EXHIBIT R-2, RDT&E Budget Item Justification							DATE: June 2001			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Advanced Submarine Systems Development/0603561N					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002							
Total PE Cost	**127.615**	**128.082**	**110.766**							
Adv. Sub. Systems Development/S2033	**41.009**	**47.642**	**49.457**							
Enhanced Performance Metal Brush/S2756	**2.221**	**2.972**	**0.000**							
Adv. Sub. Combt Sys. Dev/V0223	**76.640**	**0.000**	**0.000**							
Adv. Sub. Combt Sys. Dev/S0223*	**0.000**	**66.569**	**61.309**							
Conf Array Vel Sensor/V2753	**2.912**	**0.000**	**0.000**							
Conf Array Vel Sensor/S2753	**0.000**	**4.954**	**0.000**							
Common Towed Array Prog/V2754	**1.933**	**0.000**	**0.000**							
Common Towed Array Prog/S2754	**0.000**	**5.945**	**0.000**							
Afford Adv Acoustic Arrays/V2755	**2.900**	**0.000**	**0.000**							

Note *: Due to realignment of Program Executive Office, FY2000 funds are allocated under V0223 and for FY2001 and beyond funds will be allocated under S0223.

(U) This program supports innovative research and development in submarine technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible

(U) Project Unit S2033: The Advanced Submarine Research & Development Office identifies the most promising and emerging technologies for VIRGINIA Class Submarine and other submarine platform insertion and transitions them into specific demonstration/validation efforts. The program element is non-ACAT and transitions technologies developed by Navy technology bases, the private sector, and the Defense Advanced Research Projects Agency Tactical Technology Office. Advanced systems developed under this program have potential for backfit into existing classes of submarines, supporting emerging requirements, and systems technology insertion into future submarine designs. Research and development investment factors used to select these technologies include: economic environment and return on investment; mission enhancement; and safety and survivability. The Program also supports two Information Exchange Programs with the United Kingdom, (one on submarine electromagnetic silencing and the second on submarine platform equipment, systems, and hull technology); operates the Large Scale Vehicle to provide at-sea test capability for propulsor, acoustic and non-acoustic signature reduction, remote vehicle R&D, and large scale hydrodynamic experimentation; operates the Hydrodynamic/Hydroacoustic Technology Center to enhance the Navy's ability to accurately, computationally predict hydrodynamic and hydroacoustic performance of submerged bodies; operates and supports the Intermediate Scale

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: June 2001
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Advanced Submarine Systems Development/0603561N

Measurement System; and provides life cycle support for the R&D Submarine modifications. In addition, the Program is constructing a second large scale vehicle, LSV2.

This Program has been structured to support near term VIRGINIA Class insertion as well as core technologies in Hydrodynamics/Hydroacoustics, Affordability, and Stealth. (U) Project S2756 is authorized by Congress under Committee Report - Senate Rpt. 106-50 - for Advanced Metal Fiber Brush Technology. Metal Fiber electric motor brushes have the potential to significantly improve shipboard quality of life, reduce total ownership costs of ships and increase the survivability and operational reliability of electric motors and generators.

U) Project Unit V0223: This non-acquisition (Non-ACAT) program supports the Navy Submarine Acoustic Superiority and Technology Insertion Initiatives by the application of advanced development and testing of sonar and combat control systems improvements. The program addresses technology challenges that marginalize tactical control in littoral and open ocean environments for a variety of operational missions including peacetime engagement, surveillance, battlespace preparation, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. Prototype hardware / software systems are developed to demonstrate technologically promising system concepts in Laboratory and at-sea submarine environments. Specific technology areas include transducers, hull and towed arrays, monostatic and bistatic sonar signal processing, net-centric warfare, target motion analysis (TMA), multiple contact processing. Program is funded under demonstration and validation because it develops and integrates hardware for experimental test related to specific ship and aircraft applications.

(U) Projects V2753, V2754, and V2755 are authorized by Congress to pursue the application of fiber optic technology in submarine acoustic array systems as potential cost and performance improvements to future operational sonar array systems.

B. (U) Program Change Summary:	FY 2000	FY 2001	FY 2002
FY 2001 President's Budget	115,767	113,269	121,064
Appropriated Value:	115,767	113,269	
Adjustment to FY 2000/2001 Appropriated Value/			
FY 2001 President's Budget:	11,848	14,813	-10,298
FY 2002 PRES Budget Submit:	127,615	128,082	110,766

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: June 2001
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Advanced Submarine Systems Development/0603561N

(U) Change Summary Explanation:

(U)S2033 Funding:
FY 2000 decreases of ($3.126M) is attributed to an increase of ($0.057M) to Restore Issue 62288 Outsourcing, decrease of ($-0.051M) for SSP contracts, decreases of ($-0.243M) for across the board reduction, decreases of ($-2.0M) ONR BTR update (May-00), decreases of ($-0.141M) FY00 SBIR Load June 00, decreases of ($-0.172M) Section 8055: proportionate reduction and ($-0.576M) for various minor program adjustments.

FY 2001 increase ($1.558M) is attributed to decreases of ($-0.337M) for Section 8086: .7% Pro-rata reduction, increases of ($2.000M) for Adv. Composite sail, and decreases of (-$0.105M) for a government wide rescission FY 2002 decreases of ($-5.317M) is attributed to a decreases of (-$0.067M) for various minor program adjustments, (-(-$0.447M) for NWCF Rate Adjustment, a decrease of ($-5.0M) for 93R/ASTO to Core plus DARPA, an increase of ($0.036M) for Non-Pay inflation, an increase of ($0.161M) for program support,

(U)V0223 Funding: FY 2000 increase of ($5.018M) is attributed to an increase of ($8.018M) for program adjustments, and decreases of (-$1.333M) for Advanced Undersea Warfare, (-$0.388M) for Across the Board Reduction, (-$1.0M) for other adjustments, and (-$0.279M) Proportionate reduction.

(U)S0223 Funding: FY 2001 decreases of (-$0.616M) is attributed to a decrease of (-$0.470K) for .7% pro-rata reduction and (-$0.146M) for Government -Wide Rescission. FY 2002 decrease of (-$4.981M) is attributed to a decrease of (-$0.754M) for various minor program adjustments, (-$5.0M). for 93R Asto to Core Plus DARPA, (-$0.004M)
for BSO Actual Update, (-$0.168M) for NWCF Rate adjustments, increases of ($0.199M) for Program Support .

(U)S2753 Funding: FY2000 increase of ($2.912M) is attributed to an increase of ($3.0M) for Caves and decreases of (-$0.017M) for Across the Board reduction, (-$0.059M) for Small Business Innovative Research load and -($0.012M) for Proportionate reduction. The FY2001 increase of ($4.965) is attributed to a an increase of ($5.0M) for Conformal Acoustic Velocity Sonar and a decrease of (-$0.035M) for 7% pro-rata reduction and (-$0.11K) for Government-Wide Rescission.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: June 2001
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Advanced Submarine Systems Development/0603561N

(U)S2754 Funding: FY2000 increase of ($1.933M) is attributed to and increase of ($2.0M) for Common Towed Array, and decreases of (-$0.011M) for Across the Board Reduction, (-$0.040M) for Small Business Innovative Research load and (-$0.008M) for Section 8055: Proportionate reduction and (-$0.008M) for minor program adjustments. FY2001 increase of ($5.945M) is attributed to an increase of ($6.0M) for Common Towed Array and a decrease of (-$0.042M) for Section 8056 .7% Pro-rata reduction. and
(-$0.013M) Government Wide Rescission .

(U)S2755 Funding: FY2000 increase of (($2.900M) is attributed to an increase of ($3.0M) for 631 - Affordable Advanced Acoustic Array and decreases of ($-0.017M) for Across the Board reduction, (-$0.059M) for Small Business Innovative Research load, (-$0.012M) for Proportionate reduction and (-$0.012M) for various minor program adjustments.

(U)S2756 Funding: FY2000 increase of (2.221M) is attributed to an increase of ($2.3M) for 631 - High Performance Brush Technology and decreases of ($-0.013M) for Across the Board reduction, (-$0.057M) for Small Business Innovative Research load and (-$0.009M) for Section 8055: Proportinate reduction. FY2001 increase of ($2.972M) is attributed to an increase of ($3.0M) for High Performance Bruch Technoloby and a decrease of (-$0.021M) for Section 8086: .7% Pro-Rata reduction.
and (-$0.007M) for Government wide Rescission.

(U) Schedule: Not Applicable.

(U) Technical: Proceed with the advanced development of technologies as identified in Secretary of Defense Report on Nuclear Attack Submarine Procurement and Submarine Technology.

EXHIBIT R-2a, RDT&E Project Justification									DATE: **June 2001**	
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002							
Adv. Submarine Systems Dev. - S2033	**41.009**	**47.642**	**49.457**							
Adv. Metal Fiber Brushes - S2756	**2.221**	**2.972**	**0.000**							

A. (U) Mission Description and Budget Item Justification: This program supports innovative research and development in submarine technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible.

(U) Project Unit S2033: The Advanced Submarine Research & Development Office identifies the most promising and emerging technologies for the VIRGINIA Class Submarine and other submarine platform insertion and transitions them into specific demonstration/validation efforts. The program element is non-ACAT and transitions technologies developed by Navy technology bases, the private sector, and the Defense Advanced Research Projects Agency Tactical Technology Office. Advanced systems developed under this program have potential for backfit into existing classes of submarines, supporting emerging requirements, and systems technology insertion into future submarine designs. Research and development investment factors used to select these technologies include: economic environment and return on investment; mission enhancement; and safety and survivability. The Program also supports two Information Exchange Programs with the United Kingdom, (one on submarine electromagnetic silencing and the second on submarine platform equipment, systems, and hull technology); operates the Large Scale Vehicle (LSV) to provide at-sea test capability for propulsor, acoustic and non-acoustic signature reduction, remote vehicle R&D, and large scale hydrodynamic experimentation; operates the Hydrodynamic/Hydroacoustic Technology Center to enhance the Navy's ability to accurately, computationally predict hydrodynamic and hydroacoustic performance of submerged bodies; operates and supports the Intermediate Scale Measurement System; and provides life cycle support for the R&D Submarine modifications. In addition, the program is constructing a second large scale vehicle, LSV2.

U) Project S2756 is authorized by Congress under Committee Report - Senate Rpt. 106-50 - for Advanced Metal Fiber Brush Technology. Metal Fiber electric motor brushes have the potential to significantly improve shipboard quality of life, reduce total ownership costs of ships and increase the survivability and operational reliability of electric motors and generators.

(U) This Program has been structured to support near term Virginia Class insertion as well as core technologies in Hydrodynamics/Hydroacoustics, Affordability, and Stealth.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **June 2001**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Advanced Submarine Sys Dev/0603561N**	Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756

(U) Program Accomplishments and Plans:

1. (U) FY 2000 Plan:

- (U) ($8.007M) Stealth: Continue development of advanced submarine propulsor technologies, internal transmission paths, Stealth Master Plan, Advanced Electromagnetic Silencing, hull radiation and echo formation (Advanced Coatings), Advanced Launchers and the Malice Program.
- (U) ($11.403M) Hydrodynamics/Hydroacoustics: Continue development of elements of Integrated Computational Design Environment analysis of hydrodynamic and hydroacoustic submarine performance (Maneuvering and Control). Develop and demonstrate techniques to improve hyrodynamic performance of submarines through modification of flow and lift characteristics (Powering and Resistance). Complete demonstration/validation of the Advanced Sail on LSV. Initiate Composite Sail development. Continue Rim Driven Thruster/Main Seawater Pump development .
- (U) ($.220M) SSM Master Plan: Complete development of the Structures, Survivability and Materials Primer and Technology needs document.
- (U) ($17.493M) Infrastructure: Continue operations and support for the Large Scale Vehicle, H/HTC, ISMS, R&D submarine. Continued design and construction of LSV 2.
- (U) ($3.440M) Total Ownership Cost/Affordability: Initiate Peel and Stick Damping study, initiate design and testing of Advanced Metal Fiber Brushes technology ($2.2M funding under Project Unit S2756).
- (U) ($2.667M) Continue Mission and Future Design (M&FD)/Hull, Mechanical and Electrical (HM&E) Conform Studies and New Technology Assessment support.

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$43.230M TOTAL ($41.009 + $2.221)

2. (U) FY 2001 Plan:

- (U) ($17.239M) Stealth: Continue development of submarine portions of corporate Electric Drive, advanced submarine propulsor technologies, internal transmission paths, Stealth Master Plan, Advanced Launchers, Advanced Electromagnetic Silencing, and hull radiation and echo formation (Adv. Coatings).
- (U) ($7.035M) Hydrodynamics/Hydroacoustics: Continue development of elements of Integrated Computational Design Environment analysis of hydrodynamic and hydroacoustic submarine performance (Maneuvering and Control). Develop and demonstrate techniques to improve hydrodynamic performance of submarines through modification of flow and lift characteristics (Powering and Resistance). Complete Rim Driven Thruster/Main Seawater pump development.

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EXHIBIT R-2a, RDT&E Project Justification		DATE: **June 2001**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Advanced Submarine Sys Dev/0603561N**	Advanced Sub Systems Development - S2033/Adv. Metal Fiber Brushes - S2756

2. (U) FY 2001 Plan (continued)

Complete Advanced Sail development. Continue Advanced Composite Sail development.

- (U) ($18.120M) Infrastructure: Continue operations and support for the Large Scale Vehicle, Hydroacoustic/Hydrodynamic Test Center(H/HTC), Intermediate Scale Measurement System (ISMS), R&D Submarine. Complete design and construction of the LSV 2. Initiate acceptance trials.
- (U) ($3.565M) Total Ownership/Affordability: Continue development of Advanced Metal Fiber Brushes ($2.972M from S2756).
- (U) ($4.097M) Continue study and initiate demonstration for Payloads in compliance with Defense Science Board Report recommendations. Continue M&FD/HM&E Conform Studies and New Technology Assessment support.
- (U) ($.558M) Portion of extramural program reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

$50.614M TOTAL ($47,642 + $2,972)

3. (U) FY 2002 Plan

- (U) ($17.958M) Stealth: Continue development of submarine unique portions of corporate Electric Drive, advanced submarine propulsor technologies, internal transmission paths, Stealth Master Plan, Advanced Electromagnetic Silencing, and hull radiation and echo formation (adv. coatings).
- (U) ($6.096M) Hydrodynamics/Hydroacoustics: Continue development of elements of Integrated Computational Design Environment analysis of hydrodynamic and hydroacoustic submarine performance (Maneuvering and Control). Continue Composite Sail.
- (U) ($15.773M) Infrastructure: Continue operations and support for the Large Scale Vehicle, Hydroacoustic/Hydrodynamic Test Center(H/HTC), Intermediate Scale Measurement System (ISMS), R&D Submarine. Complete acceptance trials of LSV 2 for IOC.
- (U) ($2.743M) Total Ownership/Affordability: Initiate full scale land based testing of Advanced Metal Fiber Brushes.
- (U) ($6.887M) Continue study and demonstrations for Payloads in compliance with Defense Science Board Report recommendations. Continue M&FD/HM&E Conform Studies and New Technology Assessment support.

$49.457M TOTAL

EXHIBIT R-2a, RDT&E Project Justification		DATE: **June 2001**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Advanced Submarine Sys Dev/0603561N**	Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756

B. (U) Other Program Funding Summary: additional $50M of SEALIFT National Defense Funds was appropriated in FY97, authorized in FY98 for LSV development.
(U) Related RDT&E: Not applicable.

C. (U) Acquisition Strategy: Not applicable.

D. (U) Schedule Profile:

	FY 2000	FY 2001	FY 2002
PROGRAM MILESTONES	Completed demonstration/validation of advanced sail on LSV, transition to VIRGINIA class PE. Hydroacoustic/Hydrodynamic Test Center computer refresh upgrade. Acoustic Research Detachment Range upgrade (phase 1). Initiated composite advanced sail development.	Launching of LSV 2. Troubleshoot SEAWOLF Acoustic issues LSV 1. Complete Rim Driven Thruster/ main seawater pump development. Issue Stealth Master Plan. Terminate Flow Mgmt. Complete Adv. Sail development, transition to VIRGINIA class. Initiate lemtep launcher cost feasability study. Initiate SSTG signature dev. Select composite adv. Sail vendor. Peel & stick transition. Electro-magnetic Silencing reprogramming. Develop advanced hull treatment plan. Transition dynamic bulk modules measurement system.	Initiate propulsor rapid prototype design developmnts. Initiate Advanced Maneuvering and Control development. SEAWOLF steel sail trail, LSV 1. VIRGINIA 4th generation propulsor trail.
ENGINEERING MILESTONES	Complete construction of LSV 2 modules. Assemble LSV 2 modules at Lake Pend Oreille. Initiate prototype design of flow mgmt.	LSV 2 acceptance and characterization trials. Initiate electric drive development. Complete upgrade/replace LSV range acoustic array.	LSV 2 RAV install Hull treatment on Sail. ITP Mount down select development.

EXHIBIT R-2a, RDT&E Project Justification — **June 2001**

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Advanced Submarine Sys Dev/0603561N**	Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756

	FY 2000	FY2001	FY 2002
ENGINEERING MILESTONES	Install replacement battery in LSV 1. Complete development of Stealth Master Plan. Concept for LSV evaluation Maneuvering design and analysis tool at H/HTC.	Continue advanced mount design, mount analysis test flanking path, shock analysis. SSN 22 coating characterization. Malice report & trial peel & stick. Malice full scale mock up test. Conduct composite Advanced Sail vendor qualification. Install Propulsor Design and analysis tool at H/HTC	
T&E MILESTONES	Complete EES 2nd generation disk life cycle aging test. Completed hydroacoustic evaluation of Advanced Sail prototype on LSV 1. Weapons effect testing of advanced decks and mounts. Conduct EES warfare effectiveness analysis. Completed hydroacoustic evaluation of LSV 1 with no sail. Demonstrate commutator operation for Adv. Metal Fiber Brushes - lab scale.	Intermediate scale land based testing for Advanced Metal Fiber Brushes. Complete EES warfare effectiveness analysis. If continued development is warranted, design mod to ASLF. Electro-magnetic Silencing US/UK sea trial - 8 and analysis. SSN 22 characterization sea- trial. Complete "no sail" trails LSV-1.	Demonstrate commutator operation for Advanced Metal Fiber Brushes - full scale. Electro-magnetic silencing US/UK sea trial - 9 Intermediate scale sea trials for brushes.
CONTRACT MILESTONES		Accept delivery of LSV 2 to Navy. Advanced Metal Fiber Brushes completion contract award.	
	43230	50614	49457

R-1 SHOPPING LIST - Item No. 59

Exhibit R-3 Cost Analysis (page 1)								DATE: June 2001						
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT				PROJECT NAME AND NUMBER								
RDT&E, N/BA-4		**Advanced Submarine Sys Dev/0603561N**				Advanced Submarine Systems Development/S2033								
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date					
Systems Engineering	S/CPFF	NNS Newport News, VA	42.201	1.249	02/00	1.169	12/00	1.500	12/01					
Systems Engineering	S/CPIF	NNS Newport News, VA	11.267	3.215	02/00	3.949	12/00	10.200	12/01					
Systems Engineering	S/CPFF	EB Groton, CT	47.876	0.830	02/00	1.800	12/00	4.500	12/01					
Systems Engineering	WR	NSWC Bethesda, MD	135.015	17.047	10/99	14.550		15.294						
Systems Engineering	S/CPFF	ARL/PSU, State College,PA	31.724	1.673	01/00	1.524	12/00	4.000	12/01					
Systems Engineering	S/CPFF	APL/JHU	0.100	0.250	04/00	0.200	01/00							
Systems Engineering	WR	NUWC Newport, RI	69.628	1.664	10/99	1.000		1.230						
Systems Engineering	WR	NRAD San Diego, CA	0.400	0.260	11/99	0.300								
Systems Engineering	S/CPFF	KAPL Schenectady, NY	2.000	3.000		9.700								
Systems Engineering	S/CPFF	Cortana	1.400	1.780		0.000		0.000						
Systems Engineering	S/CPFF	NOESIS		2.221		2.972								
Subtotal Product Development			341.611	33.189		37.164		36.724						

Remarks:

EB's PY cost is greater than total value of contract due to a new contract award.

Development Support Equipment														
Software Development														
Training Development														
Integrated Logistics Support														
Configuration Management														
Technical Data														
GFE														
Subtotal Support			0.000	0.000		0.000		0.000						

Remarks: Not applicable.

Exhibit R-3 Cost Analysis (page 2) | DATE: **June 2001**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N/BA-4** | PROGRAM ELEMENT: **Advanced Submarine Sys Dev/0603561N** | PROJECT NAME AND NUMBER: Advanced Submarine Systems Development/S2033

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date					
Developmental Test & Evaluation	WR	NSWC Bethesda, MD	17.676	5.653	10/99	2.983		9.043						
Developmental Test & Evaluation	S/CPFF	NNS Norfolk, VA	1.817	1.663	02/00	4.000	12/00	2.000	12/01					
Developmental Test & Evaluation	S/CPFF	EB Groton, CT	17.706	1.097	02/00	1.800	12/00	1.000	12/01					
Developmental Test & Evaluation	S/CPFF	DARPA Fairfax, VA	3.000	0.000		0.540		0.000						
Developmental Test & Evaluation	S/CPFF	NOESIS	1.200	0.511		2.972		0.000						
Developmental Test & Evaluation	S/CPFF	SPA	0.410	0.547		0.600		0.000						
Subtotal T&E			41.809	9.471		12.895		12.043						

Remarks:

Contractor Engineering Support	S/CPFF	NNS Norfolk, VA	1.700											
Contractor Engineering Support	S/CPFF	EB Groton, CT	1.700											
Travel				0.080		0.080		0.090						
Contractor Financial Support		Vredenburg		0.090	11/99	0.060	11/00							
Government Engineering Support	WR	NSWC Bethesda, MD	1.000											
Contractor Engineering Support		Rosenblatt		0.175	12/99	0.190	12/00	0.200	12/01					
Contractor Engineering Support		JJMA		0.120	02/00	0.120	11/00	0.400	11/01					
Contractor Engineering Support		AME		0.105	12/99	0.105	11/00							
Subtotal Management			4.400	0.570		0.555		0.690						

Remarks: FY00 &01 includes congressional plus-up funds project unit S2756 for Metal Fiber Brushes in which all funds go to Noesis.

Total Cost			387.820	43.230		50.614		49.457						

Remarks:

EXHIBIT R-2a, RDT&E Project Justification										DATE: **June 2001**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223/S0223					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002							
Project Cost	**76.640**	**66.569**	**61.309**							
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: This program supports innovative research and development in submarine technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible.

(U) Project Unit V0223: This non-acquisition (Non-ACAT) program supports the Navy Submarine Acoustic Superiority and Technology Insertion Initiatives by the application of advanced development and testing of sonar and combat control systems improvements. The program addresses technology challenges that marginalize tactical control in littoral and open ocean environments for a variety of operational missions including peacetime engagement, surveillance, battlespace preparation, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. Prototype hardware / software systems are developed to demonstrate technologically promising system concepts in Laboratory and at-sea submarine environments. Specific technology areas include transducers, hull and towed arrays, monostatic and bistatic sonar signal processing, net-centric warfare, target motion analysis (TMA), Environmental Intelligence, multiple contact processing. Program office supports twelve international information exchange agreements. Program is funded under demonstration and validation because it develops and integrates hardware for experimental test related to specific ship and aircraft applications.

(U) Program Accomplishments and Plans:

FY 2000 Accomplishments (V0223):
-($8.200) Advanced Tactical Control – Began development of Advance Processing Build-01 (Tactical) (APB(T)-01) software. Further defined functional priorities and initiated development of 3D tactical scene rendering, improved use of ARCI data and integrated vulnerability information management. Developed performance quantification metrics and data collection, storage and analysis methodologies. Completed development SFMPL 6.1 Initiated developement of tools to address close encounter requirements. Identified potential information management solutions including enviromental tools, cooperative Common Tactical Decisions Aids from DARPA, ONR, industry and academia. Initiated evaluation for inclusion in APB(T) Builds.

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EXHIBIT R-2a, RDT&E Project Justification								DATE: **June 2001**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223/S0223					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002							
Project Cost	**76.640**	**66.569**	**61.309**							
RDT&E Articles Qty										

FY2000 Plan (V0223) - Cont'd

- ($32.114) Advanced Sonar System and Processing – Completed APB(A)-99 sea test and transitioned to ARCI Phase III. Completed development of APB(A)-00 and initiated verification testing. Initiated definition and development of APB(A)-01 for low frequency vulnerability. Continued development of APB(A)-01 for mid and high frequency. APB improvements included enhanced automation for detection and claissifcation, and enhanced localization functionality.
- ($5.711) Advanced Towed Arrays - Continued 3-line array development. Continued fabrication of 1-line array. Developed NTMLTA signal processing design. Conducted1-line lake test and Critical Item Tests.
- ($10.800) Advanced Hull Arrays – Continued development of CAVES technology. Performed analysis on CAVES pre-patch test data. Installed CAVES Patch arrays USS Newport News. Conducted Post-patch DMP Sea Test. Investigated current coatings CAVES performance. Continued planning for integration of CAVES technology with other Hull arrays. Performed CAVES Outer decoupler buckling experiment. Continued documentation of CAVES program. Investigated impact of outer decoupler on inner decoupler. Initiated CACTISS III test planning. Initiated CAVES WAA transition planning. Initiated Bow Conformal array technology in conjunction with Advanced Sail to maintain current capability. Initiated Integrated Bow Conformal Array technology to replace spherical array, HF sail array, and HF chin array. Extended Noise Audit Model for Integrated Conformal Array. Initiated planning for FY04 Lake Test/Demonstration and FY05 Sea Test/Demonstration. Designed Bow Dome for demonstration tests. Initiated sensor development. Initiated acoustic source development. Initiated processor software development.
- ($6.700) High Frequency Sonar Program - Completed development, evaluation, testing and implemented APB99 Build 2+ into ARCI program. Completed Test bed upgrades. Continued sail and conformal array studies. Initiated investigation of HF bow conformal requirements, design trade-offs and planning efforts. Continued processing improvements including PUMA for APB 01 bottom and target mapping, ASW improvements, bottom tracking and navigation, and adaptive signal design. Initiated PUMA processing improvements into LMRS precision mapping efforts.
- ($.500) Test and Evaluation – Conducted Towed Array lake test. Continued at-sea data gathering program. Initiated planning for HF APB Sea Test.
- ($12.615) Fiber Optic Technology Transition - Risk reduction to assure smooth transition to VIRGINIA CLASS Submarine Program.

$76,640 TOTAL

EXHIBIT R-2a, RDT&E Project Justification							DATE: **June 2001**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223/S0223					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002							
Project Cost	**76.640**	**66.569**	**61.309**							
RDT&E Articles Qty										

U) FY 2001 Plan (Proj S0223 (denoting new PEO)):
-($7.215) Advanced Tactical Control – Complete APB(T)-01 development which is focused on close encounter requirements. Conduct combat system performance assessment based on the defined metrics. Evaluate candidate technologies for APB(T)-02. Deliver SFMPL 6.1.
- ($33.132) Advanced Sonar System and Processing -Complete performance assessment and transition of APB(A)-00 to BQQ -10 project and VIRGINIA. Complete development, and intiate testing and transition of APB(A)-01 for low frequency. Complete development and intiate testing and transition of APB(A)-01 for mid and high frequency. Initiate APB(A)-02 to address inital acoustic scene management functionality including matched field techniques, new tracking, and automated passive operator search support.
- ($3.800) Advanced Towed Arrays- Continue 3-line array development. Conduct subsystem CITs. Fabricate 3-line array ADM. Fabricate 3-line signal processor ADM. Conduct system integration & testing.
- ($6.100) Advanced Hull Arrays- Continue development of CAVES technology - Complete installation of CAVES Patch array on USS NEWPORT NEWS (SSN 751). Conduct installation of CAVES Patch instrumentation. Conduct CAVES Patch test. Begin analysis of CAVES Patch Test. Continue documentation of CAVES program. Conduct CACTISS III test. Conduct planning for installation of CAVES Large Vertical Aperture (LVA) sonar on VIRGINIA hull 05 instead of CAVES WAA. Continue Noise Audit Model for Integrated Bow Conformal (IBC) Array and LVA. Conduct modeling of CAVES LVA performance. Begin modeling of Integrated Bow Conformal notional array performance. Construct 1/4 scale bow dome for material, beamforming, and self noise testing. Conduct material testing for inner decoupler use in CAVES LVA and IBC. Continue processor software development. Continue planning for demonstration test.
- ($5.700) High Frequency Sonar Program- Continue processing improvements including PUMA, evaluation and testing of APB01 initiatives. Continue investigation of HF bow conformal requirements, design trade-offs, and planning eforts. Transition on-going processing developments to advance processing. Continue PUMA processing improvements into LMRS precision mapping efforts. Initate PUMA/TEDS/MEDAL integration.
- ($9.000) Payloads/Sensors Program- Initiate a cooperative Navy/DARPA effort to identify and assess emerging technology concepts that will provide significant operational payoff within the context of curent and future submarine missions consistent with Navy strategic concepts.
- ($.500) Test & Evaluation - Conduct APB(T) -01 sea tests, HF sea tests, and hull array testing.
- ($1.122M) Portion of extramural program reserved for Small Business Inovation Research assessment in accordance with 15 USC 638.

EXHIBIT R-2a, RDT&E Project Justification							DATE: **June 2001**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223/S0223					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002							
Project Cost	**76.640**	**66.569**	**61.309**							
RDT&E Articles Qty										

FY 2002 Plan (S0223):
- ($8.500) Advanced Tactical Control – Conduct APB(T)-01 Sea Test. Incorporate APB(T)-01 upgrades based on at-sea test and transition to CCS MK2 and VIRGINA Class Program for system level integration. Complete Development and Sea Test of APB(T)-02 , focusing on high density contact management and integration of non acoustic sensors.
- ($33.089) Advanced Sonar System and Processing – Complete transition of APB(A)-01 to BQQ-10 program and VIRGINIA. Complete development and initiate and transition test of APB(A)-02 to BQQ-10 and VIRGINIA program. Initiate definition/development of APB(A)-03 for follow-on acoustic scene management functionality including active intercept, TSMS, integrated active and passive processing, torpedo DCL, ACINT 21and improvements automated alertment, contact localization and tracking and sonar tactical decision aids.
- ($.770) Advanced Towed Arrays - Conduct 3 line R/V sea test. Conduct 3 line submarine demonstration. Perform 3 line data analysis.
- ($2.200) Advanced Hull Arrays - Complete CAVES Large Vertical Array (LVA) transition to VIRGINIA, update noise audit model. Complete LVA optimization study. Continue integration of CAVES technology into advanced broad frequency coverage, large horizontal and vertical aperture flank and bow sonar concept development. Continue development of noise audit model for Integrated Bow Conformal (IBC) Array. Complete 1/4 scale bow dome testing. Continue IBC Dome structure and array design. Complete CACTISS III test data analysis and issue report. Conduct Broadband active sonar demonstation in conjunction with High Frequency Sonar Program.
- ($4.400) High Frequency Sonar Program-Transition processing improvement, including PUMA, into APB 02. Continue improvements of HF passive and LPI active. Complete investigation of HF bow conformal requirements. Continue PUMA LMRS improvements efforts. Continue PUMA/TEDS/MEDAL integration.
- ($11.850) Payloads/Sensors Program- Continue cooperative efforts to identify, define, assess and evaluate emerging sensor and payload concepts for potential to provide significant operational benefit. Determine the development and transition path to bring technologies to the future submarine combatants.
- ($.500) Test & Evaluation - Conduct APB(T) -01 sea tests, HF sea tests, and hull array testing. Conducted Towed Array APB lake test. Continued at-sea data gathering program. Initiated planning for HF APB Sea Test.

$61.184 TOTAL

EXHIBIT R-2a, RDT&E Project Justification							DATE:	**June 2001**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223/S0223					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002							
Project Cost	**76.640**	**66.569**	**61.309**							
RDT&E Articles Qty										

B. (U) Other Program Funding Summary: Not applicable.

(U) Related RDT&E: Not applicable.

C. (U) Acquisition Strategy: Plan to use competitively awarded contracts from Board Agency Announcement (BAA) solicitations.

EXHIBIT R-2a, RDT&E Project Justification							DATE: **June 2001**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223/S0223					
COST ($ in Millions)	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	Cost to Complete	Total Cost
Project Cost	**76.640**	**66.569**	**61.309**	**59.115**	**61.190**	**53.401**	**59.600**	**60.933**	**CONT.**	**CONT.**
RDT&E Articles Qty										

D. (U) Schedule Profile:

	FY 2000	FY 2001	FY2002
Program Milestones	4Q - SFMPL 6.1 Complete 3Q -APB(A)-99 & HF APB99 transition	1Q - HF Transition to PUMA/APB(A) - 01 2Q - APB(A)-00 Transition 2Q - APB(A)-01 LF Transition 4Q - CAVES LVA Transition Decision	1Q - APB(A/T)-01 Transition 4Q - APB (A)-02 Transition Initiated
Engineering Milestones	1Q - Initiate APB(A)-01 LF 3Q - Complete APB(A)-00 Dev. 1Q - Initiate APB(T)-01 4Q -3-line MLTA CDR	1Q - Deliver SFMPL 6.1 1Q - Initiate APB(A)-02 3Q - MLTA System Integration	1Q - Initiate APB(T)-02 4Q - IBC Bow Structure Design Complete 3Q - APB(A)-03 initiated
Test & Evaluation Milestones	3Q - HF APB99 Sea Test 3Q - APB(A)-99 Sea Test 4Q - Initiate APB(A)-00 Test	4Q - CACTISS III Test 4Q - CAVES Patch Sea Test 4Q HF APB 01 Sea Test 4Q - APB(A/T)-01 Test 3Q - 3-line MLTA Self Noise Test	1Q - HF Transition 3Q - CACTISS III Final Report 3Q - CAVES Patch Final Report 3Q - 3 BB Active Sonar Test 4Q - Complete 1/4 scale bow dome Test 2Q - 3-line MLTA Sea Test 3Q - APB(A)-02 Test Complete 4Q - APB(T)-02 Sea Test

Exhibit R-3 Cost Analysis (page 1)								DATE: **June 2001**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Advanced Submarine Sys Dev/0603561N**			PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223/S0223						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date			
Product Development	WR	NUWC Newport, RI	0.000	23.148	10/99	20.417	10/00	18.508	10/01			
Product Development	RCP	NUWC Newport, RI	0.000	0.500	04/00	0.500	-	0.500	-			
Product Development	WR	NRL/Washington	0.000	1.900	10/99	1.000	10/00	0.000	10/01			
Product Development	RCP	NRL/Washington	0.000	0.240	12/99	0.250	-	0.000	-			
Product Development	WR	NSWC Carderock, MD	0.000	5.082	10/99	2.750	10/00	1.250	10/01			
Product Development	RCP	NSWC Carderock, MD	0.000	0.036	12/99	0.000	-	0.000	-			
Product Development	WR	NCCOSC San Diego, CA	0.000	0.000	10/99	0.160	10/00	0.000	-			
Product Development	PD	ONI, Washington	0.000	0.735	06/00	0.183	12/01	0.150	12/02			
Product Development	C/CPFF	Lockheed-Martin,VA	0.000	3.371	11/99	3.250	-	3.000	-			
Product Development	C/CPFF	Sanders Assoc. (L-M),NH	0.000	0.902	11/99	1.000	11/00	0.750	11/01			
Product Development	RCP	NSMA	0.000	0.150	03/00	0.180	-	0.180	-			
Product Development	MIPR	U.S. Army/MITRE	0.000	1.740	12/99	1.750	12/00	1.750	12/01			
Product Development	MIPR	U.S. Air Force/MIT Lincoln Labs	0.000	1.500	12/99	1.000	12/00	1.000	12/01			
Product Development	RCP	ONR/MCCI/METRON	0.000	1.200	01/00	1.200	01/01	0.750	12/01			
Product Development	C/CPFF	Progeny, VA	0.000	0.400	11/99	0.750	-	1.000	-			
Product Development	C/CPFF	BBN, VA	0.000	0.810	12/99	0.500	-	0.000	-			
Product Development	RCP	ONR/GTRI	0.000	1.050	11/99	1.000	01/01	0.000	-			
Product Development	SS/CPFF	ARL/JHU, MD	0.000	6.895	12/99	5.500	01/01	6.000	01/02			
Product Development	SS/CPFF	APL/UW, WA	0.000	0.025	04/00	0.050	12/00	0.050	12/01			
Product Development	SS/CPFF	ARL/UT, TX	0.000	5.890	12/99	7.000	01/01	6.750	12/01			
Product Development	SS/CPFF	ARL/PSU, PA	0.000	0.825	12/99	0.350	12/00	0.350	12/01			
Product Development	MD	ARL/PSU, PA	0.000	0.357	01/00	0.150	01/01	0.185	01/02			
Product Development	WR	NAVAIR PAX/NSWC Indian H	0.000	0.040	01/00	0.000	-	0.000	-			
Product Development	WR	SPWAR, CA	0.000	0.206	10/99	0.200	10/00	0.200	10/01			
Product Development	C/CPFF	DSR, VA	0.000	4.500	12/99	4.500	12/00	5.000	-			
Product Development	C/CPFF	TWD Associate, VA	0.000	0.000	01/00	0.000	-	0.000	-			
Product Development	C/CPFF	Electric Boat, CT	0.000	5.603	01/00	0.000	-	0.000	-			
Product Development	CPFF	NNS, VA	0.000	0.000	01/00	0.000	-	0.000	-			
Product Development	MIPR	DARPA, VA	0.000	0.000	-	9.000	12/00	9.600	12/01			

Exhibit R-3 Cost Analysis (page 1)								DATE: **June 2001**				
APPROPRIATION/BUDGET ACTIVITY		PROGRAM ELEMENT				PROJECT NAME AND NUMBER						
RDT&E, N/BA-4		**Advanced Submarine Sys Dev/0603561N**				Advanced Submarine Combat Systems Development/V0223/S0223						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date			
SBIRs / BAAs	C/CPFF	Various	0.000	5.584	Various	0.384	Various	1.291	Various			
Advanced Towed Array BAA	C/CPFF	Lockheed Martin, NY	0.000	1.315	12/99	0.000	-	0.000	-			
Product Development	Various	Various	0.000	0.811	Various	1.000	Various	1.000	Various			
Subtotal Product Development			0.000	74.815		64.024		59.264				
Remarks:												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support			0.000	0.000		0.000		0.000				
Remarks: This is a Non Acquisition Program which therefore includes no indirect support costs.												

Exhibit R-3 Cost Analysis (page 2)								DATE: **June 2001**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Advanced Submarine Sys Dev/0603561N**			PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223/S0223						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	FY 02 Cost	FY 02 Award Date			
Developmental Test & Evaluation	WR	NUWC Newport, RI	0.000	0.425	10/99	0.450	10/00	0.450	10/01			
Developmental Test & Evaluation	Various	Various	0.000	0.050	Various	0.050	Various	0.050	Various			
Operational Test & Evaluation												
GFE												
Subtotal T&E			0.000	0.475		0.500		0.500				
Remarks:												
Program Management Support	C/CPFF	Integrated Product Dec, CT	0.000	0.200	Various	0.250	Various	0.250	Various			
Program Management Support	C/CPFF	Stanley Associates, VA	0.000	0.900	12/99	1.750	12/00	1.250	12/01			
Program Management Support	Various	Various	0.000	0.200	Various	0.000	-	0.000	-			
Government Engineering Support												
Travel				0.050		0.045		0.045				
Overhead												
Subtotal Management			0.000	1.350		2.045		1.545				
Remarks:												
Total Cost			0.000	76.640		66.569		61.309				
Remarks:												