CLASSIFICATION:	UNCLASSIFIED		
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION			DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603561N/ADVANCED SUBMARINE SYSTEM DEVELOPMENT**	PROJECT NUMBER AND NAME **3220/SBSD Advanced Submarine System Development**	

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

Accomplishments/Effort/Subtotal Cost	FY 2008	FY 2009	FY 2010
RDT&E Articles Quantity	0.000	0.000	387.517
SBSD Prototyping and Concept and System Definition	0	0	0

Planned FY10 Accomplishments include the following: Conduct trade studies, initiate concept and system definition efforts, and initiate technology demonstrations in the areas of propulsors, hull and platform technologies, electric actuation, and ship control. For missile compartment and strategic weapon system, begin design of the missile compartment along with development of an adaptable launch complex along with scale model and full scale prototyping as appropriate.

C. OTHER PROGRAM FUNDING SUMMARY:
Not applicable.

D. ACQUISITION STRATEGY:
The OHIO Class replacement will use a variety of acquisition strategies. The missile compartment must be designed and developed earlier than other parts of the ship in order to support the expressed intent of the President to support the UK in development of its own Successor SSBN program. It also preserves the potential for a common US-UK missile compartment, which would maximize the benefit of the ongoing US-UK partnership in strategic deterrence. Concept and System Definition efforts will be performed primarily by the US submarine shipyards. R&D efforts will be performed by Navy laboratories, shipyards, private industry, and University Affiliated Research Centers, as appropriate.

E. MAJOR PERFORMERS:
General Dynamics, Electric Boat Corp., Groton CT
Northrop Grumman Newport News Shipbuilding, Newport News VA
ARL Penn State, State College PA
Naval Surface Warfare Center, Carderock MD
Naval Undersea Warfare Center, Newport RI
Northrop Grumman Marine Systems, Sunnyvale, CA
Lockheed Martin Missiles and Space, Bethesda, MD
Draper Laboratories, Cambridge, MA

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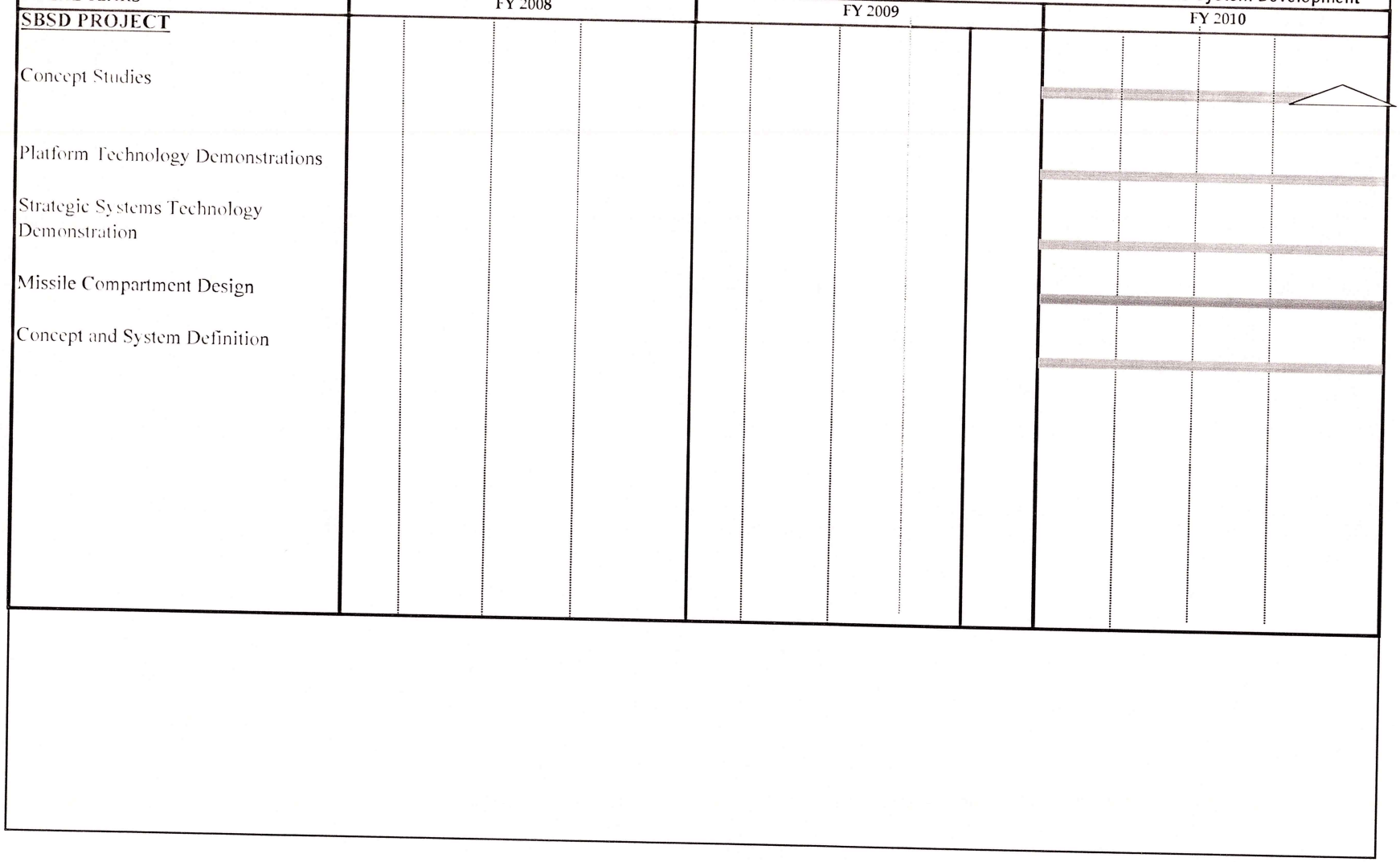
EXHIBIT R-3, RDT&E PROJECT COST ANALYSIS										DATE May 2009		
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**		PROGRAM ELEMENT NUMBER AND NAME **0603561N/ADVANCED SUBMARINE SYSTEM DEVELOPMENT**					PROJECT NUMBER AND NAME **3220/SBSD Advanced Submarine System Development**					
Cost Categories	Contract 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		Total Cost ($000)	Target Value of Contract
Contractor Test and Evaluation Support	VAR	Various	0.000			0.000		1.000	VAR			
Government Test and Evaluation Support	WR	Various	0.000			0.000		1.000	VAR			
Travel	WR	NAVSEA HQ	0.000			0.000		0.100	OCT-09			
Subtotal Test and Evaluation			0.000			0.000		2.100				
Remarks: Note: Various is used for multiple activities with different award dates.												
Contractor Management Support	VAR	Various	0.000			0.000		8.000	VAR			
Government Management Support	WR	Various	0.000			0.000		10.000	VAR			
Travel	WR	NAVSEA HQ	0.000			0.000		0.200	OCT-09			
Subtotal Management Services			0.000			0.000		18.200				
Remarks: Note: Various is used for multiple activities with different award dates.												
Product Development	SS/CPIF	Ship Design Contractor	0.000			0.000		30.000	JAN-10			
Product Development	WR	NSWC Carderock MD	0.000			0.000		25.000	VAR			
Product Development	SS/CPFF	ARL PSU, State College PA	0.000			0.000		2.000	VAR			
Product Development	SS/CPIF	EB, Groton CT	0.000			0.000		32.500	VAR			
Product Development	SS/CPIF	NGSB, Newport News VA	0.000			0.000		26.700	VAR			
Product Development	SS/CPIF	NGMS, Sunnyvale CA	0.000			0.000		55.000	VAR			
Product Development	WR	NUWC Newport, RI	0.000			0.000		4.000	VAR			
Product Development	TBD	Missile Comp Design Contractor	0.000			0.000		130.000	JAN-10			
Product Development	WR	JHU-APL, Laurel MD	0.000			0.000		4.500	VAR			
Product Development	SS/CPIF	Missile Launch Sys Contractor	0.000			0.000		35.000	VAR			
Product Development	SS/CPIF	Draper Labs, Cambridge MA	0.000			0.000		5.000	VAR			
Product Development	SS/CPIF	Lockheed Martin Missiles and Space, Bethesda MD	0.000			0.000		15.000	VAR			
Product Development	VAR	Various	0.000			0.000		2.517	VAR			
Subtotal Product Development			**0.000**			**0.000**		**367.217**				
Remarks:												

CLASSIFICATION:	UNCLASSIFIED											
EXHIBIT R-3, RDT&E PROJECT COST ANALYSIS										DATE May 2009		
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**		PROGRAM ELEMENT NUMBER AND NAME **0603561N/ADVANCED SUBMARINE SYSTEM DEVELOPMENT**					PROJECT NUMBER AND NAME **3220/SBSD Advanced Submarine System 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		Total Cost ($000)	Target Value of Contract
Note: Various is used for multiple activities with different award dates.												
Subtotal Support Costs			0.000			0.000		0.000				
Remarks:												
Total Cost			0.000			0.000		387.517				

CLASSIFICATION:	UNCLASSIFIED		
EXHIBIT R-4, SCHEDULE PROFILE			DATE May 2009
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA 4	PROGRAM ELEMENT NUMBER AND NAME 0603561N/ADVANCED SUBMARINE SYSTEM DEVELOPMENT	PROJECT NUMBER AND NAME 3220/SBSD Advanced Submarine System Development	



CLASSIFICATION:	UNCLASSIFIED						
EXHIBIT R-4a, SCHEDULE DETAIL						DATE May 2009	
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603561N/ADVANCED SUBMARINE SYSTEM DEVELOPMENT**			PROJECT NUMBER AND NAME **3220/SBSD Advanced Submarine System Development**			
Schedule Profile	FY 2008	FY 2009	FY 2010				
Concept Studies			1Q-4Q				
Platform Technology Demonstrations			1Q-4Q				
Strategic Systems Technology Demonstrations			1Q-4Q				
Missile Compartment Design			1Q-4Q				
Concept and System Definition			1Q-4Q				

studies and mission utility studies for variant submarine designs, including VIRGINIA derivatives. Develop a future undersea superiority system alternative to the reduced submarine program.

FY08 Accomplishments include the following: Completed component level TANGO BRAVO (TB) technology demonstrations. Demonstrated maneuvering and sea keeping aspects of Shaftless propulsion at small scale. Assessed Go/No Go for TB Phase 3 Shaftless Propulsion award. Completed load out demonstration and at-sea launch demonstration at depth of External Weapons Stow and Launch. Continued development of innovative technologies to support the undersea superiority initiative, Deep Water Active Detection System (DWADS), Reliable Acoustic Path (RAP) Line Array system, Shallow Water Array Processing (SWAP) system, Distributed Netted Sensors (DNS) Command Control and Communication system, Medium Frequency Acoustic Communications system, Deployable Autonomous Distributed System (DADS), and an ASW Command Common Tool Set. Continued studies, analysis and assessments of potential transformational submarine and ASW technologies. Conducted SBSD concept studies and technology trade studies to support Analysis of Alternatives (AoA) requirements development and R&D planning. Initiated planning for development of new technologies resulting from aforementioned studies. Performed Electromagnetic (EM) testing on Tango Bravo electric actuator at Groton, CT. Initiated electric actuator endurance test. Began partnership with DARPA on follow-on TB S3D project. Selected Submarine Shaftless Stern Demonstrator (S3D) vehicle platform and established performance requirements.

FY09 Planned Accomplishments include the following: Conduct TB demonstrations and acoustic modeling to reduce risk of proceeding to TB Shaftless Propulsion phase 3. Complete construction of shaftless demonstrator and commence demonstrating and performance testing. Complete External Weapons final report. Continue concept studies to support Sea Based Strategic Deterrent (SBSD) Analysis of Alternatives (AoA), requirements development and R&D planning. Complete the detail design of the Tango Bravo X-Planes electric actuator and ship control system modifications. Complete performance requirements, OPALT planning and procure long lead material for bow plane control surface electric actuator demonstration on SSN 774.

FY10 Planned Accomplishments include the following: Continue partnership with DARPA on follow-on TB S3D project. Continue concept studies to support Sea Based Strategic Deterrent (SBSD) requirements development and R&D planning. Complete demonstration and performance testing of TB Shaftless Propulsion prototype. Perform motor structural acoustic design and testing. Define vehicle interface and design modifications. Conduct radio control testing and hydro design model validation. Provide high-risk long lead-time procurements, Phase 2-3 cost estimate, and cost model update.

CLASSIFICATION:	UNCLASSIFIED		
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION			DATE May 2009
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA 4	PROGRAM ELEMENT NUMBER AND NAME 0603561N/ADVANCED SUBMARINE SYSTEM DEVELOPMENT	PROJECT NUMBER AND NAME 9999/Congressional Add	

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2008	FY 2009	FY 2010
0223A/Fiber Optic Conformal Acoustic Velocity Sensor (FOCAVES)			
RDT&E Articles Quantity	0.000	1.995	0.000
	0	0	0

Funds will be used to accelerate development of Fiber Optic Conformal Acoustic Velocity Sensor (FOCAVES) technology for the next generation SSN (Virginia Block IV) and the follow-on Strategic Based Sea Deterrent (next generation Ballistic Missile Submarine).

	FY 2008	FY 2009	FY 2010
9987N/Large Displacement UUV at Sea Launch & Recovery			
RDT&E Articles Quantity	3.000	0.000	0.000
	0	0	0

Funding will be used to define, document and provide interfaces, modular support equipment, and launch & recovery documentation for rapid affordable integration of Large Displacement UUVs and undersea payloads into SSGN Large Tubes. Land based facilities and in-water tests will be executed to demonstrate modular integration techniques and procedures. Payload interfaces and modular integration approach will maximize compatibility for potential use on other submarine classes.

	FY 2008	FY 2009	FY 2010
9B70A/Acoustic Materials for Integral Bow Conformal Array			
RDT&E Articles Quantity	0.972	0.000	0.000
	0	0	0

This funding will support research and development into the design and configuration of acoustic materials to support Integrated Bow Conformal Array concepts.

	FY 2008	FY 2009	FY 2010
9B71A/CISRT Enabling Materials Technology			
RDT&E Articles Quantity	2.314	0.000	0.000
	0	0	0

Funds will be used to develop the practical closure system utilizing shape memory or piezoelectric materials to secure payloads from salt water and sea pressure, which would be a significant technology enabler that would allow a wide variety of unmanned off board systems to be deployed. This effort includes systems engineering/analysis, test fixture development, design/development of subscale test items and evaluation testing.

	FY 2008	FY 2009	FY 2010
9B72A/Controllable Shock Absorber for Advanced Submarines			
RDT&E Articles Quantity	1.749	0.000	0.000
	0	0	0

This funding will be used to perform research and development associated with a controllable shock mitigation device for future submarine designs. This effort includes analysis, testing and evaluation of candidate concepts.

	FY 2008	FY 2009	FY 2010
9B73A/Low Cost Laser Module Assembly for High Frequency Fiber Optics			
RDT&E Articles Quantity	0.965	1.596	0.000
	0	0	0

Funds will be used to develop and evaluate promising laser interrogation technologies for a common towed array fiber optic receiver that is lower cost, more insensitive to

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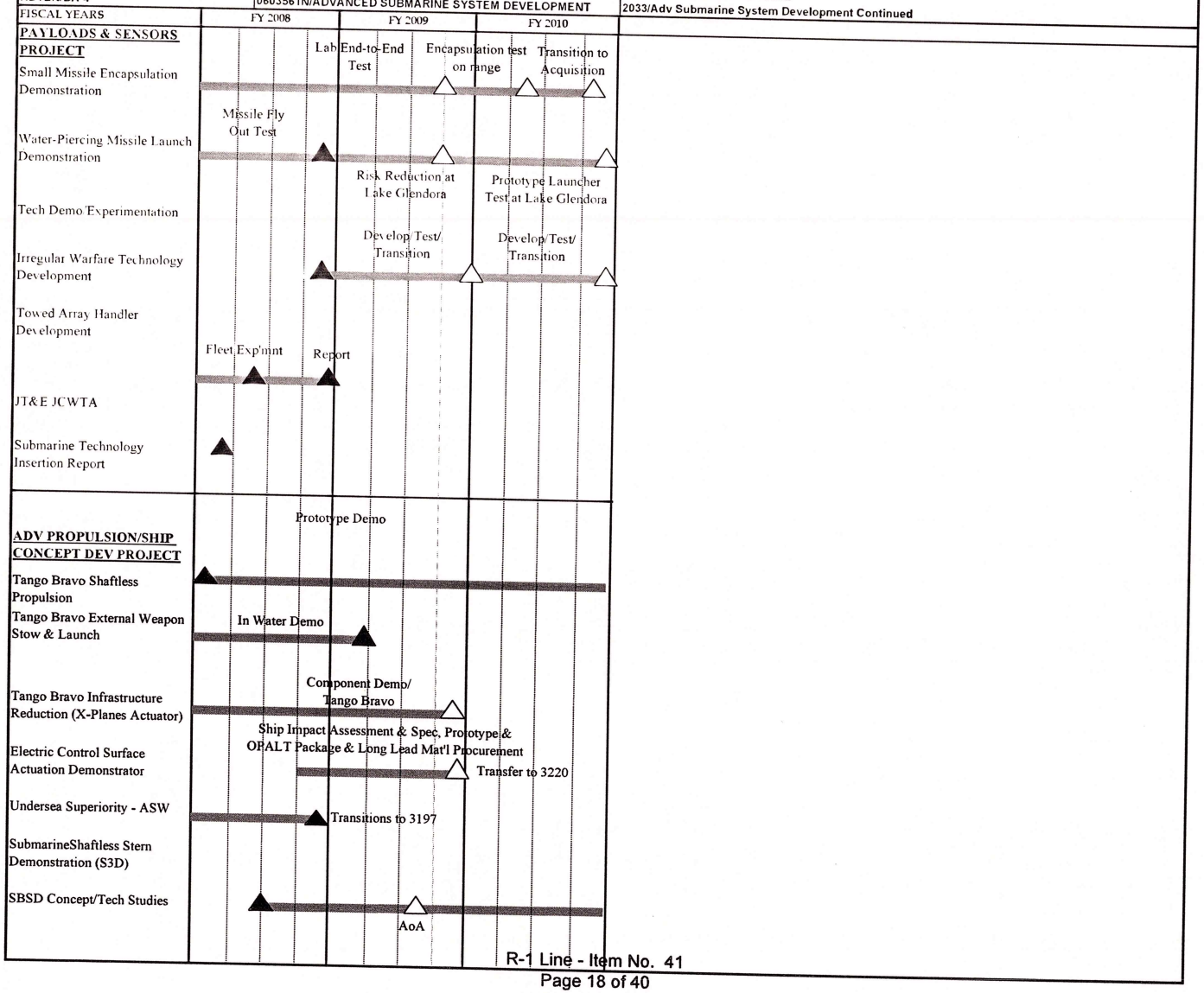
EXHIBIT R-4, SCHEDULE PROFILE		DATE May 2009
APPROPRIATION/BUDGET ACTIVITY RDTEN/BA 4	PROGRAM ELEMENT NUMBER AND NAME 0603561N/ADVANCED SUBMARINE SYSTEM DEVELOPMENT	PROJECT NUMBER AND NAME 2033/Adv Submarine System Development Continued



CLASSIFICATION:	UNCLASSIFIED	
EXHIBIT R-2a, RDT&E PROJECT JUSTIFICATION (CONTINUATION)		DATE May 2009
APPROPRIATION/BUDGET ACTIVITY **RDTEN/BA 4**	PROGRAM ELEMENT NUMBER AND NAME **0603561N/ADVANCED SUBMARINE SYSTEM DEVELOPMENT**	PROJECT NUMBER AND NAME **2033/Adv Submarine System Development**

current Universal Modular Mast (UMM) hydraulic actuation system with an EAS. Initiated paper design of a UMM EAS. Completed a study to replace remaining hydraulic actuators with EAS in the sail and in the external hydraulics supply. Completed draft EAS performance specification for snorkel induction head valve, mast hoist system, and the radar in the sail. Performed EAS feasibility study of all SSBN hydraulic applications. Conducted engineering study of Common Electric Hull Penetrator (CEHP) design concepts. Conducted an engineering analysis and evaluation of laboratory scale trials and alternate chemistries for Carbon Dioxide (CO2) capture material to determine the optimum form of solid phase sorbent for an advanced CO2 removal system for submarine air purification. Completed report on SSN-690 (USS PHILADELPHIA) summarizing observations and recommendations from full-scale trial with modified damping configuration. Defined configuration for two modified SSN-668 platforms with modified Main Ballast Tank (MBT) treatment configurations. Obtained acoustic data on both platforms. Supported configuration of SSN-688I class submarine to address reduced maintenance requirements related to MBT Damping. Completed testing on VIRGINIA (VA) class Modular Integrated Deck Structures (MIDS) configuration with a cost reduction based damping configuration to support VA class cost reduction initiatives and database for future designs.

FY09 Planned Accomplishments include the following: Complete qualification testing on 10,000 and/or 20,000 in-lb 3-position rotary EAS ADMs. Plan and schedule for the at-sea retractable bow plane electric actuator demonstration. Initiate Temporary Alteration (TEMPALT) planning to demonstrate rotary EAS on an operational submarine. Conduct pop up and Intermediate Scale Measurement System tests to assess damping configuration. Complete UMM EAS design, Interface Control Drawings (ICDs), and build ADM. Complete CO2 scrubber sorbent material performance testing. Complete design and construction of a 1/10 th scale CO2 scrubber test unit for lab evaluation. Complete design of sorbent test cubes for shipboard testing. Complete BCA in support of implementing the new CO2 removal system. Complete report on trial of two SSN-688 class platforms with modified MBT Damping configurations to support reduction in maintenance requirements. Complete summary report on MIDS testing and associated analysis. Complete functional requirements, BCA, ICDs, arrangement studies and concept designs for replacing external hydraulic actuators with electric systems.

FY10 Planned Accomplishments include the following: Complete TEMPALT planning for an at-sea demonstration of rotary and UMM EAS. Acquire external EAS ADMs for test and evaluation. Build and lab test CO2 scrubber sorbent test cubes. Install test cubes for shipboard testing. Initiate design of full scale CO2 scrubber prototype system. Complete MBT Damping trial report on SSN-688I platform with modified configuration.

	FY 2008	FY 2009	FY 2010
Advanced Propulsion/Ship Concept Developments/Subtotal Cost	44.838	14.507	26.852
RDT&E Articles Quantity	0	0	0

Overcome selected technological barriers that are expected to have significant impact on submarine hull, mechanical, and electrical (HM&E) systems to enable design options for a submarine with VIRGINIA Class capability in three technical areas: Shaftless Propulsion, External Weapon Stow and Launch, and Radical Ship HM&E Infrastructure Reduction. Develop submarine alternative propulsion and stern configurations with potential to significantly reduce submarine acquisition cost. Demonstrate critical performance parameters via Appropriate Scale Demonstrators in realistic environmental conditions. Evaluate integration of technologies and approaches for cost reduction in future nuclear submarines. Develop understanding of ship concept studies and submarine cost drivers and model analysis. Develop and demonstrate technologies for a future SSBN in areas of hull and platform technologies, propulsors, ship control, electric actuation, sensors, and self defense. This work will apply to future submarine designs and will begin the long-lead concept work on the next undersea strategic deterrent platform, for which design work must begin in earnest early next decade. Conduct concept