaging Sys	0.965	1.197	0.000
RDT&E Articles Quantity	0	0	0

The objective of the High Awareness Littoral Observing Halo effort is to provide US Navy submarines with Passive Real Time 360 Degree Imaging. The system will contain no moving parts, will provide digital image stabilization and will operate in real time (i.e. minimal delay between event and display). The outboard sensor unit will be compatible with a standard 7.5 inch diameter submarine periscope mast. A graphical user interface (GUI) will provide interaction with the system.

	FY 2008	FY 2009	FY 2010
9B80A/Submarine Targeting Agile Array with Rapid Zooming	1.272	0.000	0.000
RDT&E Articles Quantity	0	0	0

The objective of the Submarine Targeting Agile Array with Rapid Zooming effort is the development of the 360 degree Periscope initiative, near term, in support of Integrated Submarine Imaging System (ISIS) increment three.

	FY 2008	FY 2009	FY 2010
9D37A/Submarine Panoramic Awareness System Program	0.000	1.596	0.000
RDT&E Articles Quantity	0	0	0

Develop a 360 degree prototype non-rotating periscope in direct support of the Integrated Submarine Imaging System, Digital Periscope for insertion into the pressure vessel in development.

	FY 2008	FY 2009	FY 2010
9D36A/Common Architecture Imaging System (CAIS) Program	0.000	0.798	0.000
RDT&E Articles Quantity	0	0	0

Develop a design approach to migrate the Digital Periscope Optical Sensor package and/or 360 module to PMS435 line of products.